SLATS Passenger Rail Study

Prepared for

Stateline Area Transportation Study

February 2021

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Prepared for:

Stateline Area Transportation Study

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Final Report submitted:

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Statement on COVID-19

The decision to conduct this study was made in fall 2019 with the goal of having study results in time for the SLATS 2045 LRTP update (beginning in early 2021). The COVID-19 pandemic has created many challenges for the transportation industry, resulting in a host of uncertainties. The long-term impacts of the pandemic on travel demand and commute patterns were not clear at that time of this study. The evaluation and market analysis contained in this report reflects pre-pandemic conditions, and conclusions should consider these uncertainties.

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Abbreviations

ACS	Census American Community Survey
ADA	Americans with Disabilities Act
API	Application Programming Interface
BART	San Francisco Bay Area Rapid Transit District
BTS	Beloit Transit System
BRT	bus rapid transit
CN	Canadian National Railway
CP	Canadian Pacific Railway
CCCR	Chicago & Chemung Connecting Railroad
CHGL	Chemung & Geneva Lake Railway
CMAP	Chicago Metropolitan Agency for Planning
CMStP&P	Chicago, Milwaukee, St. Paul & Pacific Railroad Company
C&NW	Chicago & NorthWestern Railway Company
CTA	Chicago Transit Authority
CUS	Chicago Union Station
CTPP	Census Transportation Planning Products
DMU	diesel multiple-unit vehicles
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GTFS	General Transit Feed Specification
HH	Households
ICE	Iowa, Chicago and Eastern Railroad
IC	Illinois Central Railroad
IDOT	Illinois Department of Transportation
IR	Illinois Railway, Inc.
JAMPO	Janesville Area Metropolitan Planning Organization
JTS	Janesville Transit System
jct.	junction
k	thousand
LAZ	Local Allocation Zone
LPA	Locally Preferred Alternative
LRTP	Long Range Transportation Plan
LODES	Longitudinal Origin-Destination Employment Statistics
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MDN	Metra Milwaukee District North Line
MDW	Metra Milwaukee District West Line
MWRRP	Midwest Regional Rail Planning Study
NTD	FTA's National Transit Database
NICRI	Northern Illinois Commuter Rail Initiative
NIRCRC	Northeast Illinois Regional Commuter Railroad Corporation
NNEPRA	Northern New England Passenger Rail Authority
OTC	Ogilvie Transportation Center
OLS	ordinary least squares regression
O-D	origin-destination
RTA	Northeastern Illinois Regional Transportation Authority
RTD	Regional Transit District
RMTD	Rockford Mass Transit District
STOPS	Simplified Trips-on-Project Software
SMART	Sonoma-Marin Area Rail Transit
SLATS	Stateline Area Transportation Study
SMTD	Stateline Mass Transit District
TAZ	Traffic Analysis Zone
UP	Union Pacific Railroad
UP-NW	Metra Union Pacific Northwest Line
WisDOT	Wisconsin Department of Transportation
WSOR	Wisconsin & Southern Railroad

Executive Summary

The Stateline Area Transportation Study (SLATS) is the federally designated Metropolitan Planning Organization (MPO) for the Beloit, WI urbanized area. Since early 2000, SLATS has explored the possibility of extending passenger rail service to the region as part of studies in 2002 and 2008. As more than a decade has passed since the last study, and in preparation for the upcoming Long Range Transportation Plan (LRTP) update, SLATS determined that it was an appropriate time to revisit the feasibility of extending passenger/intercity and/or commuter rail to the Stateline Area (it should be noted that this decision was made pre-COVID-19).

The closest rail service to SLATS is the Metra station located in Harvard, IL which provides commuter service along the Union Pacific-Northwest (UP-NW) line. IDOT has also advanced plans to restore intercity passenger rail service between Rockford and Chicago. Primary factors in studying passenger rail service to the Stateline Area is the potential benefits associated with improving workforce mobility, supporting economic development, expanding alternative travel options, reducing roadway congestion, and encouraging compact development patterns.

Data on commuter origins, destinations, and travel modes were gathered from the Census Transportation Planning Products (CTPP) using the most current five-year estimates (2012-2016). This data was combined with year 2050 regional population and employment projections to evaluate ridership potential at a high level of analysis. A progressive screening process was used to evaluate previously identified rail alignments and five viable study corridors. These included an extension of the Metra UP-NW to Beloit, an extension of rail service from Harvard to Madison (no direct connection to Beloit), and a new rail service connecting Rockford to Madison (with service through Beloit). The alternatives to Madison included two route variations between Janesville and Madison.

The Harvard-Beloit extension showed very low ridership potential and was dropped from consideration. The remaining four alignments showed ridership that ranged from approximately 850 to 2,150 passenger trips per day. The higher end of this range was found to be comparable to some existing passenger rail operations nationally, although these systems generally have the lowest levels of ridership and cost-effectiveness among all commuter rail systems.

While all stations along the potentially viable rail alignments contribute to the overall demand for each route, the single most important source of demand appeared to be from the concentration of jobs in proximity to a potential Madison station.

In conclusion, additional analysis would be required to identify the most appropriate passenger rail alignment option within the region. Some important factors for consideration include:

- Implementation will require the active involvement of all major governmental units affected, including the states (Wisconsin and Illinois), counties, local governments, other MPOs, and other regional stakeholders.
- The willingness of railroad owners to consider hosting a passenger rail service.
- Existing and future rail network capacity for passenger and freight needs.
- Alignment capital cost, including any right-of-way needs for stations and other supportive infrastructure (e.g., track/signal upgrades, rolling stock, yards, maintenance facilities).
- An identified funding source to sustain the ongoing operational and maintenance of the service.

1. Overview

1.1 Stateline Area Transportation Study

The Stateline Area Transportation Study (SLATS) is the federally designated Metropolitan Planning Organization (MPO) for the Beloit, WI urbanized area (as defined by the US Census Bureau). The SLATS planning process considers the safe and efficient movement of people, services and freight by all modes of travel including streets and highways, public transportation, commuter railways, bicycle and pedestrian as well as intermodal connections for freight and passengers between ground transportation, waterways and airports as applicable, and railroads.

SLATS is directed and governed by a Policy Board that includes representation from the City of Beloit, Town of Beloit, Town of Turtle and Rock County in Wisconsin, and the City of South Beloit, Village of Rockton, Rockton Township, and Winnebago County in Illinois. Representation on the Policy Board also includes the Wisconsin Department of Transportation (WisDOT) and the Illinois Department of Transportation (IDOT).

A Technical Advisory Committee that includes public works officials, engineers, planners and administrators from the member municipalities and counties, as well as local public transit representatives (Beloit Transit System and Stateline Mass Transit District (SMTD)) advise the Policy Board on transportation issues of a regional nature. Additional non-voting members include Federal Highway Administration (FHWA), Federal Transit Administration (FTA), WisDOT, IDOT, adjacent MPOs (Janesville, WI and Rockford, IL) and non-member municipalities with land included in the SLATS Metropolitan Planning Area (MPA).

1.2 Study Background and Purpose

The SLATS MPA does not have passenger rail service that operates within the planning boundary; however, a Metra rail station is located to the east of the MPA in nearby Harvard, IL Metra, the commuter rail service connecting to the Chicago Metropolitan area, provides service via the Union Pacific-Northwest (UP-NW) line. Most recently, IDOT has developed plans to restore intercity passenger rail service between Rockford and Chicago for the first time in four decades. The Chicago to Rockford route is expected to follow Metra's Milwaukee District West Line from Chicago's Union Station to the Big Timber Station in Elgin and then the Union Pacific (UP) Belvidere Subdivision line to Rockford, with stops in Huntley and Belvidere.

Since early 2000, SLATS has explored the possibility of extending passenger rail service to the Beloit area. A 2002 study (*Metra – UP Northwest Line Harvard, Illinois / Clinton, Wisconsin Commuter Rail Extension Feasibility Study*) examined existing conditions, potential ridership, and alternative transit service options, including a Beloit and Janesville shuttle bus. The study concluded that the Metra extension from Harvard, IL to Clinton, WI appeared to be financially and technically feasible.

In 2008, the *South Central Wisconsin Commuter Transportation Study* (SCWCTS) examined the concept of extending passenger rail service to the Janesville/Beloit area. The primary motivation behind the study involved boosting economic development ties between the Rock County region and Northeast Illinois by improving commuter rail connections. The SCWCTS concluded that the extension of commuter rail should be examined at a future time as transportation conditions in the region evolved.

As more than a decade has passed since the 2008 SCWCTS, and in preparation for the upcoming Long Range Transportation Plan (LRTP) update, SLATS determined that it was an appropriate time to revisit the feasibility of extending passenger/intercity and/or commuter rail to the Stateline Area, either by connecting directly to a station located within the SLATS MPA, or through service connecting to an adjacent area.

A primary factor in studying passenger rail service is the potential to provide a number of benefits to the SLATS area, including improving workforce mobility, supporting economic development, expanding alterative travel options, reducing roadway congestion, encouraging more compact development patterns (e.g., transit-oriented development), and providing environmental benefits—all consistent with the SLATS 2040 LRTP goals and objectives. (Note: SLATS is preparing to start the 2045 LRTP update in early 2021.)

To this end, the SLATS Rail Study builds on prior research to evaluate previously identified potential passenger rail alignments, and to determine the market feasibility of introducing passenger rail service on the identified alignments. Another important component of this study was to explore the potential impact that future (year 2050) population and employment could have on passenger rail ridership, and the overall feasibility of passenger rail service within the region.

Statement on COVID-19

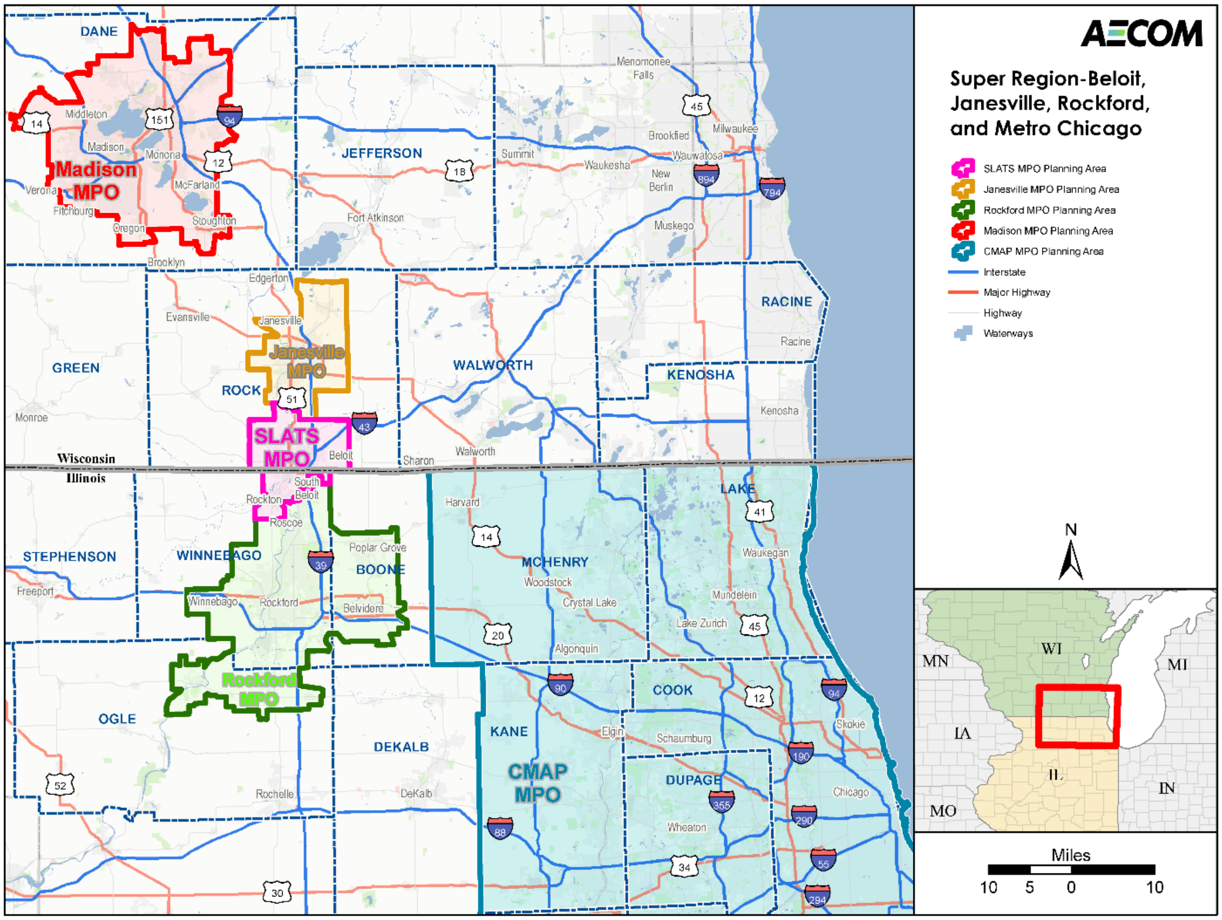
The decision to conduct this study was made in fall 2019 with the goal of having study results in time for the SLATS 2045 LRTP update. Since this time, the COVID-19 pandemic has created many challenges for the transportation industry, resulting in a host of uncertainties. The long-term impacts of the pandemic on travel demand and commute patterns are not clear at this time. The evaluation and market analysis contained in this report reflects pre-pandemic conditions, and conclusions should consider these uncertainties.

1.3 Study Area

In defining the SLATS Rail Study area, the project team believed that it was important to explore potential rail alignments that extended beyond the immediate SLATS MPA. The primary consideration was that an extension of passenger rail service terminating in Beloit by itself may not be feasible; however, an alignment through Beloit and continuing to Janesville, Madison, or possibly connecting to Rockford, could potentially yield different results. Furthermore, the proximity to the Chicago metropolitan region was considered to be important to the market analysis, especially given the extensive passenger rail service operating in the region. As such, the study area includes the SLATS MPA and the following nearby MPOs, which is generally referred to as the “super region” throughout this study (Figure 1-1):

- Chicago Metropolitan Agency for Planning (CMAP)
- Greater Madison MPO
- Janesville Area Metropolitan Planning Organization
- Region 1 Planning Council (Rockford)

Figure 1-1. Super Region – Beloit, Janesville, Rockford, Metro Chicago



1.4 Study Methodology Overview

The SLATS Rail Study methodology includes a high-level travel market analysis to determine the potential demand for passenger rail service. The data that were used for this analysis represent pre-COVID travel patterns. In addition to the base year existing conditions, a future year scenario was also considered to be an important part of the study and, as such, year 2050 conditions are included. While current conditions may not be likely to justify passenger rail service, 2050 conditions might prove more promising. Furthermore, the lead time to plan, design, engineer, and construct passenger rail service often takes decades to turn the vision into reality. By focusing this analysis on 2050 conditions, it provides SLATS the opportunity to identify next steps should the results indicate that passenger rail service within the super region is potentially feasible. Future planning work that would be required to further advance potential passenger rail service beyond this high-level market analysis would include: travel demand forecasting, operational analysis, capital costing, financial modeling, among other activities.

The study methodology consisted of the following activities:

- Assess existing and future transportation conditions
- Define possible rail corridors and stations to study, building on previous studies
- Collect and analyze future socioeconomic data from affected MPOs

- Determine appropriate alignment and station market sheds (i.e., areas where rail service can draw riders)
- Analyze regional and alignment-specific work travel flows
- Determine ridership potential for each of the alignments
- Develop appropriate thresholds or benchmarks to evaluate alignment ridership results
- Summarize results, and recommend next steps

It should be noted that the analysis performed assumed that the passenger rail service would have the characteristics of the commuter rail mode, that is, focus of travel on a center city with frequent and fast peak period service and less frequent service during off-peak periods. In addition, most riders are traveling for the purpose of work. The analysis would not be reflective of intercity passenger rail service, which is characteristic of less frequent service and longer-distance, non-work travel. A third rail passenger mode called hybrid rail has characteristics of light rail and commuter rail, with service frequencies being more consistent throughout the service day. Since work travel would likely be a significant component of the travel market served, the report's findings would likely be generally reflective of hybrid rail.

1.5 Relevant Prior Planning Studies

This section provides a summary of prior plans and studies that are relevant to the SLATS Rail Study. The identification of these studies serves as a baseline for research and key considerations that the SLATS Rail Study can build upon. Current links (active at the time of this report, December 2020) are provided as an additional reference.

- **Metra – UP Northwest Line Commuter Rail Extension Feasibility Study (2002)** | This study was prepared for the Village of Clinton and Rock County to evaluate the physical and operational feasibility of extending the Metra UP-NW line from Harvard, IL to Clinton, WI. The study concluded that the service extension would be feasible and would require a capital cost investment of $18.8 million. Ridership estimates were developed based on demographic data and a survey. Estimated ridership totaled 300 per day in 2001, with growth to 500 by 2020. The full report can be found at Metra UP-NW Extension.
- **South Central Wisconsin Commuter Transportation Study (SCWCTS) (2008) |** The SCWCTS was funded by a WisDOT grant, and was overseen by a Steering Committee represented by the municipalities of Beloit, Clinton, Janesville, and Sharon, as well as the MPOs of Beloit (SLATS) and Janesville (i.e., Janesville Area MPO (JAMPO)), Rock County and WisDOT. The study addressed regional transportation issues and opportunities for improvement for the 11-county Madison-Rockford-Chicago area. Improvements explored a range of options, including introducing passenger rail service, express bus service, and enhancements to the privately-operated Van Galder Coach USA bus service, which serves Madison to downtown Chicago and O'Hare Airports by way of Janesville, South Beloit, and Rockford. Potential rail lines and station locations identified in the SCWCTS are used as the starting point of analysis contained in this study. The SCWCTS Executive Summary can be found at SCWCTS Executive Summary.
- **Wisconsin State Rail Plan** | The 2050 Wisconsin State Rail Plan was being prepared at the time of this study. Information regarding the plan development can be found at WI Rail Plan 2050. The 2030 Plan, prepared in 2014 and located at WI Rail Plan 2030,

describes WisDOT's role in commuter rail service (i.e., to provide financial and technical support) and summarizes planning initiatives in Madison (*Transport 2020*) and the SCWCTS.

- **Illinois State Rail Plan Update (2017)** | The 2017 Illinois State Rail Plan Update report provides information on intercity and commuter passenger rail services and future plans within the State. This includes a reference to the SLATS 2040 LRTP, as well as a recommendation that SLATS maintain an ongoing coordination with WisDOT and IDOT to develop performance measures that can be used to evaluate progress toward implementing the SLATS regional vision for implementing a future passenger rail service. The plan is located at IL Rail Plan 2017.

- **Northern Illinois Commuter Rail Initiative (NICRI) (2004)** | This study evaluated the feasibility of initiating new commuter rail service between Rockford and the end of the existing Metra Milwaukee District West (MDW) Line at the Big Timber Station (west of Elgin). The study examined existing railroad operating conditions, anticipated improvements necessary to support commuter rail operations, potential station and yard locations, potential commuter rail ridership, anticipated operating revenue and costs, potential funding sources, and recommendations for next steps for implementation. The feasibility study is located at NICRI.

- **Feasibility Report on Proposed Amtrak Service Chicago-Rockford-Galena-Dubuque (2007)** | This report was prepared by Amtrak at IDOT's formal request for a feasibility study regarding possible passenger service between Chicago-Rockford, Galena and Dubuque. The study evaluated four rail alignments, and estimated costs and ridership for each. An analysis of costs and demand of a shorter route to Rockford was also included. The plan was coordinated with the NICRI study, although it was noted that this study assumed an intercity level of service (i.e., one round trip per day), while the commuter rail service assumptions for the NICRI called for more trains per day, especially during peak commuting times. In addition to higher frequencies, the commuter plan assumed more stations, higher operating speeds, parking at stations, and additional rolling stock. The report is located at Amtrak Study.

- **Stateline Area Transportation Study 2040 Long Range Transportation Plan (2016)** | As a recipient of federal funding to carry out metropolitan transportation planning, SLATS is required to prepare a LRTP that covers a minimum 20-year planning horizon. The 2040 LRTP includes long- and short-range strategies that lead to the safe and efficient movement of people and goods. The plan is multimodal, covering roadways, public transit, non-motorized transportation, and freight and intermodal connectivity. Findings of the SCWCTS report are noted, that is, commuter rail should be examined at a future time as transportation conditions in the region continue to evolve. It was noted that preservation of corridors identified in the SCWCTS should be a priority based on potential future use of passenger rail. The report is located at SLATS 2040 LRTP. In addition, SLATS is preparing to start the 2045 LRTP update in early 2021.

- **Janesville Area 2015-2050 Long Range Transportation Plan (Freight Section) (2016)** | Similar to SLATS, the Janesville Area MPO is required to prepare an LRTP as a tool for developing safe and efficient multimodal transportation improvements. A relevant section of the plan covered freight and noted a concern about two freight rail lines serving Janesville. This includes the UP line between Evansville and Harvard, which provides the only higher-speed rail access to the region but suffered a great loss of traffic with the closure of the Janesville General Motors plant in 2009. The Iowa, Chicago and Eastern (ICE) line owned by the Canadian Pacific Railway (CP) between Janesville and South Beloit is also noted as this line has minimal traffic but provides the only direct north-south rail access between Janesville and Beloit and continuing onto the Rockford area. The LRTP notes that a proposed abandonment of either line would require a response in line with the adopted policy of the MPO to preserve railroad corridors. The LRTP also states that future requests for potential commuter rail service within the MPA should be evaluated and consider necessary improvements to allow both freight and passenger modes to operate in shared corridors. The freight section of the plan is located at JAMPO 2050 LRTP Freight.

- **2050 Metropolitan Transportation Plan for the Rockford Region (2020)** | The LRTP for the Rockford region addresses all transport modes and complies with federal and state metropolitan planning requirements. Of interest is the discussion of intercity and commuter rail services. A timeline of passenger rail planning history dating back to 2002 is included. The passage of the 2019 Rebuild Illinois Capital Plan that provides $275 million to restore intercity service between Rockford and Chicago is noted. The LRTP also indicates that the State-funded project will provide the initial infrastructure needed for commuter rail service, as outlined in the NICRI reports. The report is located at Rockford 2050 LRTP.

- **Madison Transport 2020 Federal Transit Administration (FTA) New Starts Application (2008)** | The City of Madison, Dane County and WisDOT applied for funding in 2008 under the FTA's New Starts program to implement an initial phase of the Transport 2020 plan, a long-term, multimodal system consisting of commuter rail, express bus services, park-n-ride lots, and improvements to local bus service. The FTA application included the Locally Preferred Alternative (LPA) of a 16-mile commuter rail line operating within an existing freight rail corridor between the City of Middleton and an area just southwest of the City of Sun Prairie, directly through the Isthmus of the City of Madison. The application is discussed at Transport 2020. As part of the proposed rail initiative, a regional transportation authority was being formed under state enabling legislation. However, the authorizing legislation was repealed by the State in 2011, and the Transport 2020 application was withdrawn. Since then, Madison has been pursuing FTA funding for a bus rapid transit (BRT) line (see East-West BRT Project).

- **Metra UP-NW Line Locally Preferred Alternative (2007)** | The purpose of this Metra report was to describe the LPA for improvements to the UP-NW line as a step towards seeking an FTA New Starts grant. The recommended improvements included a short extension of the McHenry Branch to Johnsburg, new rail yards in Woodstock and Johnsburg, upgrade of the Harvard yard, track and signal improvements, expanded parking at selected stations, two new stations, and new rolling stock. The report is located at UP-NW LPA. It is understood that Metra is no longer actively seeking federal funding for this project.

- **Federal Railroad Administration (FRA) Midwest Regional Rail Planning Study (in-progress)** | The FRA initiated the Midwest Regional Rail Planning Study (MWRRP) in 2016 to develop a comprehensive vision for an integrated regional rail network and a governance model that could be used by the states to advance planning, procurement, and operations for passenger rail service. The study, which is scheduled to be completed in 2020, will provide a strategic framework to 2055 for the Midwest passenger rail network, service, financing, and governance. The study's website is located at Midwest Rail Plan. The plan includes a robust stakeholder involvement process, engaging Midwest stakeholders to help guide study elements and provide input and feedback on the plan. An event webpage provides details on the engagement activities (Rail Plan Events).

2. Existing Transportation Conditions

A variety of transportation modes are available in the larger study area that includes three counties in Wisconsin, Boone and Winnebago in Illinois, and the 7-county Chicago metropolitan area. The most commonly used travel mode for commuting is the auto, as indicated in Table 2-1. Of particular relevance to this study are the transit services in the study area, including public and private transit operations and passenger rail services.

Table 2-1. Commute Travel Modes

Residence Area	Total Commuters	Personal Vehicle	Transit	Bike, Walk, & Other	Worked at Home	Total
Dane, Rock, Walworth, WI	413,365	84.3%	3.9%	7.4%	4.4%	100.0%
Boone & Winnebago, IL	153,938	93.4%	1.1%	2.0%	3.6%	100.0%
7-County Chicago Metro	4,068,070	77.3%	12.9%	5.1%	4.8%	100.0%
Total	4,635,373	78.4%	11.7%	5.2%	4.7%	100.0%

Source: Census Transportation Planning Package (CTTP) 2012-2016.

2.1 Public Transit Services

There are seven public transit agencies that serve the larger eleven-county study area. To provide a sense of the variety of transit modes offered and the relative scale of their operations, Table 2-2 presents reported 2019 annual unlinked passengers trips from the FTA's National Transit Database (NTD). (Note: unlinked trips represent total boardings on an individual vehicle.) As shown, five different modes are provided; two bus-based services (i.e., fixed-route bus and demand response), two rail-based services (i.e., heavy rail/rapid transit and commuter rail), and vanpool. The Chicago Transit Authority (CTA) dominates as that largest transit agency, while the Beloit and Janesville operations are the smallest in terms of ridership.

Table 2-2. 2019 Annual Unlinked Passenger Trips by Agency and Mode (*in thousands*)

Agency	Bus	Heavy Rail	Commuter Rail	Demand Response	Vanpool	Total
Beloit Transit System	93			3		96
Stateline Mass Transit District				*Not reported*		
Janesville Transit System	455			6		462
Madison Metro Transit	12,857			113		12,970
Rockford Mass Transit District	1,519			131		1,651
Chicago Transit Authority	237,276	218,467				455,744
Metra			61,457			61,457
Pace Bus	26,192			4,976	1,361	32,529

Source: FTA 2019 National Transit Database. Blank values denote that no trips were reported within the mode category. Stateline Mass Transit District did not report any trip data to the National Transit Database.

A description of the agencies, and how each could be relevant to a SLATS passenger rail service follows.

- **Beloit Transit System** | The Beloit Transit System (BTS) is a division of the City of Beloit and provides fixed-route bus service on six routes and jointly operates the intercity Beloit-Janesville Express route with the Janesville Transit System (JTS). BTS contracts with Rock County Transit to provide paratransit service. The system is supported by the

Beloit Transfer Center located southwest of downtown Beloit. BTS could provide first/last mile connections to a potential rail service. A link to the website is at BTS.

- **Stateline Mass Transit District** | The Stateline Mass Transit District (SMTD) was created in 2008 to serve transportation needs in the area of South Beloit, Rockton, Roscoe, Roscoe Township and Rockton Township in north Winnebago County, IL. SMTD provides general population demand response service within its defined service area as well as connections to services of the BTS and Rockford Mass Transit District (RTMD) at specific transfer locations. SMTD service is operated by RMTD under an intergovernmental agreement. A link to the website is at SMTD.

- **Janesville Transit System** | The JTS is operated as a department of the City of Janesville. JTS provides regular bus service on six routes within Janesville and the co-operated Beloit-Janesville Express with BTS. The JTS Downtown Transfer Center, located at 123 South River Street, provides the opportunity to make convenient connections between routes. JTS contracts with Rock County Transit to operate paratransit service. JTS could provide first/last mile connections to a potential rail service. A link to the website is at JTS.

- **Madison Metro Transit** | The Madison Metro system operates as a department of the City of Madison and serves Madison and surrounding communities in the greater Madison area. The system includes 47 bus routes. Shared-ride paratransit services is also provided using a variety of companies and vehicles to respond to individual ride requests. Metro service could provide first/last mile connections to a future rail service. A link to the website is at Metro.

- **Rockford Mass Transit District** | The RMTD provides fixed-route and paratransit bus service to Rockford and the nearby communities of Loves Park, Machesney Park, and Belvidere. The fixed-route bus system include 17 routes. Two transfer centers serve the network of bus routes, including: Downtown Transfer Center (501 W. State) and East Side Transfer Center (725 N. Lyford Road). The East Side facility is shared with interstate transportation providers, including: Coach USA/Van Galder Bus Lines, Greyhound, and Burlington Trailways. RMTD could provide first/last mile connections to a potential rail service in the study area. A link to the website is at RMTD.

- **Regional Transportation Authority** | The Regional Transportation Authority (RTA) is the agency charged with financial oversight, funding, and regional transit planning for the Chicago region's Service Boards (i.e., transit operators): the CTA, Metra, and Pace Suburban Bus. The RTA service area includes Cook, DuPage, Kane, Lake, McHenry, and Will Counties of northeastern Illinois. A link to the website is at RTA-Chicago.

- **Chicago Transit Authority** | The CTA operates the nation's second largest public transportation system and covers the City of Chicago and 35 surrounding suburbs. The CTA is an independent governmental agency created by state legislation and is one of three Service Boards of the RTA. The CTA system includes over 120 bus routes and 8 rapid transit lines. If a SLATS rail study advances an option to extend or connect to a Metra commuter rail line, CTA could provide last-mile links. A link to the website is at CTA.

- **Metra** | Metra is the agency responsible for day-to-day operations, fare and service levels, capital improvements, and planning for the 11-line commuter rail network serving northeastern Illinois. Metra was established as part of the legislation authorizing the RTA, which included provision for a railroad operating division, the Northeast Illinois Regional Commuter Railroad Corporation (NIRCRC). "Metra" has been used as the service mark for the agency since 1985. Metra also is another of the three service boards of the RTA. Metra owns and operates service on four of the system's eleven lines (Electric, Milwaukee North and West, and Rock Island), operates three lines under lease agreements with host freight carriers (Heritage, North Central Service, and SouthWest Service), and purchases service for four lines (BNSF, Union Pacific North, Northwest and West). Additional information on the three Metra lines that are especially relevant to this study follow. A link to the website is at Metra.

- **Milwaukee District North** | The Milwaukee District North (MDN) Line extends 49.5 miles northwest from Chicago Union Station (CUS) in downtown Chicago to the Fox Lake Station, serving 20 intermediate stations. The Line provides a full complement of weekday and weekend service. The MDN is owned and directly operated by Metra. Tracks continue beyond Fox Lake that are owned by another public agency and are used for freight operations by the Wisconsin & Southern Railroad (WSOR) to Janesville and points beyond.

- **Milwaukee District West** | The Milwaukee District West (MDW) Line extends 39.8 miles from CUS to the Big Timber Station in Elgin, serving 22 intermediate stations. The line provides a full complement of weekday and weekend service. The MDW is owned and directly operated by Metra. West of the Big Timber Station, the tracks continue under CP ownership and freight operation. About one mile west of the MDW Big Timber terminal, the CP tracks cross over the UP Belvidere Subdivision freight line. This UP segment of rail route is proposed for upgrade as part of the 2019 Rebuild Illinois Capital Plan that provides $275 million to restoring intercity passenger rail service between Rockford and Chicago. East of this rail line crossing, the intercity service will use the MDW Line.

- **Union Pacific Northwest** | The UP-NW Line extends northwest from Ogilvie Transportation Center (OTC) in downtown Chicago to McHenry County, serving two terminals: the Harvard Station (63 miles from OTC at the end of the Line's main line) and the McHenry Station (51 miles from OTC at the end of the 7-mile McHenry Branch). A full complement of service is provided on the UP-NW main line, serving twenty intermediate stations. Service on the McHenry Branch is limited to weekday peak periods. A single track continues west from Harvard to Janesville under UP ownership and is used for freight rail traffic. This line was studied in 2002 for a possible extension to Clinton, WI and the SCWCTS in 2008.

❖ **Pace Suburban Bus** | Pace is one of three Service Boards of the RTA and provides bus-based services for suburban areas of the 6-county Northeastern Illinois region as well as the Americans with Disabilities Act (ADA) Paratransit service for the entire metropolitan region, including the CTA service area. Pace operates a family of public transportation service types, including over 200 fixed-route bus, eleven designated areas with general population on-demand service, vanpool, dial-a-ride services, and ADA paratransit. Pace has an ambitious program of bus rapid transit routes, branded under the name Pulse. The first Pulse line to open was Milwaukee Avenue in 2019. Pace also manages the Chicago region's ride-matching program for formation of carpool and vanpools. Pace service could provide last-mile links to a future Beloit-area rail service that linked to Chicago. A link to the website is at Pace Bus.

2.2 Intercity Services

Intercity services include bus and passenger rail. Intercity bus service typically carries passengers significant distances between different cities, towns, or other populated areas. Unlike a fixed-route transit bus service, which has frequent stops throughout a city, an intercity bus service generally has a single stop at one location in or near a city and travels long distances without stopping. Intercity passenger rail services cover longer distances than commuter or regional trains, and typically operates on a limited-stop basis.

- ❖ **Coach USA Van Galder Bus Service** | Van Galder Bus Company provides intercity express bus service for southern Wisconsin and northern Illinois to O'Hare Airport and Downtown Chicago. Stop locations are listed in Table 2-3. Van Galder also operates Amtrak Thruway Bus Service, using these same stops (with the exception of O'Hare Airport). The Thruway program extends the reach of Amtrak service to communities without rail service and offers a wider selection of destinations. Amtrak Thruway service includes guaranteed connections to Amtrak trains, through-ticketing, and reservations. A link to the website is at Van Galder.

Table 2-3. Van Galder Bus Service Stops

Stop	Location	Park-n-Ride
University of Wisconsin-Madison	Gordon Center, 250 N. Lake St.	No
Dutch Mill Park-n-Ride, Madison	Highway 51 & Broadway	Yes
Van Galder Janesville Terminal	I-90 & U 14 (Humes Road)	Yes
FasMart, South Beloit	I-90 & IL 75	Yes
Van Galder Rockford Terminal	I-90 & State Street (Business US 20)	Yes
O'Hare International Airport	Departure Level of Terminals 1/2/3/5	No
Chicago Union Station	225 South Canal	No

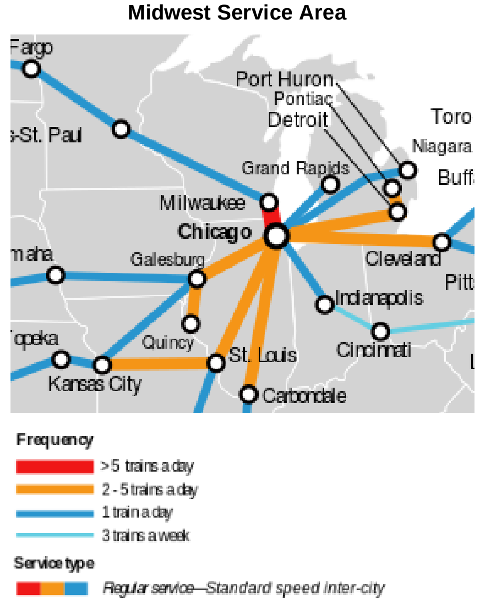
Source: Van Galder Bus Service, 2020.

- ❖ **Amtrak** | With the exception of the Chicago metropolitan area, no passenger rail service currently operates in the Madison-Janesville-Beloit-Rockford corridor. As noted in Section 1, the 2019 Rebuild Illinois Capital Plan provides funding to restore intercity passenger rail service between Rockford and Chicago. In fall 2020, IDOT hired an engineering firm to oversee design and implementation of the project. The proposed plan includes operating trains along the Metra MDW line between Chicago and Elgin and then along the UP Belvidere Subdivision to Rockford. Coordination with UP has been initiated to identify infrastructure requirements for the service. IDOT is currently considering contracting with Amtrak or Metra to operate the service. Current Amtrak service is shown in Figure 2-1.

Figure 2-1. Existing Amtrak Rail Service

Source: amtrakguide.com (2020).

Midwest Service Area

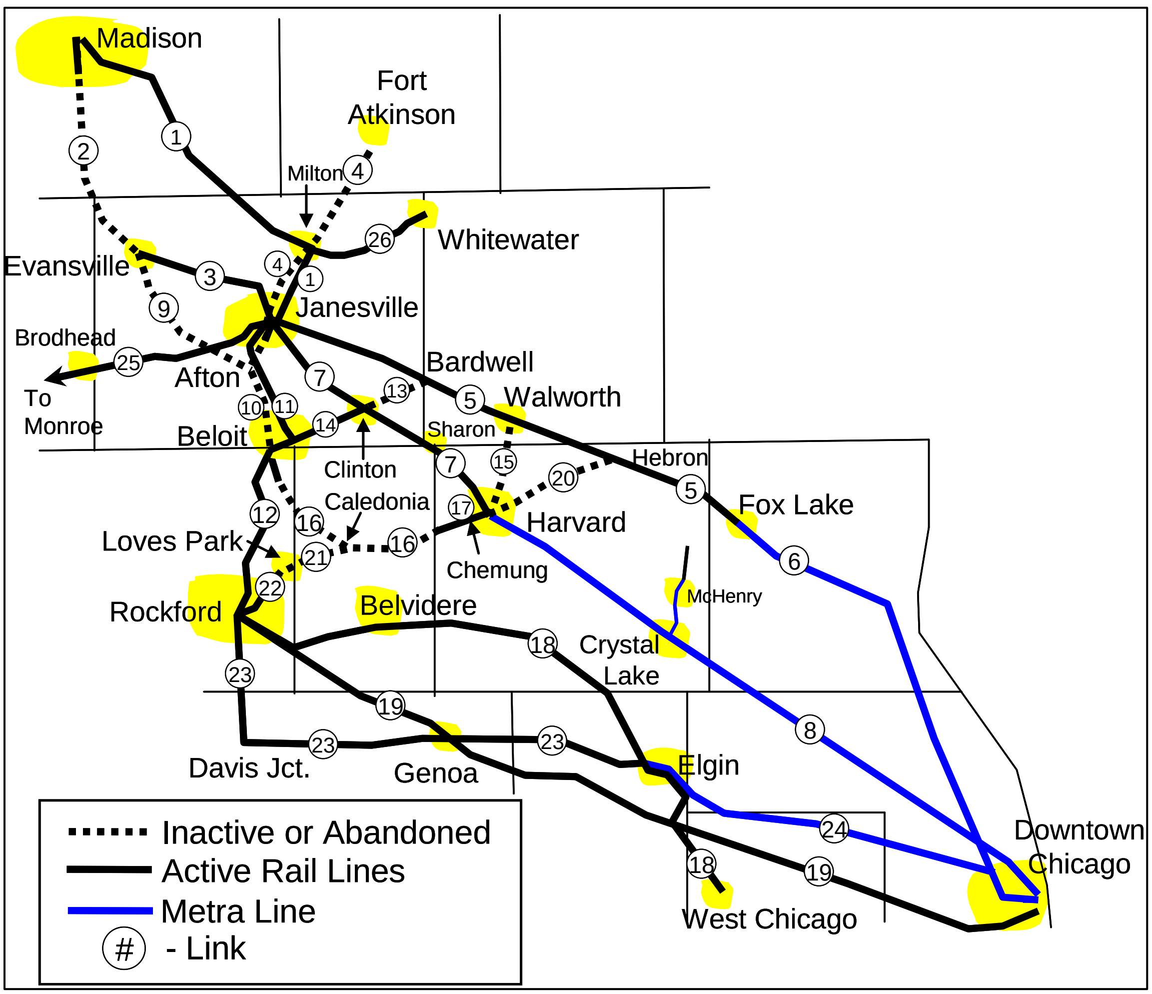


3. Rail Corridors for Study

3.1 Candidate Rail Corridors

The corridors studied in the SLATS Rail Study build on prior work, including the 2002 UP-NW Line Extension Feasibility Study and the 2008 SCWCTS. While the 2002 study focused on a single alignment (i.e., UP-NW extension), the 2008 study examined active, inactive, and abandoned rail links for the broad area that would offer reasonably direct connections between Chicago, Beloit-Janesville, Rockford, and Madison. Figure 3-1 maps the 26 candidate rail links that were identified in the 2008 study.

Figure 3-1. SCWCTS Candidate Rail Corridor Links



Source: SCWCTS, 2008.

A listing of the links by assigned number is shown in Table 3-1 and includes the prior railroad owner, the present owners, and the present users. The table also indicates whether track infrastructure is in place. (Note: This information was current as of 2008 and no detailed review of the infrastructure was included in this study, though an inquiry was made to WisDOT to confirm the potential feasibility of using the lines shown Figure 3-1.)

Table 3-1. SCWCTS Railroad Link Inventory

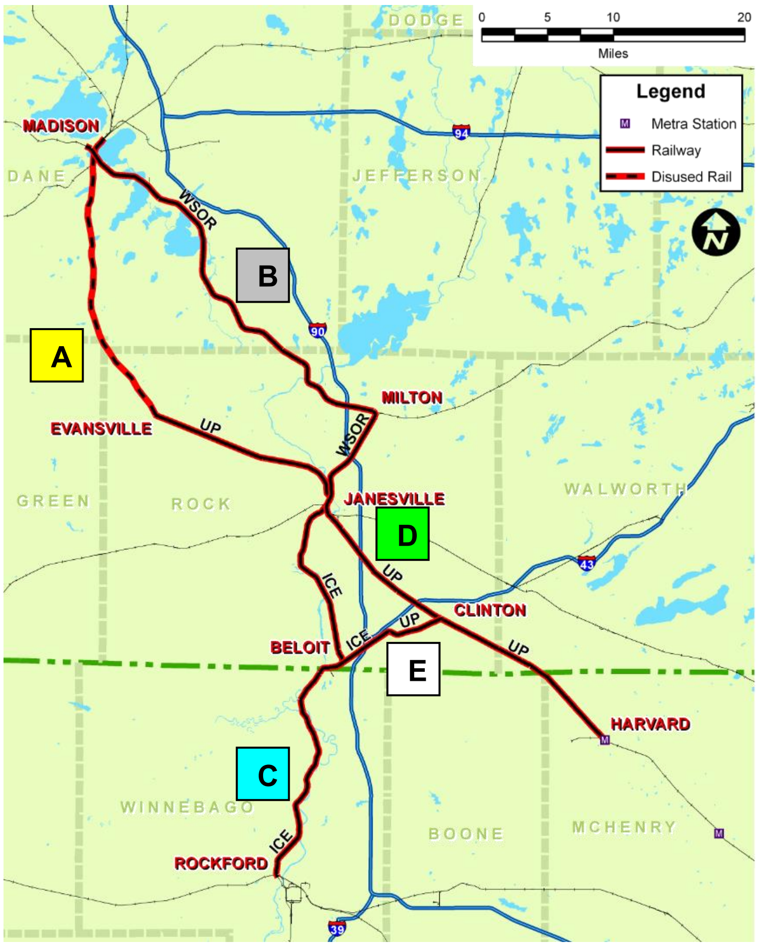
#	Rail Link	Distance in Miles	Prior Railroad	Present Ownership	Present Operator(s)	RR Intact?
1	Madison-Milton Jct.-Janesville	41.0	CMStP&P/UP	Various	UP, WSOR	Yes
2	Madison-Evansville	19.5	C&NW	Various	WSOR in Madison only	No
3	Evansville-Janesville	19.0	C&NW	UPRR	UPRR	Yes
4	Fort Atkinson-Janesville	19.0	C&NW	Various	UPRR, WSOR	No
5	Janesville-Fox Lake	49.5	CMStP&P	WisDOT & counties	WSOR	Yes
6	Fox Lake-Chicago	49.5	CMStP&P	Metra	Metra/WSOR/CP/Amtrak	Yes
7	Janesville-Harvard	28.7	C&NW	UP	UP and WSOR/ICE in Janesville	Yes
8	Harvard-Chicago	63.1	C&NW	UP	UPRR/ UP Metra NW	Yes
9	Evansville-Afton	17.0	C&NW	Various	None	No
10	Janesville-Afton-Beloit	14.0	C&NW	UP/ bike path	UP in Janesville only	No
11	Janesville-Beloit	13.8	CMStP&P	ICE/CP	ICE/UP in Beloit	Yes
12	Beloit-Rockton-Rockford	18.0	CMStP&P	ICE/CP	ICE/UP in Beloit	Yes
13	Bardwell-Clinton Jct.	7.0	CMStP&P	bike path	None	No
14	Clinton Jct.-Beloit	10.2	C&NW	UP	UP/CP in Beloit	Yes
15	Walworth Crossing-Harvard	8.0	CHGL	Various	None	No
16	Beloit-Chemung	23.8	C&NW	UP/bike path	UP to Rockton Rd	No
17	Chemung-Harvard	4.1	C&NW	UP/CCCR	UPRR	Yes
18	Rockford-Belvidere-Elgin-West Chicago	62.7	C&NW	UP	UP	Yes
19	Rockford-Genoa-Chicago	83.8	IC	CN	CN	Yes
20	Hebron Tower-Harvard	10.3	C&NW	Various	None	No
21	Caledonia-Loves Park	6.2	C&NW	Various	None	No
22	Loves Park-Rockford	5.8	C&NW	UP/bike path	UP/Rockford Park District	Yes
23	Rockford-Davis Jct.-Elgin Big Timber Sta	43.0	CMStP&P	IC&E	ICE/IR to Davis Jct.	Yes
24	Elgin Big Timber Station-Chicago	41.1	CMStP&P	Metra	Metra/ICE/CP/Others	Yes
25	Monroe-Janesville	35.2	CMStP&P	WisDOT & counties	WSOR	Yes
26	Milton Jct.-Whitewater	13.2	CMStP&P	WisDOT & counties	WSOR	Yes

Source: SCWCTS, 2008.

3.2 Recommended Rail Corridors to Study

The 2008 SCWCTS study performed several screenings and obtained input from the Study Steering Committee to reduce the 26 candidate rail links to five corridors, as shown in Figure 3-2.

Figure 3-2. Rail Corridors Considered for Market Analysis



Source: SCWCTS, 2008.

Descriptions of the five rail corridors identified in the 2008 SCWCTS study include:

A. **Madison-Evansville-Janesville** | This corridor includes two links from the candidate link list in Table 3-1. Link 2) Madison-Evansville, is out of service between Evansville and Fitchburg. Link 3) Evansville-Janesville, is an active UP freight line.

B. **Madison-Milton-Janesville** | This corridor, shown as Link 1 on the candidate list in Table 3-1, is an active WSOR freight line with much of the corridor in public ownership.

C. **Janesville-Beloit-Rockford** | This corridor includes two links from the candidate link list in Table 3-1. Link 11) Janesville-Beloit is an active CP freight line, and Link 12) Beloit-Rockton-Rockford, is an active CP freight line.

D. **Janesville-Harvard** | This corridor, shown as Link 7 on the candidate list in Table 3-1, is an active UP freight line.

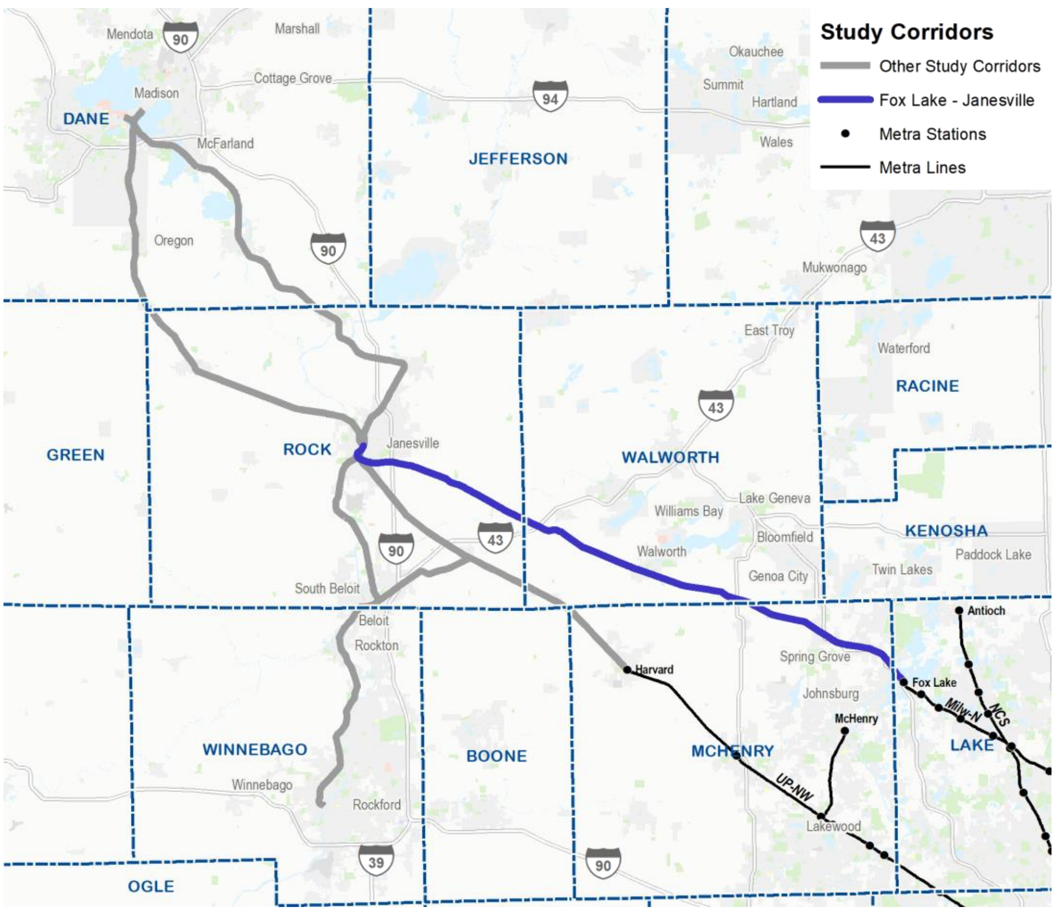
E. **Beloit-Clinton Jct. (Harvard)** | This corridor, shown as Link 14 on the candidate list in Table 3-1, is an active UP and CP freight line.

Additional Candidate Corridor for Consideration

As part of the SLATS Rail Study, the project team reexamined the 26 rail links and five corridors identified in the 2008 SCWCTS study to determine if any additional candidates warranted further analysis. One of the rail corridors that was screened out in the 2008 SCWTCS study was identified for further examination. The **Janesville-Fox Lake** rail link (Candidate Link 5 in Figure 3-1 and in Table 3-1, also highlighted below in Figure 3-3) could potentially be used as an extension of the Metra MDN Line to provide service to the region. This corridor would not directly connect to Beloit. In addition to connecting to downtown Chicago, this Metra line serves major employment areas in north Cook County, IL and Lake County, IL. WSOR currently operates freight service on the line.

A high-level assessment was made to determine the potential for an extension of the MDN from Fox Lake to Janesville as depicted in Figure 3-3. The assessment tabulated Census Transportation Planning Products (CTPP) data on commuter trips originating from locations adjacent to the study corridors and destined for workplaces along either the MDN or UP-NW. Excluding destinations in central Chicago potentially served by either line, the UP-NW attracted in aggregate over three times as many trips (approximately 3,800 versus 900), with most of these commuters originating in Boone, Winnebago, and Walworth Counties. Due to the magnitude of the difference, this potential corridor was dropped from further analysis in favor of the more promising UP-NW extension as the opportunity for a passenger rail extension serving trips to and from Chicago.

Figure 3-3. Janesville – Fox Lake Link



Source: AECOM.

3.3 Station Locations used in the Market Analysis

An important variable in the market analysis is the potential station locations, representing points of access and egress to the passenger rail service. For the purpose of this study, the project team assumed the same station locations as those identified in the 2008 SCWCTS study. Furthermore, given that the analysis for the SLATS Rail Study relies on Transportation Analysis Zone (TAZ) data, these station locations are appropriate for this scale of analysis. The delineation of market sheds, as described in Section 5.2, results in largely continuous corridors and thus the precise station locations have less of an impact since the relevant TAZ are captured within these market sheds.

The process used in the 2008 SCWCTS study began with the identification of a potential universe of rail station locations within the five recommended rail corridors. This compilation included station locations identified from prior study tasks, past planning efforts, discussions with municipal and regional stakeholders, and physical inspection of the recommended rail corridors. A set of 25 locations were selected for evaluation. These were then evaluated using the following criteria:

- **Station Area Physical Characteristics** | Meet the spatial needs for parking, platforms, waiting and circulation.
- **Transit-Supportive Land Use** | Compatible with local comprehensive plans, zoning policies and provide opportunities for future transit-oriented land use.
- **Site Accessibility** | Allow for multi-modal access (auto, bus, bicycle and pedestrian).
- **Environmental** | Avoid environmental concerns including air-quality impacts; land acquisition and relocation impacts; floodplain and water-quality impacts; noise and vibration impacts; and park and natural area impacts.
- **Mobility** | Located in areas of current or planned higher population and job density.
- **Public Support** | Be publicly acceptable.
- **Station Spacing** | Far enough apart from adjacent stations to allow trains to achieve speed but close enough to serve riders and destinations.

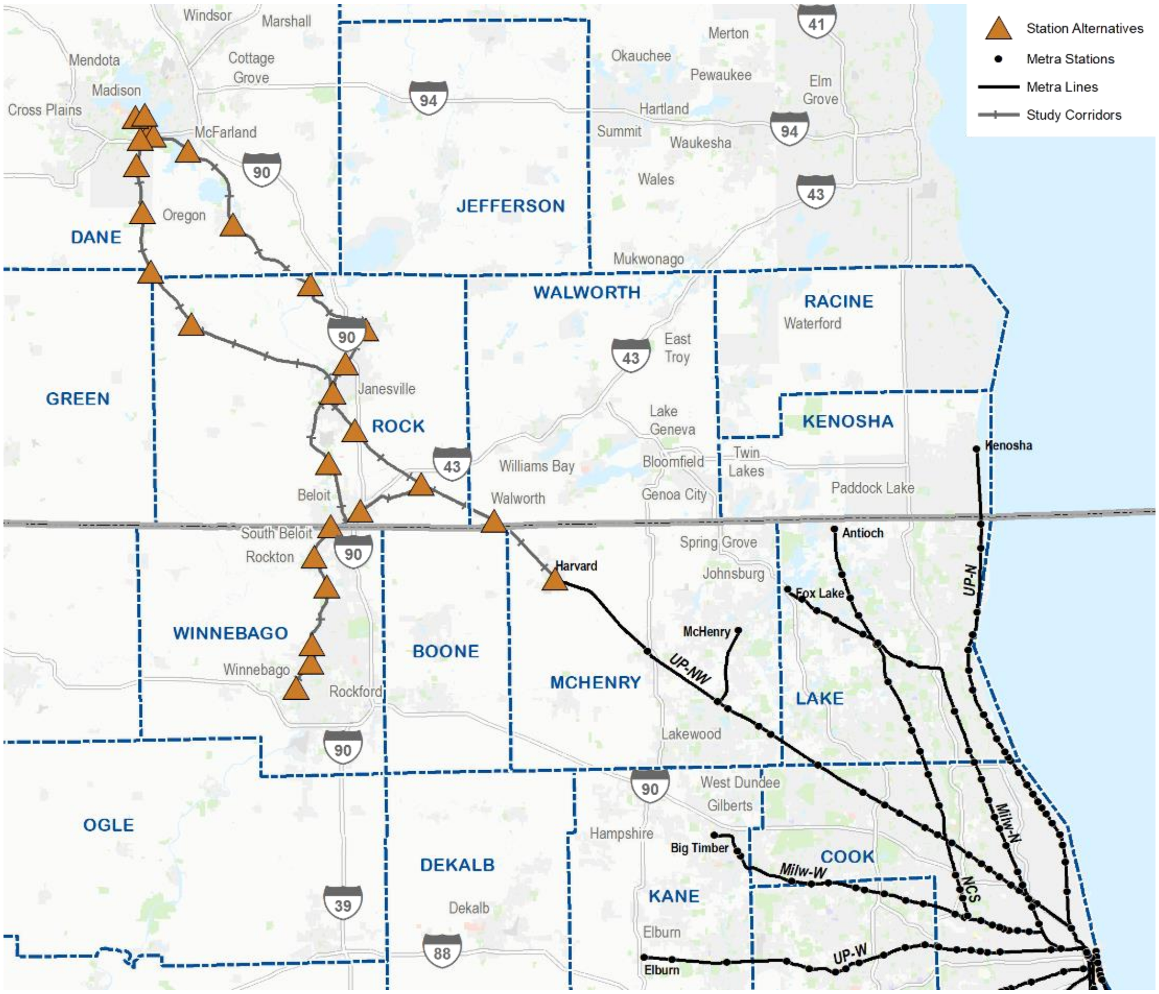
Table 3-2 shows the station locations and evaluation results. The evaluation rated locations according to three levels of performance: 1) meeting the criteria (i.e., Yes); 2) acceptable but with some qualifications (i.e., Possible); and 3) not meeting criteria (i.e., Difficult). For the purpose of the SLATS Rail Study, all of the locations in Table 3-2 were included in the market analysis. The SLATS Rail Study broadly assumes that the issues with the location rated as Difficult (Madison-Beltline/Badger) could be mitigated or an alternative nearby location found. The station locations are shown in Figure 3-4, and detailed maps of the immediate station areas are provided in Appendix A.

Table 3-2. Identified Rail Station Alternatives

Rail Link / Station	Approximate Location	Community	County	Evaluation Conclusion
Janesville-Harvard				
Sharon	Downtown	Village of Sharon	Walworth	**Yes**
Clinton	Downtown	Village of Clinton	Rock	**Yes**
Janesville-Southeast	near STH-11 west of I-90	Town of LaPrairie	Rock	**Possible**
Janesville-Downtown	Downtown	City of Janesville	Rock	**Yes**
Beloit-Clinton				
Beloit-East	near Cranston Road	City of Beloit	Rock	**Yes**
Beloit-Downtown	Downtown	City of Beloit	Rock	**Yes**
Janesville-Rockford				
Rockford-Downtown	downtown (former Amtrak station)	City of Rockford	Winnebago	**Yes**
Rockford-North	near Main Street/IL-2	City of Rockford	Winnebago	**Yes**
Rockford-Elmwood Rd	near Elmwood Road	City of Rockford	Winnebago	**Possible**
Roscoe	near Roscoe Road	Village of Roscoe	Winnebago	**Yes**
Rockton	Downtown	Village of Rockton	Winnebago	**Yes**
Beloit-Downtown	Downtown	City of Beloit	Rock	**Yes**
Town Line Road	near Town Line Road	Towns of Rock & Beloit	Rock	**Yes**
Janesville-Downtown	Downtown	City of Janesville	Rock	**Yes**
Madison-Milton-Janesville (East)				
Janesville-Downtown	Downtown	City of Janesville	Rock	**Yes**
Janesville-Northeast	near Humes (US-14) & Kennedy Rd	City of Janesville	Rock	**Yes**
Milton	near Vincent Street & CR Y	Town of Milton	Rock	**Yes**
Edgerton	near Main Street/US-51	City of Edgerton	Rock	**Yes**
Stoughton	near Main Street (US-51)	City of Stoughton	Dane	**Yes**
McFarland	near US-51	Village of McFarland	Dane	**Yes**
Madison-Beltline	near South Towne Road	Town of Blooming Grove/City of Monona	Dane	**Possible**
Madison-Alliant Center	near John Nolen Drive	City of Madison	Dane	**Possible**
Madison-Kohl Center	Kohl Center	City of Madison	Dane	**Yes**
Madison-Evansville-Janesville (West)				
Janesville-Downtown	Downtown	City of Janesville	Rock	**Yes**
Evansville	near Main Street	City of Evansville	Rock	**Yes**
Brooklyn	Downtown	Village of Brooklyn	Green	**Yes**
Oregon	near Netherwood Road	Village of Oregon	Dane	**Yes**
Fitchburg	near Lacy Road	City of Fitchburg	Dane	**Yes**
Madison-Beltline/Badger	near Badger Road	City of Madison	Dane	**Difficult**
Madison-Monona	Monona Terrace Convention Center	City of Madison	Dane	**Yes**

Source: SCWCTS, 2008. Note that the terms “East” and West” are included to clarify the two alternatives for connecting Madison and Janesville.

Figure 3-4. Market Analysis Station Locations



Source: SCWCTS, 2008.

4. Socioeconomic Trends

This section summarizes the existing and future year socioeconomic data and trends used for the market analysis.

4.1 Data Sources

Transportation Analysis Zone Data

Existing and projected future year socioeconomic conditions were gathered from four MPOs near the study corridors: SLATS (supplying all Rock County and partial Winnebago County data, including parts of the Janesville MPO and Rockford MPO area that overlap), Rockford (Boone, Ogle, and Winnebago Counties), Madison (Dane County), and CMAP. These data are provided at the TAZ level, which generally vary in size reflecting the density of the underlying development—ranging from as small as two acres in downtown Chicago to over 18,000 acres in undeveloped areas of predominately rural counties.

Different base and horizon years were provided by the MPOs. To correct for this issue, figures were extrapolated assuming a constant rate of growth within each TAZ to set a common base year (2020) and future horizon year (2050) for household and employment estimates across geographies. These figures, as well as the anticipated growth between 2020 and 2050, are provided at various levels of aggregation in Section 4.2.

Figure 4-1 illustrates the 2020 household density levels by TAZ for the four planning areas along the study corridors, and 2020 employment density levels are provided in Figure 4-2. The relevant 2020-2050 growth (or decline) per acre are illustrated in Figure 4-3 and Figure 4-4. Illustrations providing a larger context, including portions of the CMAP planning area, are available in the maps in Appendix B.

Emsi ZIP-level Projections

In some cases, not all locations within the study area had socioeconomic projections available by TAZ, as they extend beyond the designated MPO planning area boundaries. To ensure that some estimate of potential future growth for these areas could be applied to existing commuter flows, 10-year employment projections by ZIP code were gathered from the economic modeling firm Emsi for the years 2020-2030. These 10-year growth rates were extrapolated to the 2050 planning horizon, consistent with the approach used for the TAZ-level data.

Figure 4-1. Household Density (2020)

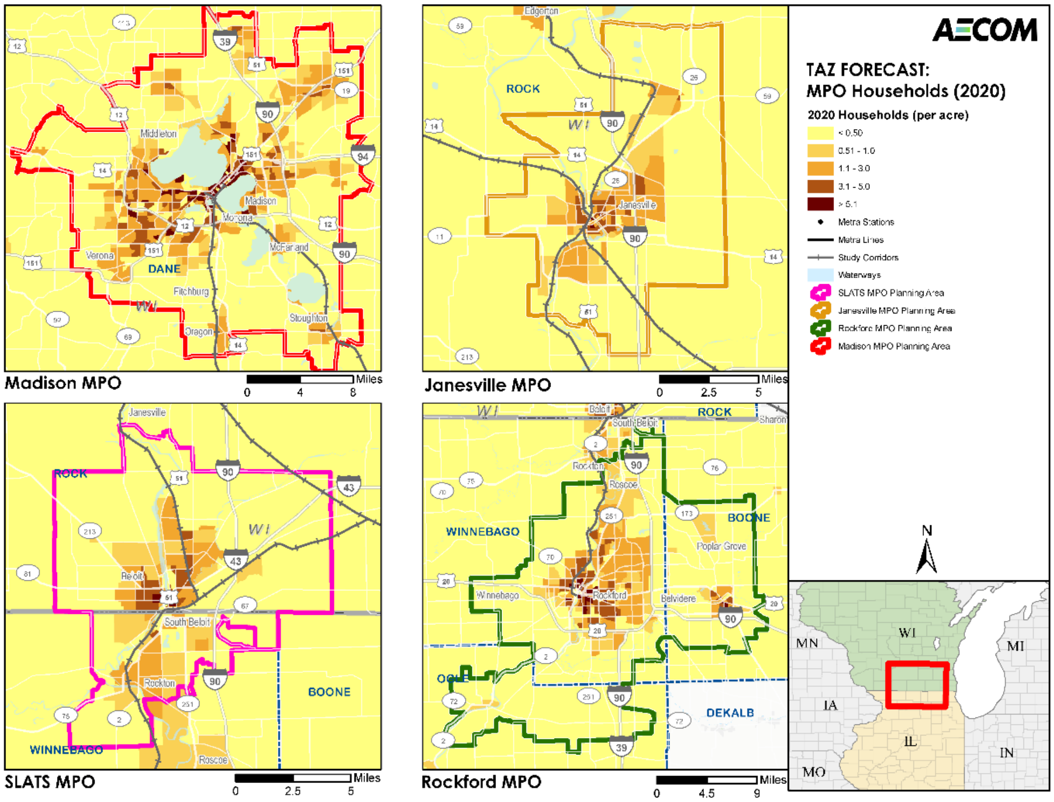


Figure 4-2. Employment Density (2020)

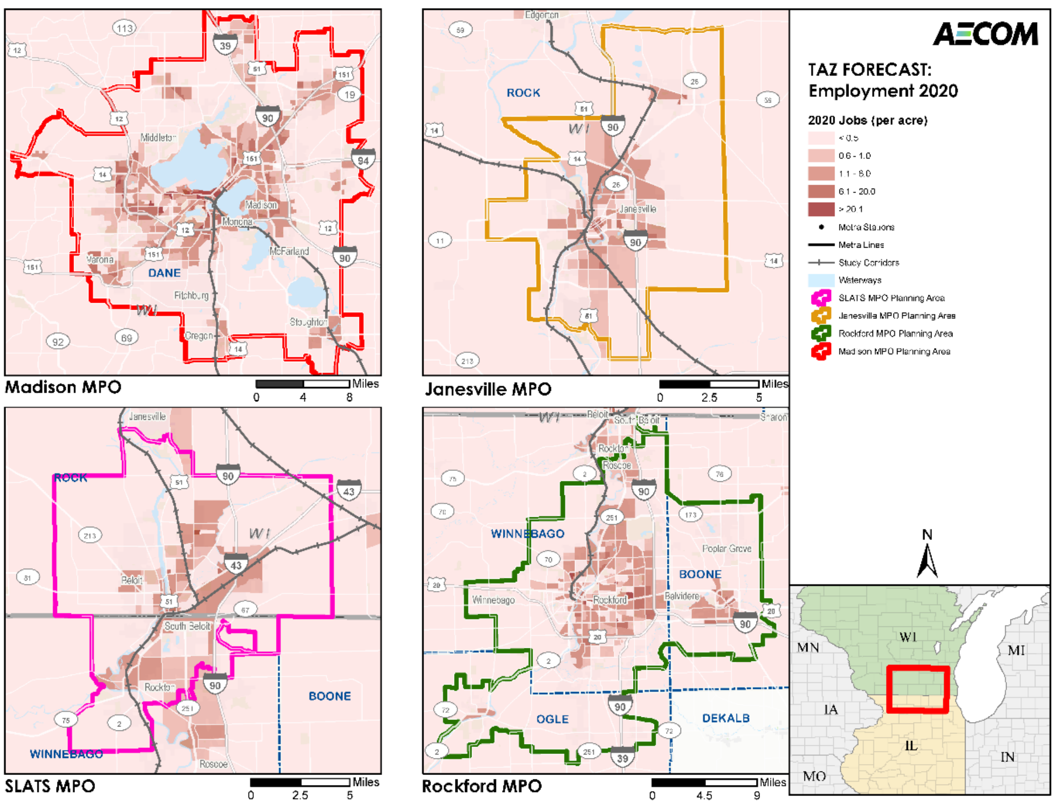


Figure 4-3. Household Density Change (2020-2050)

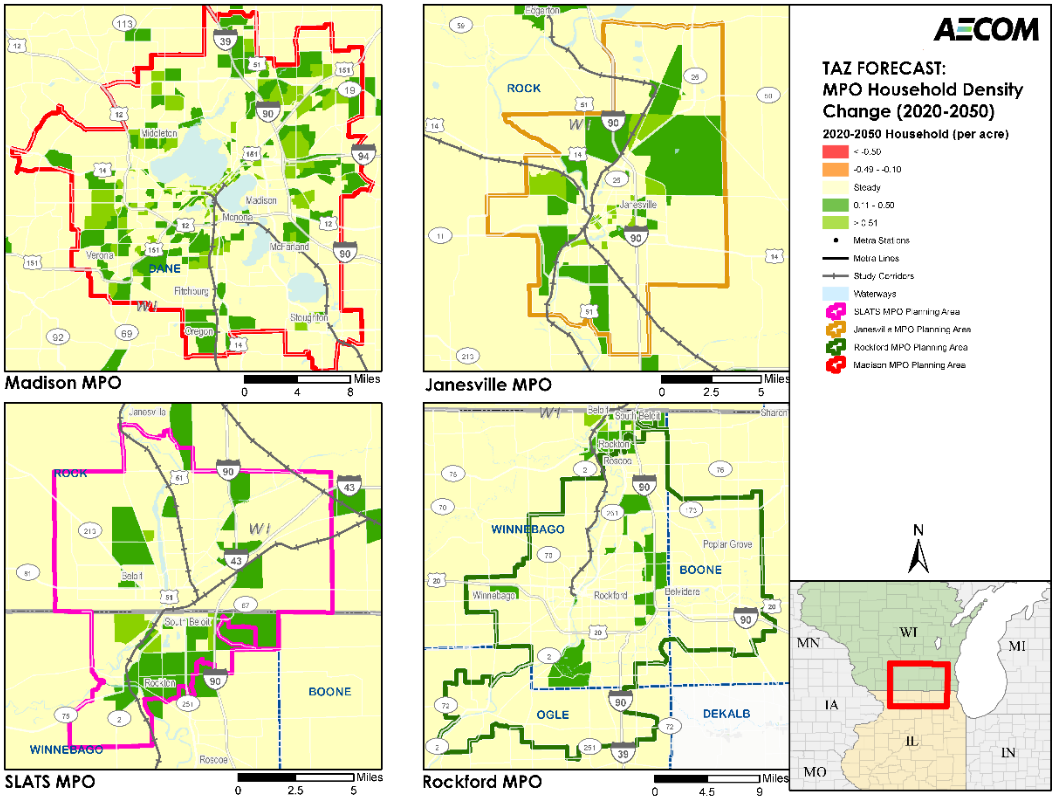
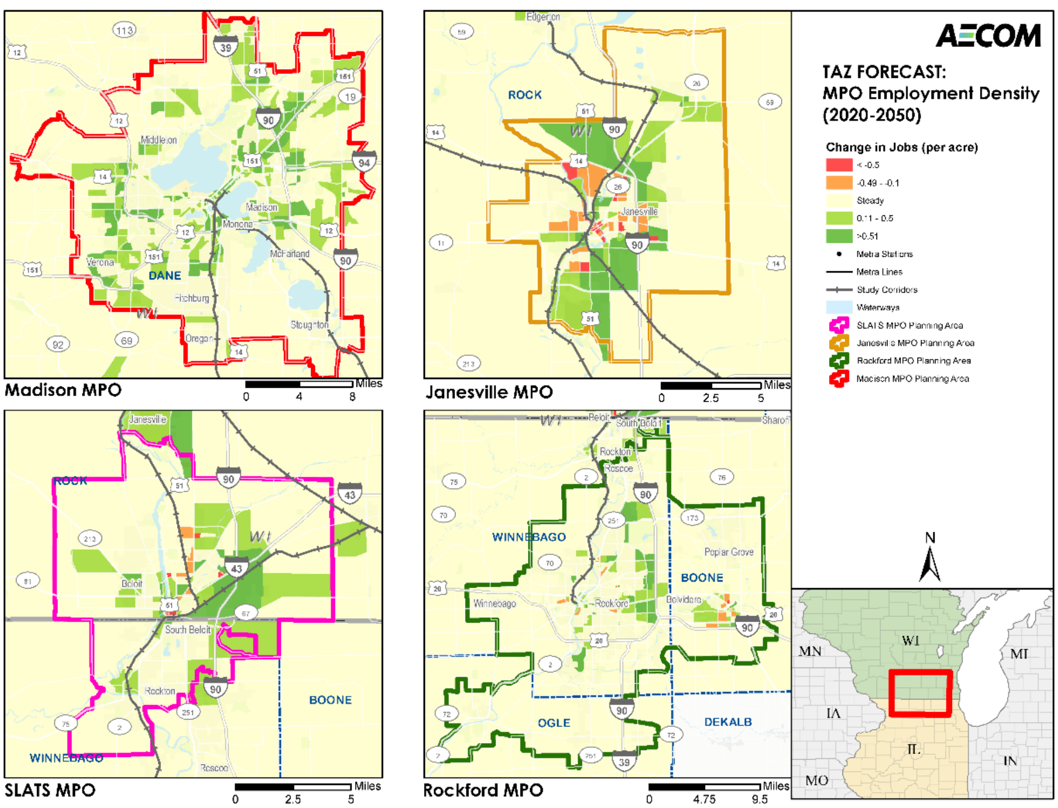


Figure 4-4. Employment Density Change (2020-2050)



4.2 Growth Projections by Geography

The socioeconomic data from the MPOs was analyzed to better understand the growth trends expected across a number of different geographies, gradually narrowing in focus to the locations near the rail corridors relevant to this study.

Regional / County

There are approximately 462,000 base year households in the five counties near the study corridors, shown in the gray rows in Table 4-1. This is expected to increase by roughly 80,000 households (18%) in total over the next 30 years, with the majority of this growth expected in Dane and Rock Counties. In comparison, Cook County (including the City of Chicago and near suburbs) households are expected to grow by roughly 16%. Most of the household growth in the greater Chicago region is expected in the collar counties, which are projected to increase by about 500,000 households (40%) between 2020 and 2050.

Table 4-1 also illustrates the differences in household densities across these counties, ranging from 30 to 250 households per square mile in the study area counties, and up to over 2,000 households per square mile in Cook County.

Table 4-1. Existing and Future Households by County (2020, 2050)

	Sq. Miles	HH (2020)	HH (2050)	HH/sq.mi (2020)	HH/sq.mi (2050)	% Annual Change	% Change (2020-2050)
Boone	282	20,000	21,000	70	73	0.1%	5%
Ogle	763	23,000	23,000	29	30	0.1%	2%
Winnebago	519	128,000	134,000	246	259	0.2%	5%
Dane	1,238	224,000	285,000	181	230	0.8%	27%
Rock	726	67,000	80,000	93	111	0.6%	19%
Cook	953	2,109,000	2,455,000	2,212	2,576	0.5%	16%
DuPage	337	370,000	431,000	1,100	1,280	0.5%	16%
Kane	524	197,000	298,000	376	569	1.4%	51%
Kendall	322	50,000	103,000	156	318	2.4%	104%
Lake	470	269,000	342,000	572	728	0.8%	27%
McHenry	611	124,000	191,000	203	313	1.5%	55%
Will	850	257,000	405,000	302	476	1.5%	58%

Source: TAZ projections from SLATS, Madison, Rockford, CMAP. Figures have been rounded for legibility and to reflect the estimation techniques used to achieve a common base and horizon year across data sources.

In terms of employment, the roughly 621,000 jobs in the study area counties in 2020 are projected to increase by 19% to 741,000 in 2050—a net increase of 120,000. Again, the highest rates of growth are expected in Dane and Rock Counties, where the anticipated growth rates are 19% and 48% respectively. Cook County is projected to experience a 12% increase in jobs, and the collar counties a 27% increase. These figures, along with the employment densities per square mile, are broken down by county in Table 4-2.

Table 4-2. Existing and Future Employment by County (2020, 2050)

	Sq. Miles	Jobs (2020)	Jobs (2050)	Jobs/sq.mi (2020)	Jobs/sq.mi (2050)	% Annual Change	% Change (2020-2050)
Boone	282	23,000	22,000	80	79	0.0%	-1%
Ogle	763	23,000	24,000	30	31	0.1%	2%
Winnebago	519	162,000	180,000	313	347	0.3%	11%
Dane	1,238	334,000	397,000	270	321	0.6%	19%
Rock	726	79,000	118,000	109	162	1.3%	48%
Cook	953	2,654,000	2,971,000	2,784	3,117	0.4%	12%
DuPage	337	632,000	708,000	1,878	2,104	0.4%	12%
Kane	524	223,000	301,000	425	574	1.0%	35%
Kendall	322	28,000	54,000	88	166	2.1%	89%
Lake	470	349,000	416,000	743	884	0.6%	19%
McHenry	611	102,000	148,000	168	243	1.2%	45%
Will	850	234,000	361,000	275	425	1.5%	55%

Source: TAZ projections from SLATS, Madison, Rockford, CMAP. Figures have been rounded for legibility and to reflect the estimation techniques used to achieve a common base and horizon year across data sources.

County Subdivisions

Socioeconomic projections were aggregated to the Census county subdivision, which generally coincide with townships (and some cities) in Illinois, and towns, cities, and villages in Wisconsin. The 2020 and 2050 figures among county subdivisions along the study corridors are provided in Table 4-3 (for household projections) and Table 4-4 (for employment projections), sorted by absolute growth (or decline). Gray rows highlight urbanized areas of interest along the study corridors. The household and employment densities by county subdivision are depicted in Figure 4-5 and Figure 4-6.

Household density growth is most evident in Madison, Janesville/Milton, and Chemung Township (i.e., Harvard), while relatively higher employment density growth is shown for Madison, Rockford, Janesville, and Beloit. Employment growth over the 30-year period for these four areas range from 12% in Rockford to 51% in Beloit. Given the market that passenger rail serves, the employment growth in dense downtown locations is more likely to have a greater impact on rail ridership potential in future than employment growth.

Table 4-3. Household Projections by County Subdivision (2020, 2050)

County Subdivision	State	County	HH (2020)	HH (2050)	# Growth	% Growth
Madison city	WI	Dane	106,930	127,420	20,490	19%
Chemung township	IL	McHenry	3,310	7,330	4,020	122%
Janesville city	WI	Rock	25,330	28,860	3,530	14%
Fitchburg city	WI	Dane	11,370	14,750	3,380	30%
Rockton township	IL	Winnebago	7,230	9,470	2,240	31%
Harmony town	WI	Rock	2,240	4,300	2,060	92%
Roscoe township	IL	Winnebago	7,790	9,630	1,840	24%
Rockford township	IL	Winnebago	80,850	82,420	1,570	2%
Janesville town	WI	Rock	2,110	3,620	1,510	72%
Blooming Grove	WI	Dane	1,510	2,690	1,180	79%
Rock town	WI	Rock	2,220	3,310	1,090	49%
Rutland town	WI	Dane	1,340	2,340	1,000	75%
Beloit city	WI	Rock	13,640	14,580	940	7%
Oregon town	WI	Dane	2,060	2,880	820	40%
Union town	WI	Rock	1,420	1,950	530	37%
Dunn town	WI	Dane	2,310	2,830	520	22%
Edgerton city	WI	Rock, Dane	1,810	2,320	510	29%
Stoughton city	WI	Dane	4,590	5,060	470	10%
Harlem township	IL	Winnebago	15,720	16,170	450	3%
Albion town	WI	Rock	900	1,330	430	48%
McFarland village	WI	Dane	3,280	3,670	390	12%
Oregon village	WI	Dane	2,860	3,220	360	13%
Milton town	WI	Rock	2,130	2,470	340	16%
Beloit town	WI	Rock	3,320	3,650	330	10%
Clinton town	WI	Rock	1,050	1,340	290	28%
Turtle town	WI	Rock	1,360	1,650	290	22%
Milton city	WI	Rock	1,430	1,700	270	19%
Magnolia town	WI	Rock	870	1,080	210	24%
Fulton town	WI	Rock	1,910	2,120	210	11%
Evansville city	WI	Rock	1,050	1,250	200	19%
La Prairie town	WI	Rock	480	590	110	22%
Cherry Valley twp.	IL	Winnebago	8,560	8,670	110	1%
Dunkirk town	WI	Dane	1,360	1,450	90	7%
Edgerton city	WI	Rock	50	120	70	150%
Porter town	WI	Rock	420	490	70	18%
Pleasant Springs	WI	Dane	1,340	1,400	60	5%
Brooklyn village	WI	Dane	60	110	50	64%
Owen township	IL	Winnebago	1,040	1,090	50	6%
Madison town	WI	Dane	2,060	2,110	50	2%
Center town	WI	Rock	440	470	30	7%
Monona city	WI	Dane	3,870	3,880	10	0%

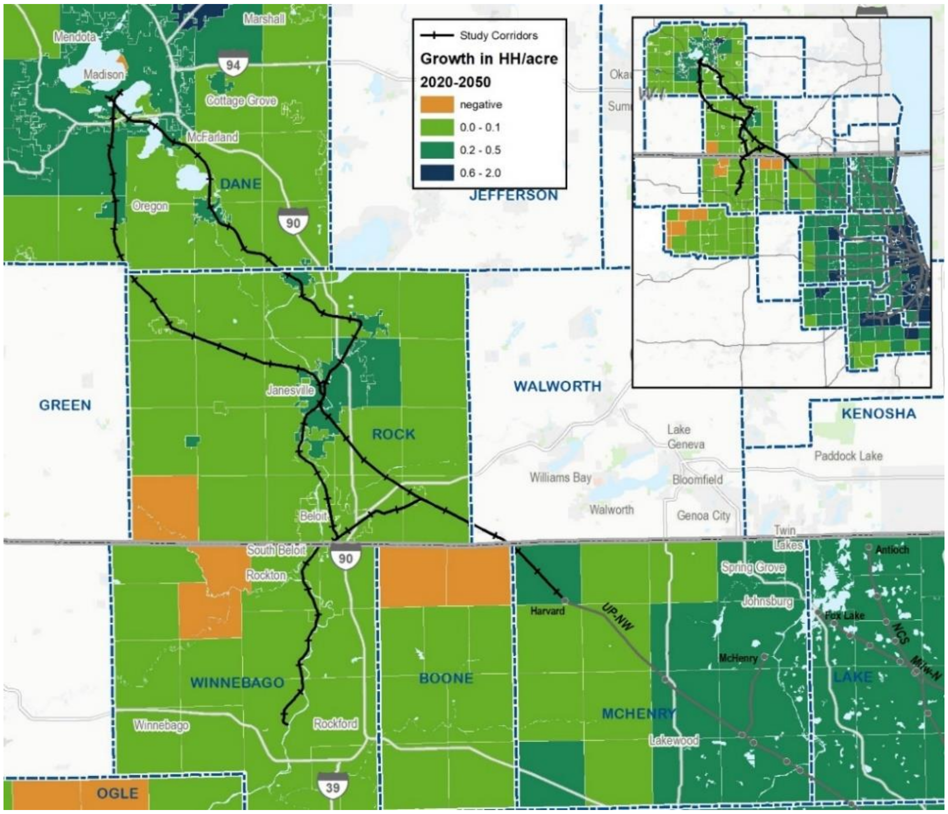
Source: TAZ projections from SLATS, Madison, Rockford, CMAP. Figures have been rounded for legibility and to reflect the estimation techniques used to achieve a common base and horizon year across data sources.

Table 4-4. Employment Projections by County Subdivision (2020, 2050)

County Subdivision	State	County	Jobs (2020)	Jobs (2050)	# Growth	% Growth
Madison city	WI	Dane	204,100	234,550	30,450	15%
Rockford township	IL	Winnebago	119,080	133,260	14,180	12%
Janesville city	WI	Rock	39,020	50,170	11,150	29%
Beloit city	WI	Rock	16,770	25,320	8,550	51%
La Prairie town	WI	Rock	2,690	7,830	5,140	191%
Fitchburg city	WI	Dane	14,400	18,780	4,380	30%
Janesville town	WI	Rock	2,620	6,830	4,210	161%
Turtle town	WI	Rock	3,140	6,790	3,650	116%
Harlem township	IL	Winnebago	14,900	17,420	2,520	17%
Chemung township	IL	McHenry	2,060	4,490	2,430	118%
Rock town	WI	Rock	1,790	4,050	2,260	126%
Blooming Grove town	WI	Dane	1,770	2,790	1,020	57%
Harmony town	WI	Rock	1,410	2,350	940	67%
Roscoe township	IL	Winnebago	5,080	6,010	930	18%
Madison town	WI	Dane	4,430	5,000	570	13%
Oregon town	WI	Dane	730	1,090	360	49%
Milton town	WI	Rock	790	1,140	350	44%
Milton city	WI	Rock	1,630	1,980	350	22%
Clinton town	WI	Rock	930	1,250	320	34%
Rutland town	WI	Dane	750	1,050	300	40%
Monona city	WI	Dane	9,660	9,960	300	3%
Union town	WI	Rock	1,360	1,640	280	20%
McFarland village	WI	Dane	2,200	2,470	270	12%
Rockton township	IL	Winnebago	4,420	4,690	270	6%
Beloit town	WI	Rock	1,950	2,210	260	14%
Dunn town	WI	Dane	710	920	210	29%
Edgerton city	WI	Rock, Dane	1,190	1,360	170	14%
Evansville city	WI	Rock	800	960	160	19%
Fulton town	WI	Rock	1,040	1,190	150	14%
Oregon village	WI	Dane	2,510	2,640	130	5%
Magnolia town	WI	Rock	460	580	120	26%
Pleasant Springs town	WI	Dane	910	950	40	5%
Stoughton city	WI	Dane	4,960	5,000	40	1%
Brooklyn village	WI	Dane	20	50	30	127%
Dunkirk town	WI	Dane	950	960	10	2%
Owen township	IL	Winnebago	2,620	2,540	-80	-3%
Porter town	WI	Rock	50	50	-	7%
Cherry Valley township	IL	Winnebago	12,280	12,280	-	0%
Albion town	WI	Rock	590	590	-	0%
Edgerton city	WI	Rock	40	40	-	0%
Center town	WI	Rock	50	50	-	0%

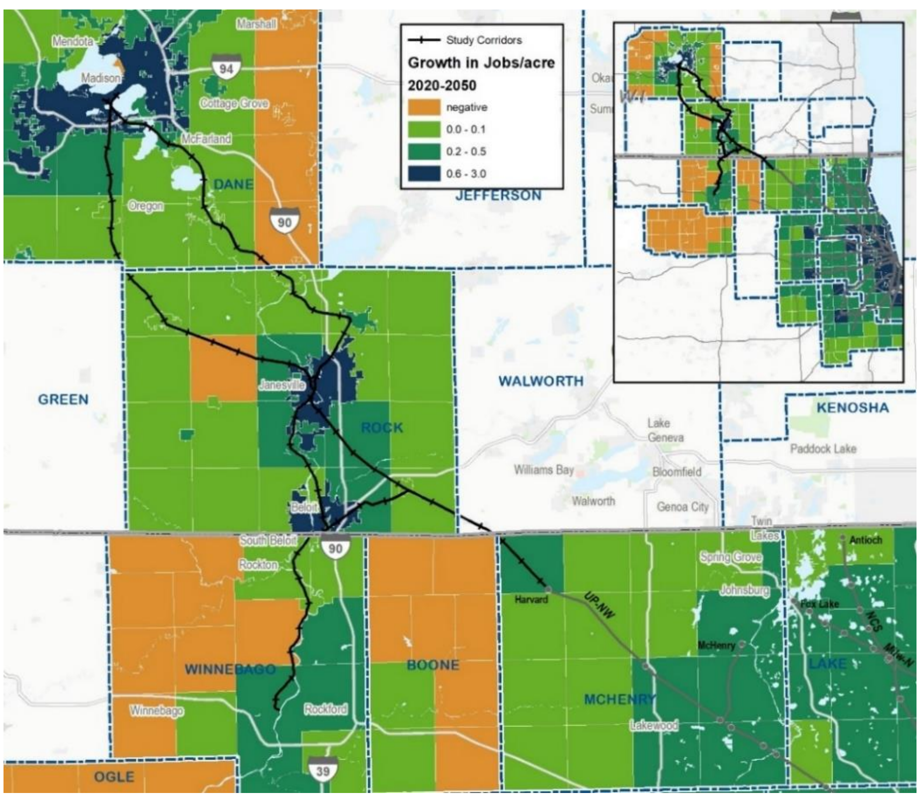
Source: TAZ projections from SLATS, Madison, Rockford, CMAP. Figures have been rounded for legibility and to reflect the estimation techniques used to achieve a common base and horizon year across data sources.

Figure 4-5. Household Density Growth by County Subdivision (2020-2050)



Source: TAZ projections from SLATS, Madison, Rockford, CMAP, adjusted to reflect common base and horizon years.

Figure 4-6. Employment Density Growth by County Subdivision (2020-2050)



Source: TAZ projections from SLATS, Madison, Rockford, CMAP, adjusted to reflect common base and horizon years.

5. Travel Flows

Data on commuter origins, destinations, and travel modes were gathered from the CTPP (five-year estimates, 2012-2016). This dataset is the most recent data available at the time of analysis, having been published in 2018 and updated roughly every five years. The travel flows reported in this dataset are referred to as "existing" in this analysis.

A key step in this market assessment is to better understand potential future travel flows in the study area. While performing land use allocation or travel demand modeling to redistribute travel flows is beyond the scope of this effort, the SLATS Rail Study includes an exercise to estimate the magnitude of growth, based on anticipated employment growth as projected by the MPOs.

As described in Section 4, socioeconomic projections were gathered at the TAZ-level from the MPOs in the super region, together with employment projections at the ZIP code-level for the outlying areas. These were synthesized into common base and horizon years, and the MPO TAZs and ZIP codes were intersected with the Census-defined TAZ in GIS (which is the most detailed geography with consistent commuter origin-destination (O-D) data coverage across the U.S.). The base and horizon year employment data were apportioned to the Census TAZ based on the acreage of the MPO TAZ or ZIP code that fell within a given Census TAZ. Employment growth rates were calculated for each Census TAZ for the 2014-2050 period (using 2014 as the midpoint of the 2012-2016 CTPP estimates), assuming a constant rate of growth. Finally, these growth rates were applied to the existing CTPP travel flows to estimate the 2050 commuter flows.

This exercise does not assume any redistribution of commuter origins. As a simple example, if half of the 100 commuters traveling to a given destination TAZ originate from Beloit and half originate from Janesville, these totals will increase in the future based on the growth rate, but no "new" commuters will appear from origins in Rockford, Madison, Harvard, or any other location. If the growth rate is estimated at 50%, the 2050 commuters would be composed of 75 from Beloit and 75 from Janesville, or 150 total.

Given that residential origins are typically far more widely distributed than workplace destinations, it is assumed that this is more useful than applying growth rates to commuter origins based on expected household growth. The more uniform distribution of households as opposed to employment yields much more widespread dispersion of future commute trips than the simplified example above. However, it bears repeating that in cases where there are no commuters at all (either by car, rail, or any other mode) from a given origin to a destination, job growth at that destination will not "introduce" commuters from new locations. This is because of the underlying assumption that the job type/mix are not attractive enough to offset the costs in terms of time or money to reach that destination—and an increase in the number of jobs will not fundamentally change this calculation.[1]

This section on travel flows is divided into two subsections, the first (5.1) examines regional travel patterns, focusing on the eight counties which are proximate to the study corridors: Boone, Cook, McHenry, Winnebago Counties in Illinois, and Dane, Green, Rock, and Walworth Counties in Wisconsin. In addition to the county-to-county travel flows, the counties are disaggregated to county subdivisions (i.e., cities, towns, townships) to delineate more detailed travel patterns in the region.

[1] Section 6 analyzes the potential for the introduction of rail service to increase the share of commuters who may be likely to select rail as their preferred transportation mode for commuting purposes.

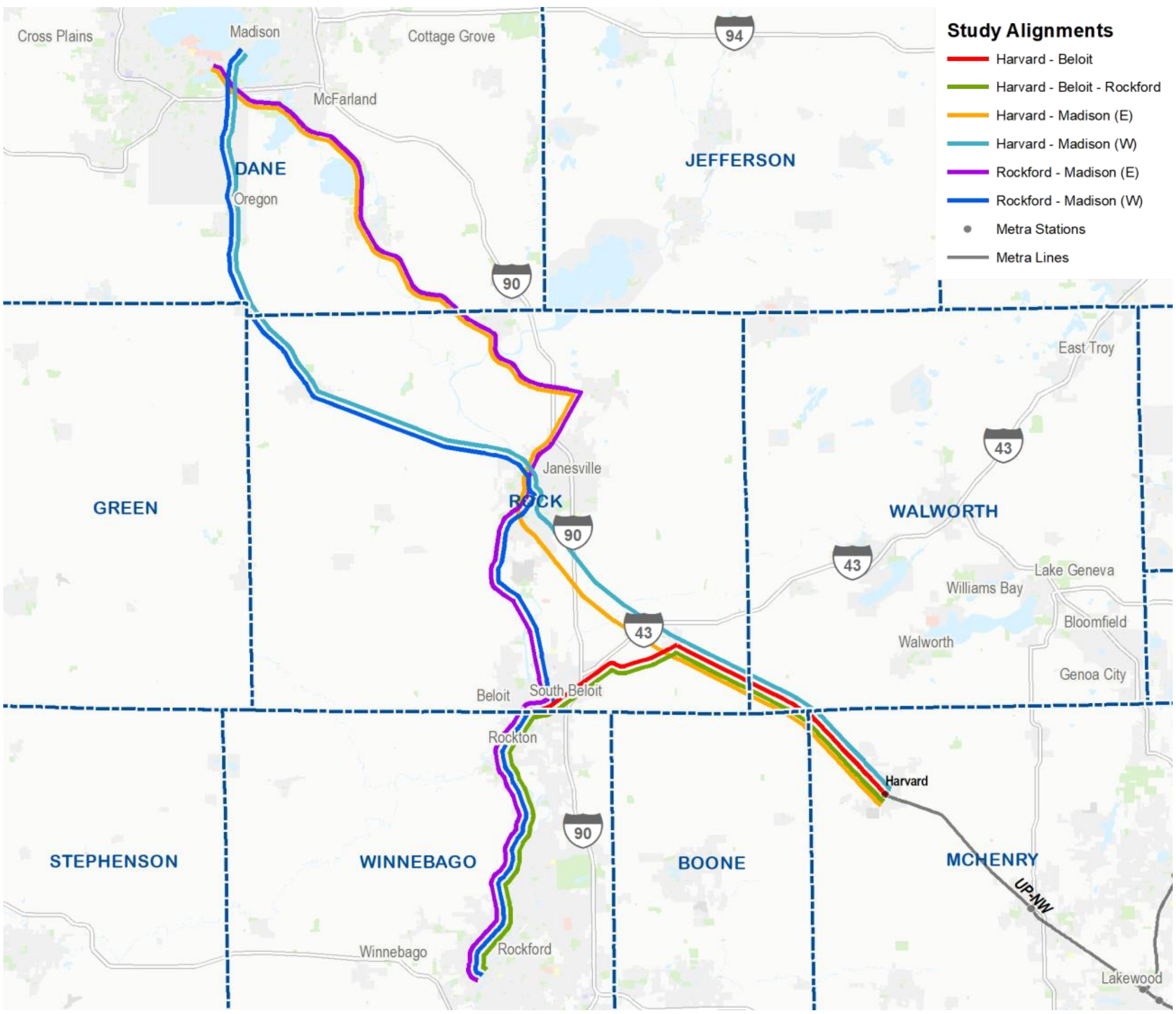
The second subsection (5.2) focuses on geographies more tailored to the types of trips suitable by passenger rail—which is largely determined by proximity to the rail infrastructure at the start and end of each trip.

Study Alignments

As described in Section 3, a progressive screening process was used to move from a universe of (active and inactive) rail links to a selection of five viable study corridors. Advancing into the travel flow analysis, these study corridors (along with the Metra UP-NW line) are combined to create the study alignments (Figure 5-1):

1. Rockford-Beloit-Janesville-Evansville-Madison, labeled as **Rockford-Madison (W)**
2. Rockford-Beloit-Janesville-Milton-Madison, labeled as **Rockford-Madison (E)**
3. Harvard-Janesville-Evansville-Madison, labeled as **Harvard-Madison (W)**
4. Harvard-Janesville-Milton-Madison, labeled as **Harvard-Madison (E)**
5. **Harvard-Beloit (-Rockford)**, analyzed with and without the extension from Beloit to Rockford

Figure 5-1. Study Alignments



The alignments including a station in Harvard are assumed to have continuing service along the UP-NW line, potentially involving transfers. Subsection 5.2 discusses how the market sheds were developed for these study alignments and the tabulation of commuter flows for each alignment by origin and destination location.

5.1 Regional Travel Patterns

County-to-County

All statistics quoted in this section pertain to a subset of county-to-county flows that are proximate to the study alignments (i.e., within or between Boone, Cook, McHenry, Winnebago, Dane, Green, Rock, and Walworth Counties).

The total existing commuters by home origin county and workplace destination county are shown in Table 5-1. The distribution highlights that most trips both start and end within a given county, as people are predisposed to work near where they live.

The county that attracts the most inter-county commuters is Cook County, about 32,000 (2%) of commuters originate from other study area counties—though only about 3,900 after excluding McHenry County. Next are Dane and Winnebago counties, attracting a little under 15,000 commuters from outside the county (6% and 13%, respectively). Boone, McHenry, Rock, and Walworth counties import between about 4,000 and 8,000 workers (10% to 15%, with the exception of Boone, which imports a very large share from Winnebago County).

Table 5-1. Total Commuters (Existing)

			Destination						
		Illinois				Wisconsin			
		Boone	Cook	McHenry	Winne-bago	Dane	Green	Rock	Walworth
Origin IL	Boone	7,000	1,200	1,970	7,960	10	-	280	140
	Cook	120	1,729,360	2,910	460	230	-	50	140
	McHenry	470	27,930	67,150	1,170	20	-	40	800
	Winnebago	5,220	1,420	1,140	94,840	440	110	3,560	260
Origin WI	Dane	160	220	-	120	242,400	840	1,500	470
	Green	-	30	10	160	5,470	10,880	780	-
	Rock	470	150	90	3,980	8,050	960	47,520	2,580
	Walworth	90	850	1,800	210	620	10	1,490	26,990

Source: CTPP (2012-2016).

As noted previously, personal vehicle (either driving alone or carpooling) is by far the most common mode of transportation for much of the study area outside of Cook County (Table 5-2). Aside from trips starting or ending in Cook County (which has more transportation options than other locations), most intra-county travel flows are between 80% and 90% personal vehicle trips, while inter-county flows are 99% personal vehicle. This is largely reflective of the length of distances involved (which preclude non-motorized trips) and the lower availability of transportation alternatives. To illustrate this point, Figure 5-2 shows the average distance traveled by residents by origin county.[2] Typically, commuters in less densely developed counties travel longer distances on average, though this is also influenced by the attractiveness of the jobs available.

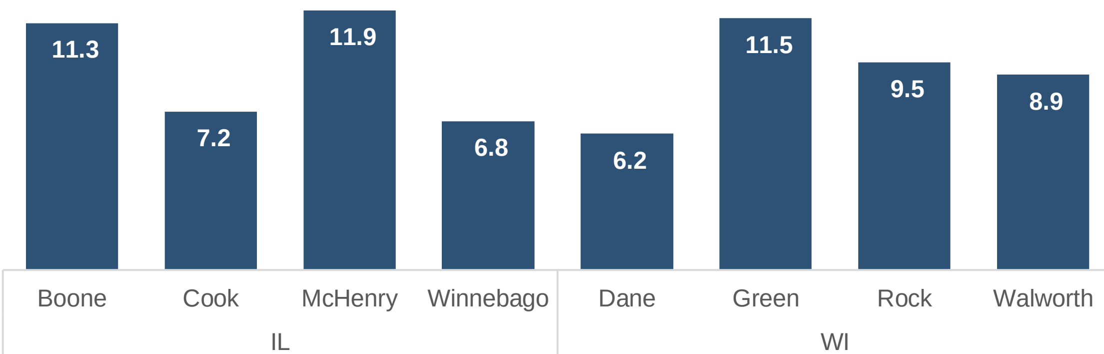
[2] These distances are calculated on the basis of the air-line distance between the origin TAZ and destination TAZ; for this reason, the distances are less accurate in the case of rural TAZs, which can be large in size and the centroid may be distant from households or workplaces it contains.

Table 5-2. Personal Vehicle Commuter Mode Share (Existing)

		Destination							
		Illinois				Wisconsin			
Origin		Boone	Cook	McHenry	Winne-bago	Dane	Green	Rock	Walworth
IL	Boone	80%	97%	100%	99%	100%		100%	100%
IL	Cook	100%	65%	90%	100%	78%		80%	93%
IL	McHenry	100%	87%	83%	99%	100%		100%	97%
IL	Winnebago	99%	91%	100%	92%	97%	100%	99%	100%
WI	Dane	100%	80%		100%	79%	99%	100%	99%
WI	Green	100%	85%	100%	100%	100%	83%	99%	100%
WI	Rock	99%	85%	100%	99%	99%	97%	90%	100%
WI	Walworth	100%	79%	99%	100%	98%	100%	99%	84%

Source: CTPP (2012-2016).

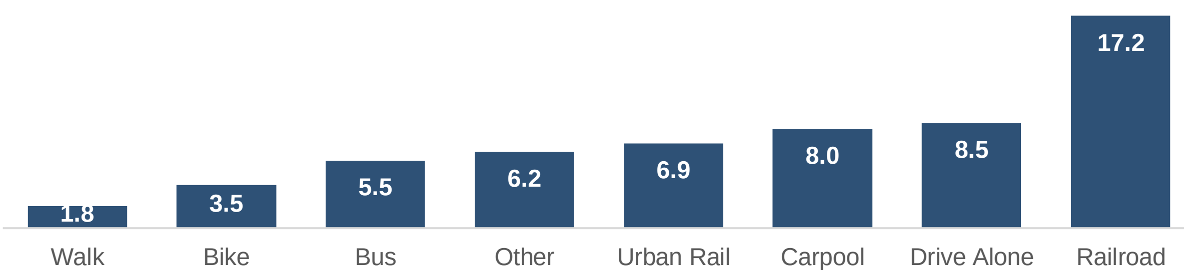
Figure 5-2. Average Miles Traveled by County Residents



Source: Air-line distances between origin and destination TAZ centroid, as reported in CTPP (2012-2016). Includes commuter flows among only the counties listed on the x-axis.

Additionally, information about the distances traveled by reported travel mode for the eight counties under analysis are provided in Figure 5-3, illustrating rail's role in serving longer-distance trips (average 17 miles) as compared to other transit modes (bus or urban rail/subway—5 to 7 miles), personal vehicle (8 to 9 miles), and non-motorized modes (less than 4 miles).

Figure 5-3. Average Miles Traveled by Mode



Source: Air-line distances between origin and destination TAZ centroid, as reported in CTPP (2012-2016). Includes commuter flows among only Boone, Cook, McHenry, Winnebago Counties in Illinois; Dane, Green, Rock, and Walworth Counties in Wisconsin.

Connecting origin location and travel mode, the average miles traveled by rail commuters are generally reflective of average distances to downtown Chicago. As shown in Table 5-3, Cook County rail commuters (who account for 98.9% of all railroad commuters) travel an average of 16.7 miles, while those in McHenry County travel 41.4 miles, and those in Walworth County travel 63.5 miles. Dane County is the most distant, with rail commuters traveling about 124.6 miles. (Note: Several of these counties are based on a very small sample set of fewer than 100 estimated rail commuters.)

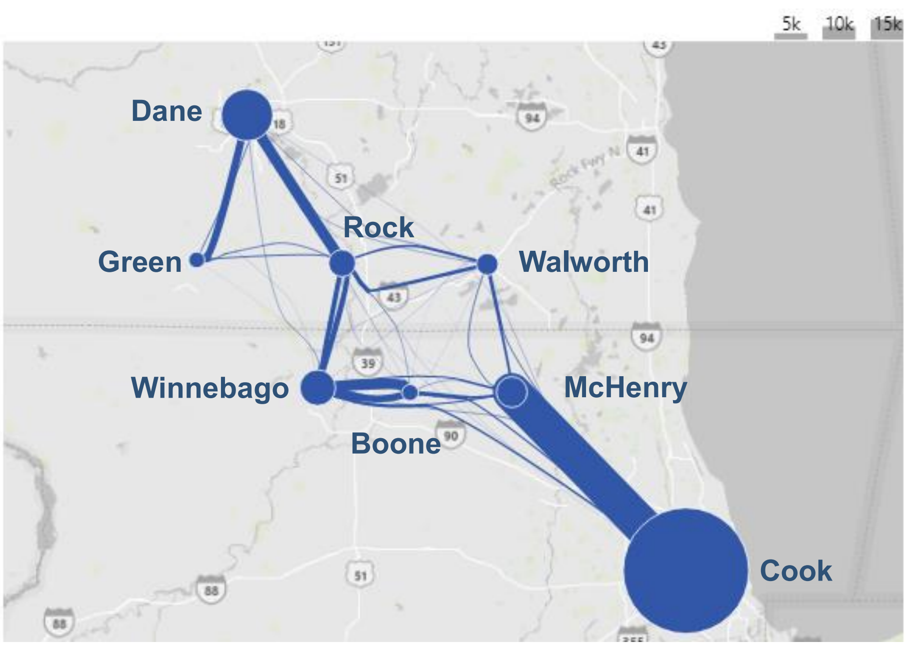
Table 5-3. Average Miles Traveled by Rail Commuters by Origin County

			Average Miles	% of Total Rail Commuters
Origin	IL	Boone	60.8	0.1%
		Cook	16.7	98.9%
		McHenry	41.4	0.4%
		Winnebago	54.6	0.3%
	WI	Dane	124.6	0.0%
		Green	112.3	0.0%
		Rock	92.5	0.0%
		Walworth	63.5	0.3%

Source: Air-line distances between origin and destination TAZ centroid, as reported in CTPP (2012-2016). Includes commuter flows among only Boone, Cook, McHenry, Winnebago Counties in Illinois; Dane, Green, Rock, and Walworth Counties in Wisconsin.

Figure 5-4 illustrates the county-to-county work commute flows, with the width of the flows representing the number of commuters by direction of travel (i.e., from home, to work). The size of the circles represent the number of commuter destinations within the county.

Figure 5-4. Inter-County Commuter Flows

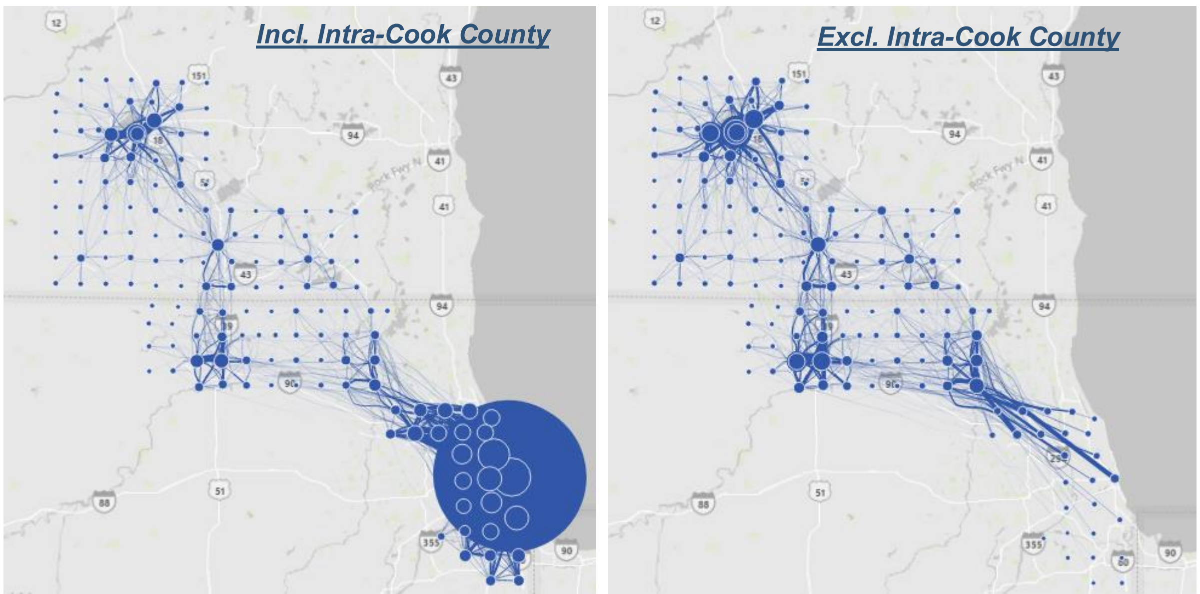


Source: CTPP (2016-2016). Counties analyzed include Boone, Cook, McHenry, Winnebago Counties in Illinois; Dane, Green, Rock, and Walworth Counties in Wisconsin.

County Subdivisions

Similar to the county-to-county flow maps above, Figure 5-5 illustrates the commuter flows between county subdivisions (i.e., cities, villages, towns, and townships). The comparatively short-distance of most commutes is indicated, although home-work trip-making between the major study area cities does occur. The map on the left of Figure 5-5 shows the relative scale of commuter travel near the study corridors in context with that in the Chicago area (primarily Cook County). On the right, the trips occurring within Cook County are excluded to better illustrate the travel flows to Cook County from the other seven counties being analyzed, as well as the smaller scale commuter networks in and among Madison, Janesville, Beloit, and Rockford.

Figure 5-5. Inter-County Subdivision Flows (with and without Intra-Cook County Flows)



Source: CTPP (2016-2016). Counties analyzed include Boone, Cook, McHenry, Winnebago Counties in Illinois; Dane, Green, Rock, and Walworth Counties in Wisconsin

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5.2 Commuter Flows Near Study Alignments

While the county subdivision analysis described above is useful to grasp the overall scale of commuter trip volumes across geographies, the standardized geographies do not reflect the unique first- and last-mile opportunities and constraints associated with commuter rail travel. Typically, riders board at more sparsely developed origin locations and alight at densely developed employment centers. Thus, park-n-ride is the dominant access mode for passenger rail, and the opportunity of using a personal automobile to travel from home to the boarding station dramatically increases the size of the origin market shed that a station can draw riders from. At the other end of the trip, most alighting passengers walk to their final destinations, though biking or connecting bus or subway connections can extend the size of the destination market shed.

This study alignment commuter flow analysis begins with describing the methodology for defining the origin and destination market sheds for station alternatives along the study alignments. Next, it defines the distance-based filtering process used to identify commuters within viable market sheds and tabulates those commuter markets by alignment and station origin-destination pair. Finally, the results are evaluated, and alignments are either advanced or dropped from further study.

Market Shed Development

Data from the 2019 Metra Origin-Destination Survey were analyzed to gauge the appropriate distance radii from the boarding station that would capture most of the rider origins. This was further refined based on distance from downtown (as reflected by fare zone) and whether the station was a line terminus or not. The average access distances range from three miles for stations near downtown to 10 miles for the furthest outlying stations, as shown in Table 5-4. As examples of the various categories, Park Ridge is a near suburb, Arlington Heights is a mid-suburb, Cary is a far suburb, and Harvard is a suburban terminus.

Table 5-4. Average Miles Traveled to Access Boarding Station

Station Type	Average Access Distance at Origin
Chicago, Near Suburbs	3 miles
Mid-Suburbs	5 miles
Far Suburbs	7 miles
Suburban Termini	10 miles

Source: Metra Origin-Destination Survey (2019), AECOM analysis.

These distances were used to generate the origin market sheds along the existing UP-NW line. Two different radii were applied to the study corridor alignments: 7 miles for non-terminal stations and 10 miles for termini. Where the resulting station buffers overlapped within a given alignment, the overlapping areas were assigned to the geographically nearest station, as measured in air-line distance. The resulting origin market sheds are depicted in Figure 5-6. It is assumed that commuters living outside of these origin sheds are likely to select a different travel mode—typically a private vehicle.

A similar—though simplified—approach was used to develop the destination sheds. Analysis of 2019 destination locations and mode revealed that roughly 80% of last-mile trips were completed on foot, and over 90% ended with the rider alighting at a central Chicago station (defined as fare Zone A). Together, riders walking from a Zone A station to their final destination comprised 76% of all Metra riders and traveled an average 0.12 miles. Outside of central Chicago, distances and modes of egress varied much more widely than they did for access trips, as the built environment and transportation/transit infrastructure surrounding the alighting station was similarly variegated[3]—variations that cannot be smoothed with the availability of a personal vehicle to complete the trip. For this reason, a mixture of professional judgement and data analysis was used to define the destination market shed radii, which are summarized in Table 5-5. The resulting destination market sheds are illustrated in Figure 5-7.

Table 5-5. Average Miles Traveled to Reach Destination from Alighting Station

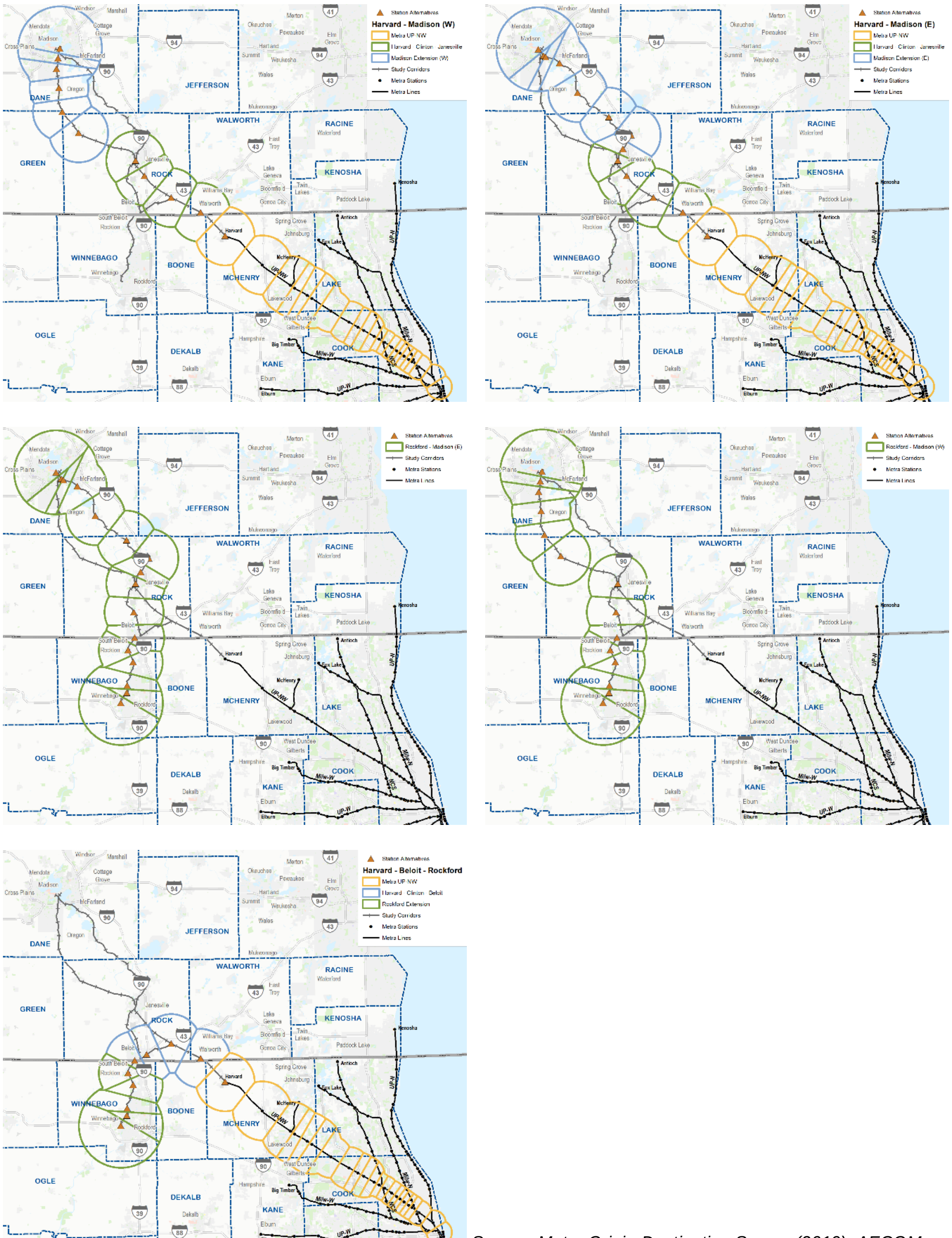
Station Type	Average Egress Distance
Chicago CBD	Loop (Custom)
Chicago, Near Suburb stations	1.0 mile
Mid-, Far Suburbs stations	0.5 mile
Study Area Downtowns	1.0 mile

Source: Metra Origin-Destination Survey (2019), AECOM analysis. Note that the Chicago CBD is not a standard radius, but rather a custom geography defined by the City of Chicago following the boundaries of the Loop.

[3] For example, some suburban stations with nearby, but not immediately adjacent employment centers, have transit service connections—either Pace suburban bus or private shuttles—which dramatically increase the distance that can be traveled beyond the typical walkshed.

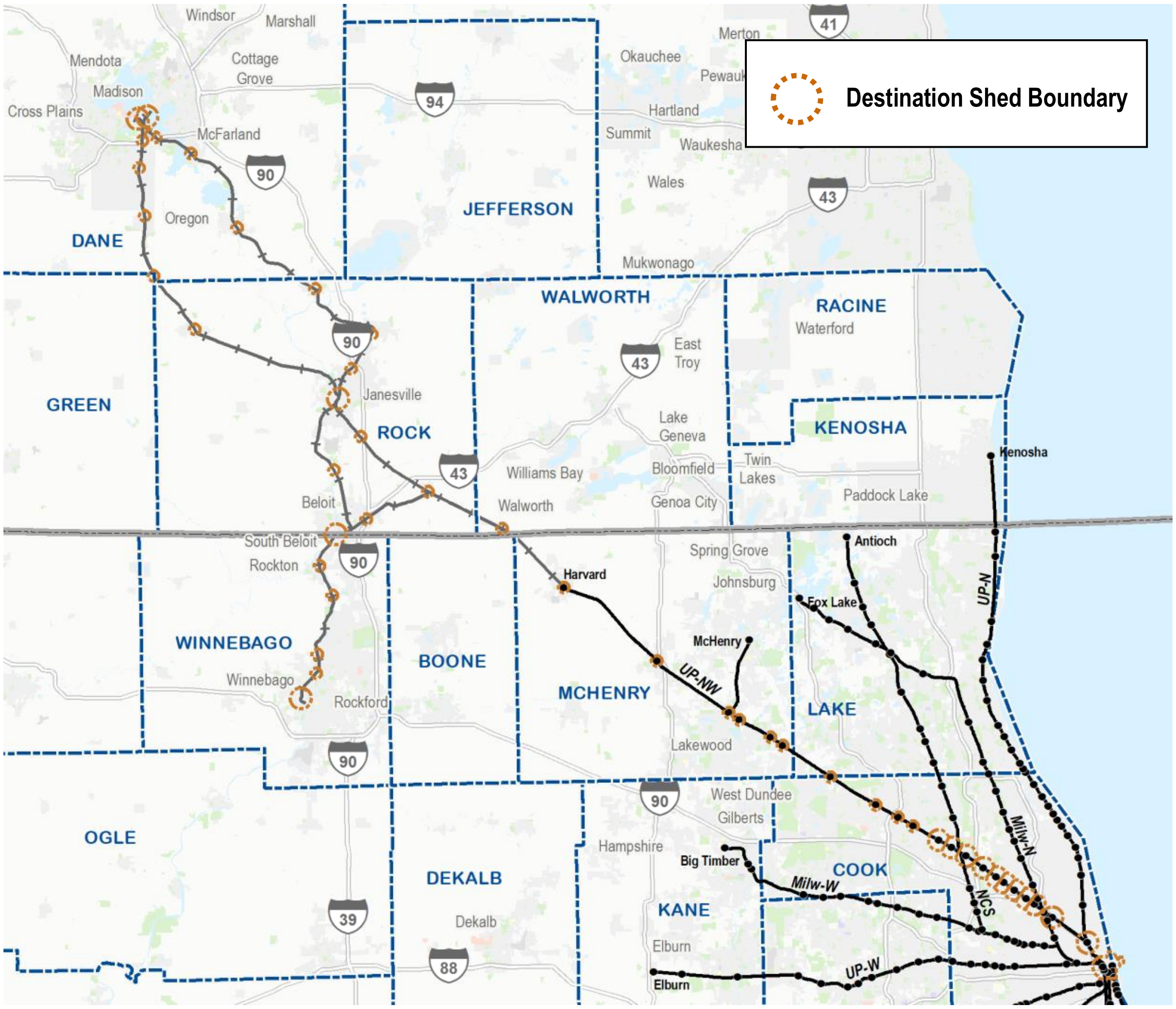
Having defined all market sheds, Census TAZ were assigned to the various sheds by location in order to analyze the CTPP commuter origin-destination data by these origin and destination market sheds. In situations where a TAZ was not fully encapsulated by a market shed, it was included if at least one acre and five percent of the TAZ were within the shed; and in the case of a TAZ overlapping more than one potential station's market shed, the TAZ was assigned to the station with the largest area of overlap.

Figure 5-6. Origin Market Sheds



Source: Metra Origin-Destination Survey (2019), AECOM analysis.

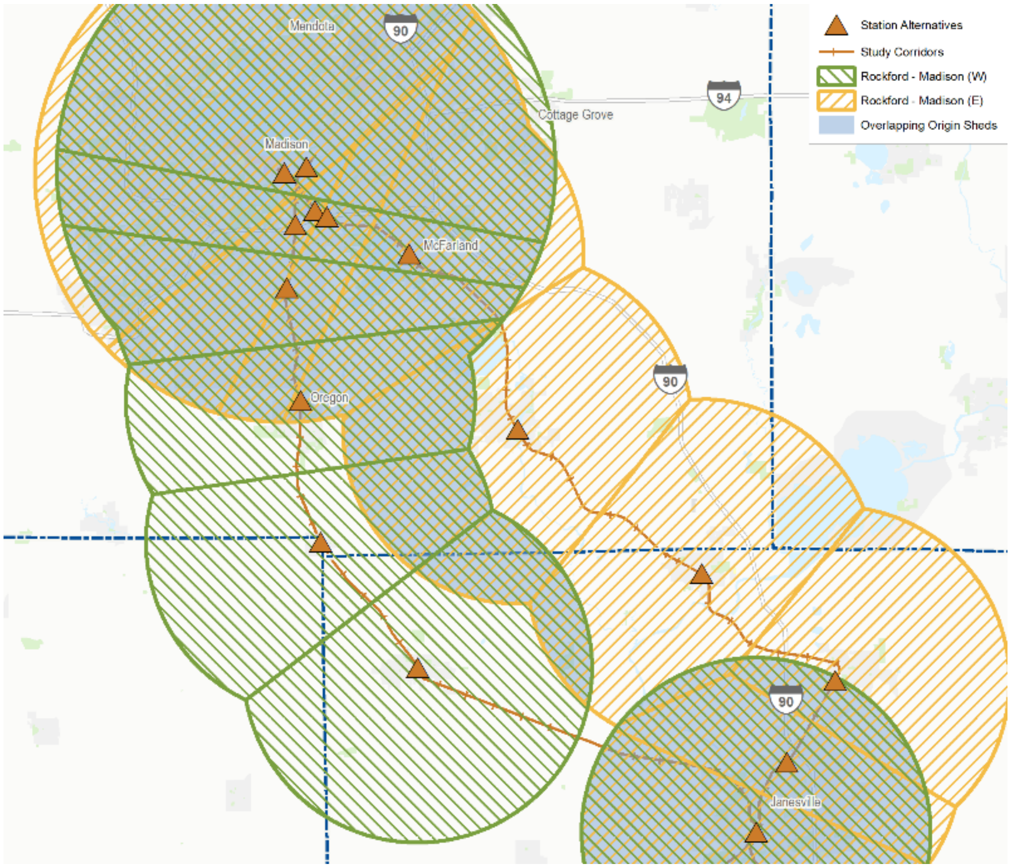
Figure 5-7. Destination Market Sheds



Source: Metra Origin-Destination Survey (2019), AECOM analysis.

In some cases, the alignment alternatives are near enough to each other that some overlap occurs in the origin (and less frequently the destination) market shed. An example of this is shown in Figure 5-8 for the East and West alignments of the Rockford-Madison connection. In the figure, the green buffer represents the West alignment origin sheds and the yellow represents the East alignment. The shaded area represents the overlap of the East and West alignment origin sheds. The travel flow analysis and ridership assessment conducted for this study consider each alignment alternative independently, so the commuters who reside in the overlapping area are included in the commuter market analysis for both the East and West alignments. For this reason, alignment commuter totals cannot be summed, but the tradeoff is that no commuters are artificially forced to “choose” between competing alignment alternatives—they are automatically assigned to any alignment within reasonable access/egress distance.

Figure 5-8. Overlapping Market Shed Example



Source: AECOM.

Distance-Based Filtering

With the origin and destination markets defined, commuter flows by any mode between the origin and destination market sheds of various alignments were tabulated using CTPP data. The data were then filtered to exclude origin-destination pairs (commutes) less than ten miles apart. In other words, commutes measured in air-line distance of less than 10 miles were excluded due to the observation that the potential inconvenience of traveling to/from the boarding and alighting station to meet designated train schedules would not be adequately offset by the convenience of driving for short distance trips.[4] Also, due to the large size of many of the origin sheds (i.e., where workers live), a further filtering was conducted to exclude TAZ origin-destination pairs whose boarding and alighting stations were less than ten miles from one another (i.e., a minimum milepost distance of ten miles). In other words, even if a commute from a household (located within a particular TAZ near a train station) met the 10-mile minimum airline distance to the destination zone (i.e., to their workplace within the destination station are), if the train ride did not meet a minimum track length distance of 10 miles, the origin-destination pair was also filtered out. This is an important filter to apply because it ensures that the portion of the trip actually completed by rail (i.e., excluding the first-and last-mile connections) is long

[4] As evidence of this, note that the average air-line distance traveled by commuter rail within the Chicago region is 17.2 miles, versus average distance of 8.5 miles for auto commutes, as indicated by the CTPP data. Appendix C examines two other commuter rail service areas: the Nashville Music City Star and Albuquerque-Santa Fe Rail Runner. The average distance traveled in Nashville is also 17 miles. The average distance traveled along the Rail Runner is 36 miles; 22 miles for commutes to Albuquerque and 45 miles for commutes to Santa Fe. The average distances are naturally influenced by the infrastructure (i.e., the length of the track in service), but 10 miles is a reasonable threshold, given that an estimated 85% to 92% of rail commutes for these peer commuter rail agencies are a minimum of 10 miles.

enough to potentially justify the selection of rail as the travel mode.[5] For example, someone who lives west of Beloit might have a 10-mile commute to a job in Roscoe, but the train ride would only be 6.5 miles, and would require first traveling to downtown Beloit to catch the train, plus traveling from the Roscoe train station to the place of employment. To summarize, the assumptions based on relevant commuter data from existing commuter rail service areas are that the greatest number of potential rail commuters live within 7 (or 10, if it is a terminus) miles of an origin train station, work within one mile of a destination train station, and travel at least 10 miles along the track to that destination train station.

To better illustrate this distance-based filtering process, examples of the valid and invalid TAZ origin-destination pairs are provided in Table 5-6 and Figure 5-9. The red outlined areas in the maps represent sample TAZs along the Rockford-Madison alignment. The calculated air-line distance between the origin TAZ and destination TAZ is provided in the table, along with the milepost distance between the assigned boarding and alighting stations. Out of the five TAZ origin-destination pairs (labeled A through E), the trips associated with TAZ pair B (Rockford-Downtown 2 to Roscoe) do not meet the minimum air-line distance threshold, and trips associated with TAZ pair A (Rockford-Downtown 1 to Rockford-North) and TAZ pair E (Beloit-Downtown to Roscoe) do not meet the minimum milepost distance threshold. Trips associated with TAZ pairs C and D meet both the minimum air-line distance and minimum milepost distance thresholds and are therefore considered valid for further analysis. Finally, it should be noted that no trips with an origin TAZ that is outside of the origin market shed (shown as a faint green buffer) or destination TAZ that is outside of the destination market shed (smaller faint orange dotted buffer) are included, as they do not meet the access/egress distance requirement established as part of the market shed development.

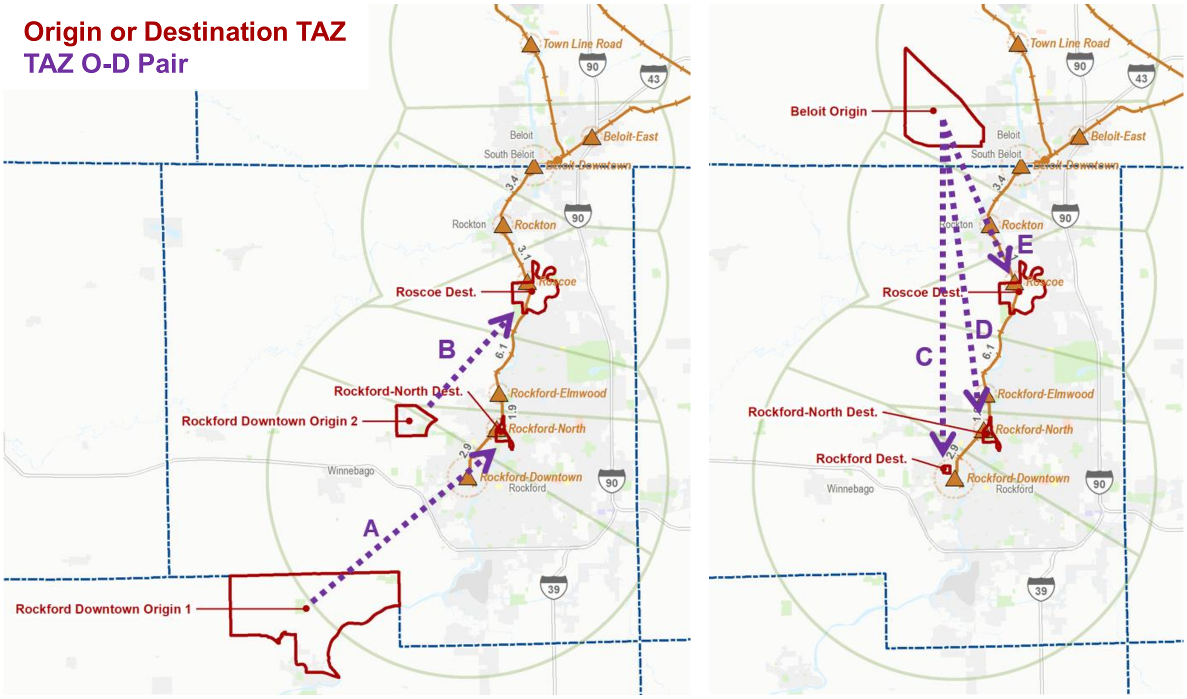
Table 5-6. Example TAZ Origin-Destination Pair Validity

ID	Origin TAZ	Destination TAZ	Air-line Distance (miles)	Air-line minimum	Milepost (MP) Distance	10-mile MP minimum	Validity
A	Rockford-Downtown 1	Rockford-North	13.2	Yes	2.9	No	No
B	Rockford-Downtown 2	Roscoe	8.9	No	10.9	Yes	No
C	Beloit- Downtown	Rockford-Downtown	17.4	Yes	18.0	Yes	Yes
D	Beloit- Downtown	Rockford-North	16.4	Yes	14.5	Yes	Yes
E	Beloit- Downtown	Roscoe	10.2	Yes	6.5	No	No

Source: AECOM.

[5] Milepost-distance thresholds will also feature prominently in the ridership assessment in Section 6.

Figure 5-9. Example TAZ Origin-Destination Pairs



Source: AECOM.

Commuter Markets by Alignment

The resulting commuter counts for each of the SLATS Rail Study alignments are described below. These commuter totals are irrespective of current travel mode (i.e., they include current drivers, carpoolers, bus-riders, etc.) but have been filtered for the 10-mile air-line and milepost distance previously described. Each alignment's total is also broken out by the boarding and alighting station that the commuters have been assigned to, in order to give greater insight into the particular home and work locations that are the major generators/attractors along the alignment. It is helpful to keep in mind that locations in the central portion of an alignment naturally show larger potential commuter markets than if they were a terminus, given that they can generate and attract trips in two directions.

Rockford – Madison (West) Alignment

There are about 6,800 existing commuters along this alignment, and this group is expected to grow to 8,000 by 2050. The various concentrations of commuter origins and destinations along the alignment are represented in Figure 5-11. The major origin location by a wide margin is Janesville-Downtown, followed by Beloit-Downtown, Evansville, and then the two central Rockford stations. The major destination locations include Beloit-Downtown, Janesville-Downtown, Madison-Monona, and Rockford-Downtown.

More detail on the specific origin-destination flows for existing and future conditions are provided in Table 5-7 and Table 5-8. These tables illustrate how most existing commuter flows are mid-range in distance (e.g., from the Stateline area to either Rockford or to Janesville, but not the full 50 miles to Madison). There is also a lack of end-to-end trips to/from the larger urban areas of Rockford and Madison, despite their local trip-generating and -attracting power. The Rockford-Madison (W) alignment hosts roughly 25% fewer commuters than the Rockford-Madison (E) alignment.

Beloit Findings

Commuters originating near Beloit currently total about 930, over half of whom are traveling to downtown Janesville for work. The next most common destination is downtown Rockford (22%).

Beloit attracts more commuters that it generates (1,440), 60% from Janesville and a combined 28% from near the Rockford-Downtown and Rockford-North stations.

Rockford – Madison (East) Alignment

There are about 9,500 existing commuters along this alignment, and this group is expected to grow to 10,700 by 2050. The various concentrations of commuter origins and destinations along the alignment are represented in Figure 5-12. The major origin locations are Stoughton, Beloit-Downtown, and Janesville-Downtown. The major destination locations include Madison-Kohl Center, Beloit-Downtown, Janesville-Downtown, Janesville-North, and Rockford-Downtown.

More detail on the specific origin-destination flows for existing and future conditions are provided in Table 5-9 and Table 5-10. Similar to the results for the Rockford-Madison (West) alignment, most existing commuter flows are mid-range in distance (i.e., not end-to-end). However, the commuter flows are notably higher in this east alternative due primarily to a larger number of commuters traveling from origins along the segment of the alignment between Stoughton and north Janesville.

Beloit Findings

Commuters originating near Beloit currently total about 1,450, a combined 70% of whom are traveling to Janesville-Downtown or Janesville-North for work. The next most common destination is downtown Rockford (14%).

Beloit attracts a similar number of commuters along this alignment, 53% from Janesville-Downtown and Janesville -North, and a combined 28% from near the Rockford-Downtown and Rockford-North stations.

Harvard – Madison (West) Alignment

There are about 3,300 existing commuters along this alignment, and this group is expected to grow to 4,600 by 2050. The various concentrations of commuter origins and destinations along the alignment are represented in Figure 5-14. The major origin locations are Janesville-Downtown and Evansville, and the major destination locations are Madison-Monona, Janesville-Downtown, and Evansville. There are about 50 commuters traveling from the existing Metra UP-NW line to the Harvard-Madison extension, and there are about 230 commuters traveling in the opposite direction.

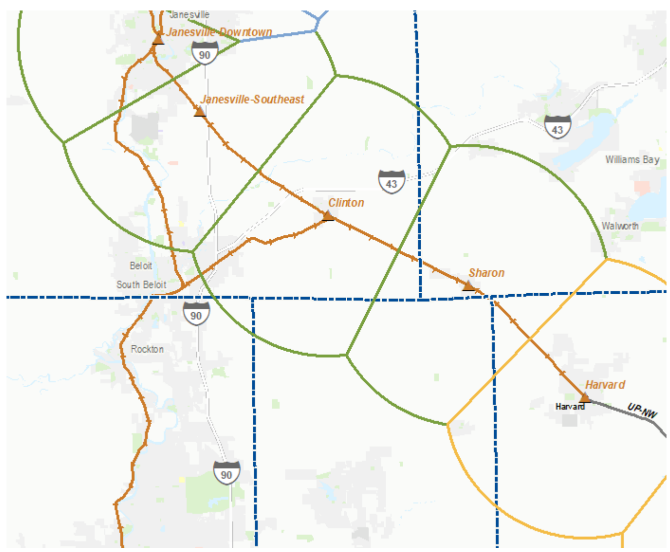
More detail on the specific origin-destination flows for existing and future conditions are provided in Table 5-13 and Table 5-14 (excluding the origins along existing UP-NW stations, due to the low level of commuters). As became apparent in the description of the Rockford-Madison alignments above, the west alignment is less promising than the east in terms of number of commuters, and this holds true for the exploration of each of these alignments vis-à-vis a Metra UP-NW extension. The Harvard-Madison (W) alignment hosts roughly 27% fewer commuters than the Harvard-Madison (E) alignment.

Beloit Findings

While Beloit is not directly served by the Harvard-Madison alignment, it is roughly ten miles air-line distance away from the Clinton and Janesville-Southeast station locations, where Beloit residents traveling longer commuting distances could potentially board.

Eastern portions of Beloit fall within the Clinton and Janesville-Southeast origin market sheds, as shown in Figure 5-10, and thus the commuters living in those locations are captured in this alignment's totals. However, given that the analysis of the Rockford-Madison alignments showed Janesville and Rockford to be the primary destinations for commuters originating near Beloit, it appears less likely that the Harvard-Madison alignment would prove as attractive to Beloit commuters, who may prefer to drive the hypotenuse along I-90 or US 51 to reach Janesville, rather than boarding at Clinton and continuing by rail.

Figure 5-10. Beloit and Harvard-Madison Origin Sheds



Harvard – Madison (East) Alignment

There are about 5,300 existing commuters along this alignment, and this group is expected to grow to 6,300 by 2050. The various concentrations of commuter origins and destinations along the alignment are represented in Figure 5-14. The major origin locations are Stoughton, Edgerton, and Janesville-Downtown. The major destination locations include Madison-Kohl Center, Stoughton, and Janesville-Downtown. There are about 70 commuters traveling from the existing Metra UP-NW line to the Harvard-Madison extension, and about 250 commuters traveling in the opposite direction.

More detail on the specific origin-destination flows for existing and future conditions are provided in Table 5-11 and Table 5-12 (excluding the origins along existing UP-NW stations, due to the lack of commuters). The promising patterns among locations along the Madison-Stoughton-Janesville segment have already been noted in the discussion of the Rockford-Madison (East) alignment above. The additional station locations south of Janesville and north of Harvard account for about 680 origins (13% of the alignment's total), or, from the opposite perspective, about 340 destinations (6%). The UP-NW stations account for 1% of origins and 5% of destinations—which can be attributed to the extremely long distances involved.

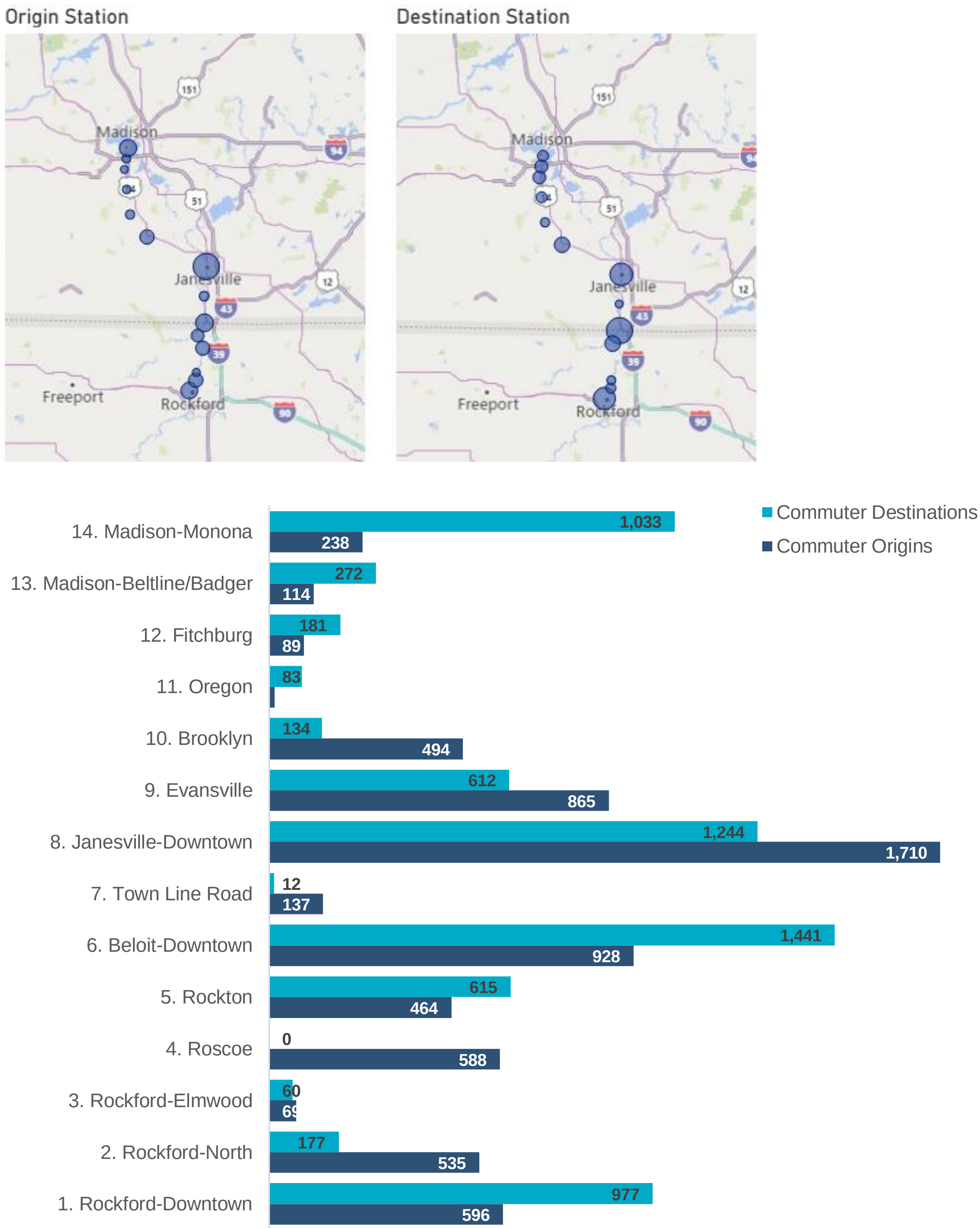
Harvard-Beloit (-Rockford) Alignment

There are about 3,700 existing commuters along this alignment, and this group is expected to grow to 4,500 by 2050. The various concentrations of commuter origins and destinations along the alignment are represented in Figure 5-15. The major origin locations are greater Rockford and—to a lesser extent—the Stateline area. The major destination locations include downtown Rockford (by a wide margin), followed by Rockton and Beloit-Downtown (with Beloit-East emerging as a significant trip attractor in future). About 10% of commuters travel from the existing Metra UP-NW line to a destination along the Harvard-Rockford extension (primarily in the greater Rockford area). There are about twice as many (780, or 21%) traveling in the opposite direction, mostly to nearer destinations in McHenry County. It should be noted that no information is available about the route selected, only the origin and destination locations; for this reason, it is reasonable to assume that the commuters traveling between the greater Rockford area and destinations in McHenry County are driving directly, e.g., using Highway 173.

> ***Beloit Findings***
>
> *Commuters originating near Beloit-Downtown and Beloit-East currently total about 440, a combined 86% of whom are traveling to workplaces near one of the three Rockford station locations. Only 4% are traveling to a destination along the UP-NW.*
>
> *Along this alignment, Beloit attracts more commuters than it generates (780 vs. 440). Just over 70% of the identified Beloit station area workers are from the Rockford-Downtown and Rockford-North areas, 14% are from stations along the UP-NW, and 8% are from the Sharon/Clinton area.*
>
> *Taken together, the most promising alignment for Beloit area residents and workers appears to be the Rockford-Madison alignment, given that it provides the most direct access to existing markets in Janesville and Rockford.*

More detail on the specific origin-destination flows for existing and future conditions are provided in Table 5-15 and Table 5-16. As visualized in these tables, the locations between downtown Beloit and Rockford show much more promising travel flows than the area between Beloit and the existing Harvard station. Given that this is an indirect routing between Rockford and the Metra UP-NW line (as well as the ongoing project to establish intercity rail service from Chicago to Rockford), the potential of these greater Rockford commuters becoming riders along an alignment including the Metra UP-NW line remains in question. Excluding these commuters who either start or end their trip in the Rockford area in order to focus on solely the Harvard-Beloit alignment reduces the commuter market by roughly 90% (500 existing, estimated 770 in 2050), rendering it essentially unviable.

Figure 5-11. Rockford-Madison (West): Existing Commuters by Origin & Destination



Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Table 5-7. Rockford-Madison (West): Station-to-Station Existing Commuter Flows

Destination Station

Origin Station	Rockford-Downtown	Rockford-North	Rockford-Elmwood	Roscoe	Rockton	Beloit-Downtown	Town Line Road	Janesville-Downtown	Evansville	Brooklyn	Oregon	Fitchburg	Madison-Beltline/Badger	Madison-Monona	Total
1. Rockford-Downtown	0	0	0	0	336	220	0	10	0	0	0	0	0	30	596
2. Rockford-North	0	0	0	0	252	188	0	80	15	0	0	0	0	0	535
3. Rockford-Elmwood	0	0	0	0	0	49	0	20	0	0	0	0	0	0	69
4. Roscoe	424	0	0	0	0	0	0	139	0	0	0	10	0	15	588
5. Rockton	299	63	0	0	0	0	0	88	0	0	0	10	0	4	464
6. Beloit-Downtown	200	59	48	0	0	0	0	501	88	0	0	0	4	28	928
7. Town Line Road	12	55	8	0	4	0	0	0	27	0	8	0	4	19	137
8. Janesville-Downtown	8	0	4	0	23	853	0	0	373	35	10	33	74	297	1,710
9. Evansville	4	0	0	0	0	72	8	234	0	0	65	98	84	300	865
10. Brooklyn	0	0	0	0	0	4	0	14	0	0	0	30	106	340	494
11. Oregon	0	0	0	0	0	0	0	14	0	0	0	0	0	0	14
12. Fitchburg	0	0	0	0	0	0	0	29	40	20	0	0	0	0	89
13. Madison-Beltline/Badger	0	0	0	0	0	0	0	19	20	75	0	0	0	0	114
14. Madison-Monona	30	0	0	0	0	55	4	96	49	4	0	0	0	0	238
Total	977	177	60	0	615	1,441	12	1,244	612	134	83	181	272	1,033	6,841

Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

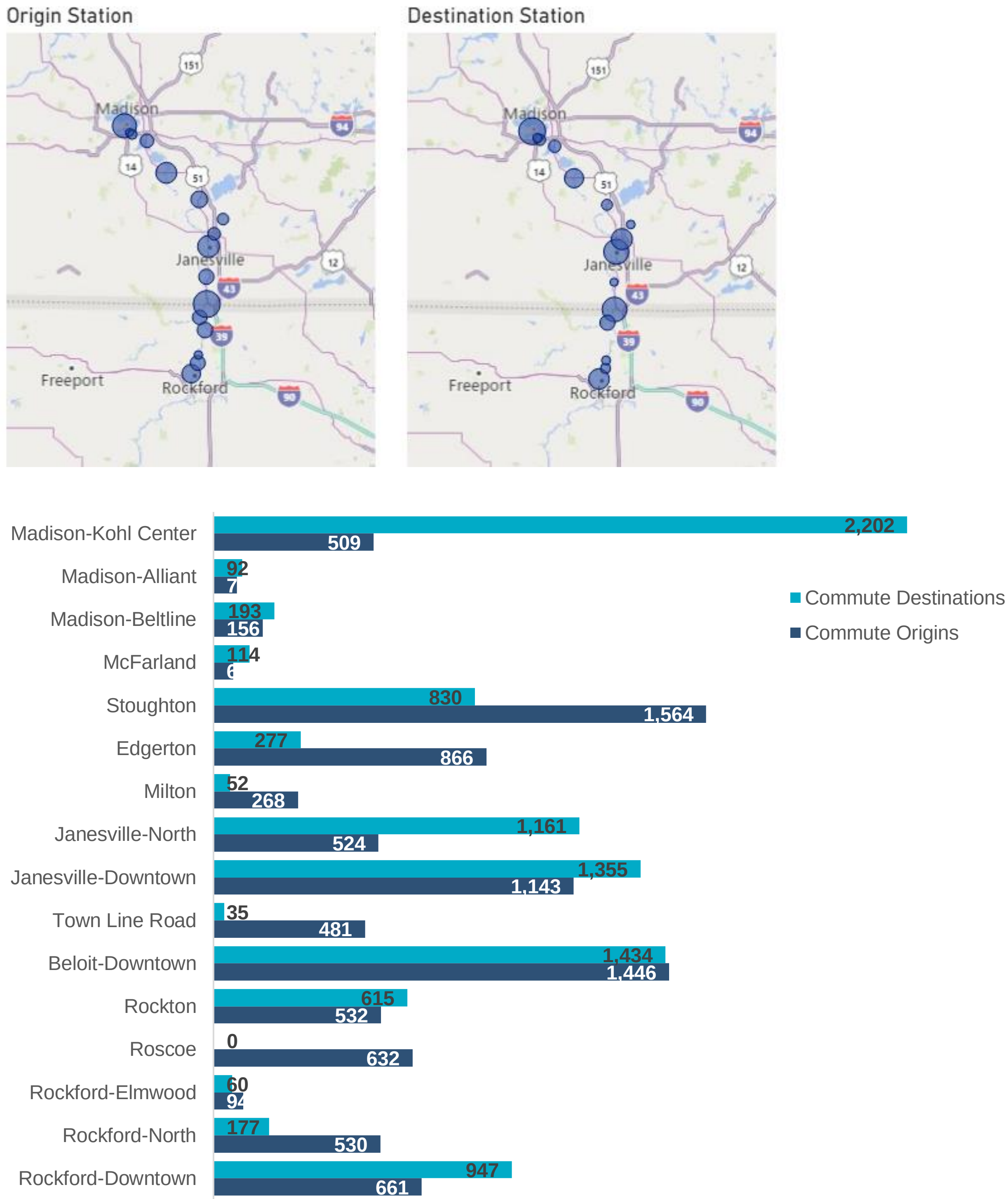
Table 5-8. Rockford-Madison (West): Station-to-Station 2050 Commuter Flows

Destination Station

Origin Station	Rockford-Downtown	Rockford-North	Rockford-Elmwood	Roscoe	Rockton	Beloit-Downtown	Town Line Road	Janesville-Downtown	Evansville	Brooklyn	Oregon	Fitchburg	Madison-Beltline/Badger	Madison-Monona	Total
1. Rockford-Downtown	0	0	0	0	347	233	0	9	0	0	0	0	0	31	620
2. Rockford-North	0	0	0	0	258	220	0	71	17	0	0	0	0	0	566
3. Rockford-Elmwood	0	0	0	0	0	50	0	20	0	0	0	0	0	0	70
4. Roscoe	437	0	0	0	0	0	0	125	0	0	0	21	0	16	599
5. Rockton	310	63	0	0	0	0	0	89	0	0	0	21	0	4	487
6. Beloit-Downtown	205	59	51	0	0	0	0	609	119	0	0	0	4	28	1,075
7. Town Line Road	12	55	8	0	4	0	0	0	37	0	9	0	5	21	151
8. Janesville-Downtown	8	0	4	0	24	1,041	0	0	464	92	10	68	93	353	2,157
9. Evansville	4	0	0	0	0	111	8	267	0	0	76	203	98	330	1,097
10. Brooklyn	0	0	0	0	0	4	0	21	0	0	0	62	127	375	589
11. Oregon	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12
12. Fitchburg	0	0	0	0	0	0	0	23	55	53	0	0	0	0	131
13. Madison-Beltline/Badger	0	0	0	0	0	0	0	17	27	197	0	0	0	0	241
14. Madison-Monona	31	0	0	0	0	56	4	85	66	11	0	0	0	0	253
Total	1,007	177	63	0	633	1,715	12	1,348	785	353	95	375	327	1,158	8,048

Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Figure 5-12. Rockford-Madison (East): Existing Commuters by Origin and Destination



Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Includes trips that are between study corridor market sheds and UP-NW market sheds (in either direction of travel), but excludes commuters traveling between UP-NW market sheds.

Table 5-9. Rockford-Madison (East): Station-to-Station Existing Commuter Flows

Origin Station	Destination Station: Rockford-Downtown	Rockford-North	Rockford-Elmwood	Roscoe	Rockton	Beloit-Downtown	Town Line Road	Janesville-Downtown	Janesville-North	Milton	Edgerton	Stoughton	McFarland	Madison-Beltline	Madison-Alliant	Madison-Kohl Center	Total
1. Rockford-Downtown	0	0	0	0	336	220	0	10	45	0	0	0	0	0	0	50	661
2. Rockford-North	0	0	0	0	252	188	0	80	10	0	0	0	0	0	0	0	530
3. Rockford-Elmwood	0	0	0	0	0	49	0	20	25	0	0	0	0	0	0	0	94
4. Roscoe	424	0	0	0	0	0	0	139	39	0	0	15	0	0	0	15	632
5. Rockton	299	63	0	0	0	0	0	88	59	0	0	0	0	0	4	19	532
6. Beloit-Downtown	200	59	48	0	0	0	0	501	515	24	39	24	0	0	0	36	1,446
7. Town Line Road	12	55	8	0	4	0	0	0	275	18	8	40	20	0	0	41	481
8. Janesville-Downtown	12	0	4	0	23	580	0	0	0	0	137	87	19	23	24	234	1,143
9. Janesville-North	0	0	0	0	0	181	15	0	0	0	53	68	15	4	0	188	524
10. Milton	0	0	0	0	0	108	4	0	0	0	0	26	8	0	20	102	268
11. Edgerton	0	0	0	0	0	37	12	313	54	0	0	47	52	44	0	307	866
12. Stoughton	0	0	0	0	0	16	0	64	86	0	22	0	0	122	44	1,210	1,564
13. McFarland	0	0	0	0	0	0	4	30	19	10	0	0	0	0	0	0	63
14. Madison-Beltline	0	0	0	0	0	0	0	34	10	0	4	108	0	0	0	0	156
15. Madison-Alliant	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0	0	75
16. Madison-Kohl Center	0	0	0	0	0	55	0	76	24	0	14	340	0	0	0	0	509
Total	947	177	60	0	615	1,434	35	1,355	1,161	52	277	830	114	193	92	2,202	9,544

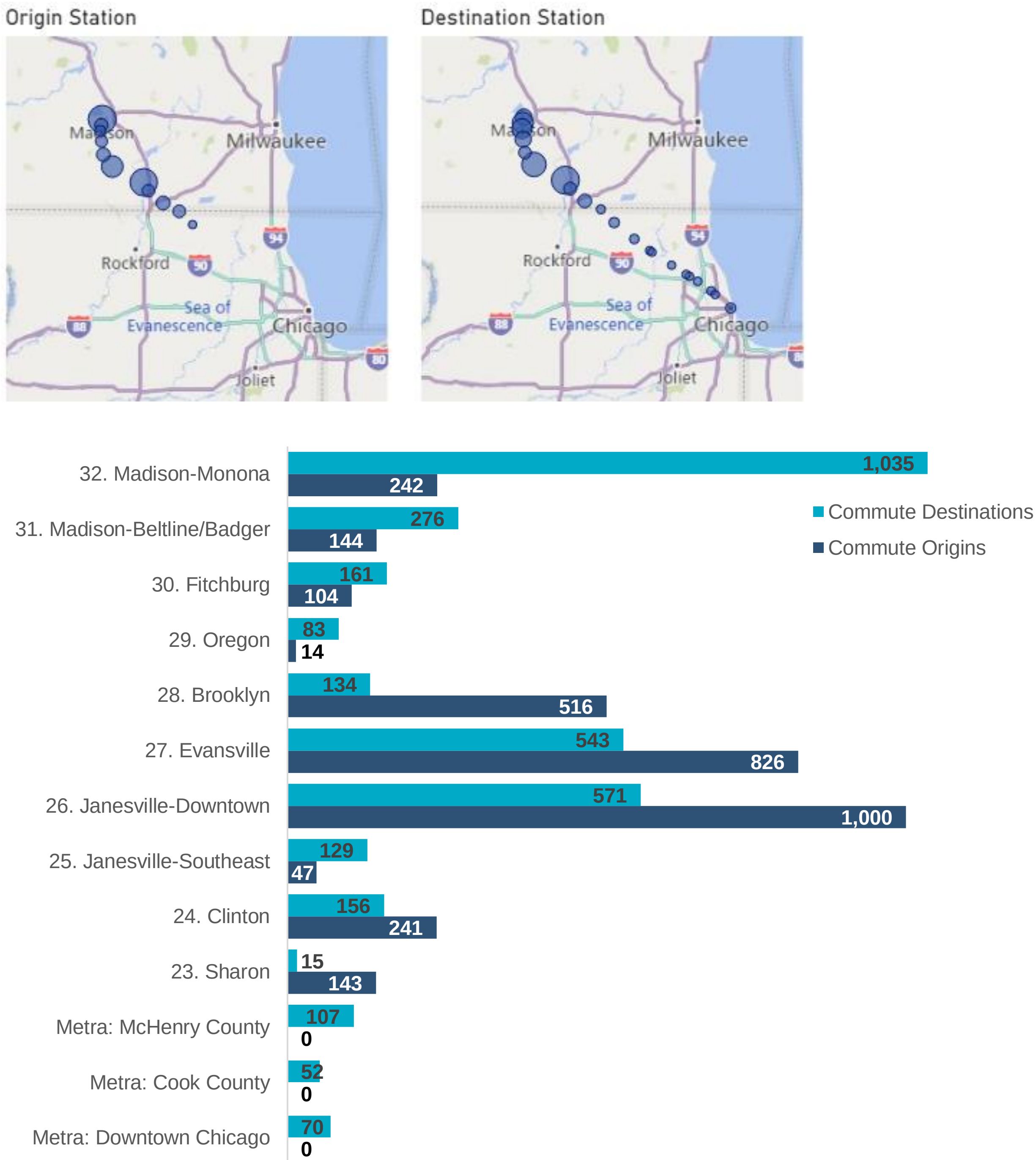
Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Table 5-10. Rockford-Madison (East): Station-to-Station 2050 Commuter Flows

Origin Station	Destination Station: Rockford-Downtown	Rockford-North	Rockford-Elmwood	Roscoe	Rockton	Beloit-Downtown	Town Line Road	Janesville-Downtown	Janesville-North	Milton	Edgerton	Stoughton	McFarland	Madison-Beltline	Madison-Alliant	Madison-Kohl Center	Total
1. Rockford-Downtown	0	0	0	0	347	233	0	9	43	0	0	0	0	0	0	51	683
2. Rockford-North	0	0	0	0	258	220	0	71	9	0	0	0	0	0	0	0	558
3. Rockford-Elmwood	0	0	0	0	0	50	0	20	40	0	0	0	0	0	0	0	110
4. Roscoe	437	0	0	0	0	0	0	125	75	0	0	15	0	0	0	16	668
5. Rockton	310	63	0	0	0	0	0	89	75	0	0	0	0	0	4	19	560
6. Beloit-Downtown	205	59	51	0	0	0	0	609	809	40	46	25	0	0	0	36	1,880
7. Town Line Road	12	55	8	0	4	0	0	0	310	21	9	40	25	0	0	42	526
8. Janesville-Downtown	12	0	4	0	24	695	0	0	0	0	158	89	24	23	28	258	1,315
9. Janesville-North	0	0	0	0	0	238	15	0	0	0	62	69	19	4	0	191	598
10. Milton	0	0	0	0	0	137	4	0	0	0	0	26	10	0	22	109	308
11. Edgerton	0	0	0	0	0	42	12	465	71	0	0	48	63	44	0	316	1,061
12. Stoughton	0	0	0	0	0	18	0	47	118	0	25	0	0	122	55	1,267	1,652
13. McFarland	0	0	0	0	0	0	4	33	19	12	0	0	0	0	0	0	68
14. Madison-Beltline	0	0	0	0	0	0	0	27	10	0	4	110	0	0	0	0	151
15. Madison-Alliant	0	0	0	0	0	0	0	0	0	0	0	76	0	0	0	0	76
16. Madison-Kohl Center	0	0	0	0	0	56	0	61	33	0	16	348	0	0	0	0	514
Total	976	177	63	0	633	1,689	35	1,556	1,612	73	320	846	141	193	109	2,305	10,728

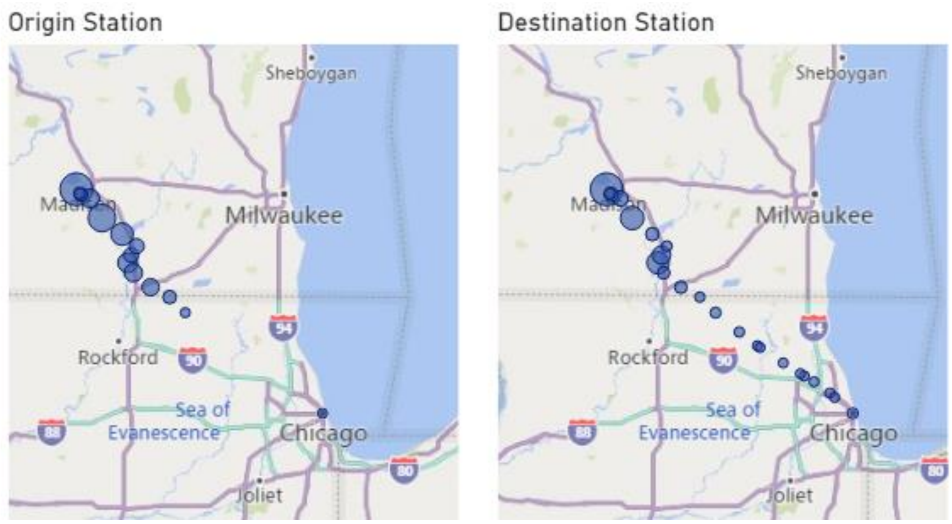
Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

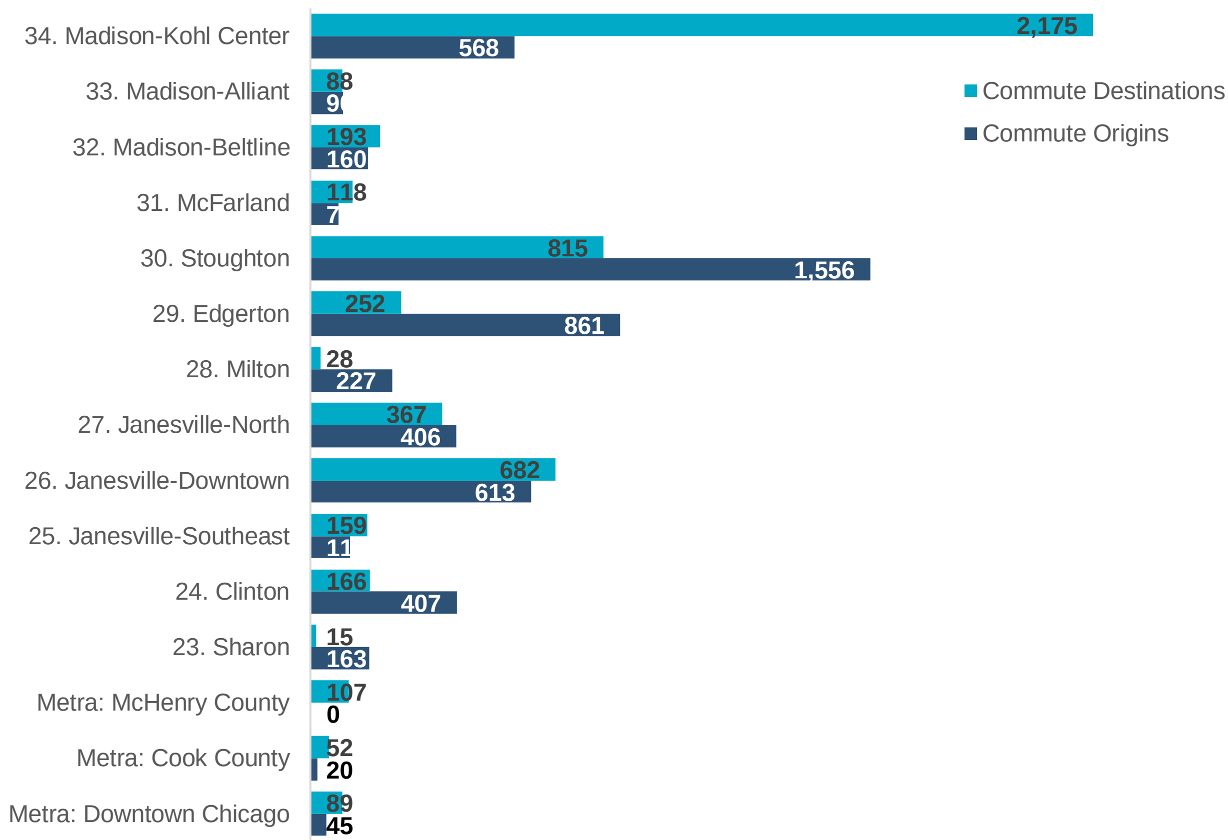
Figure 5-13. Harvard-Madison (West): Existing Commuters by Origin & Destination



Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Includes trips that are between study corridor market sheds and UP-NW market sheds (in either direction of travel), but excludes commuters traveling between UP-NW market sheds.

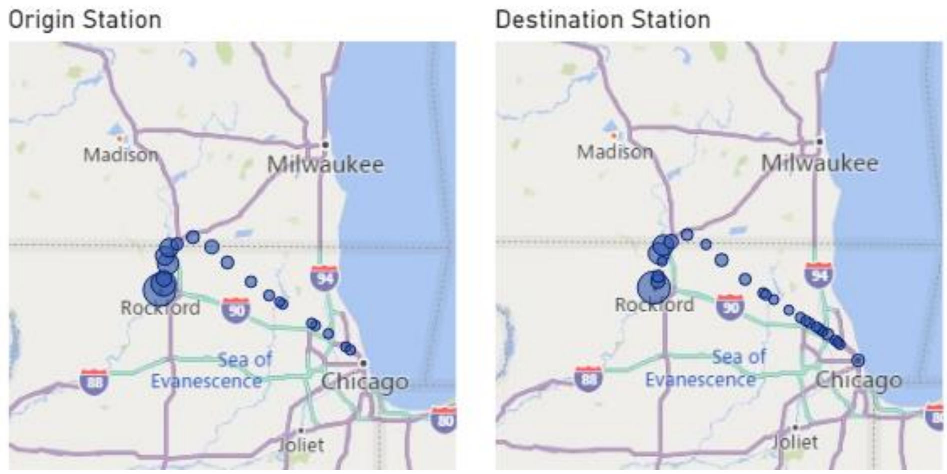
Figure 5-14. Harvard-Madison (East): Existing Commuters by Origin & Destination



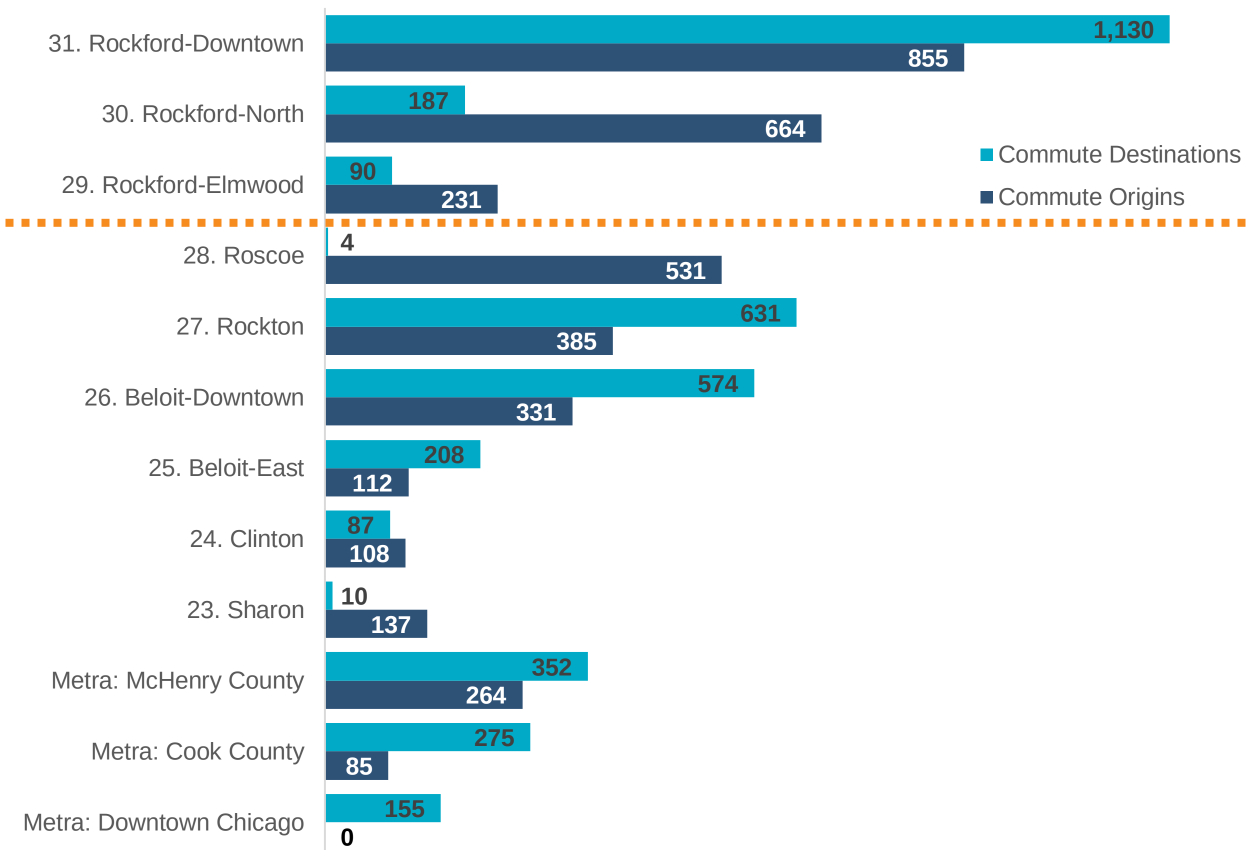


Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Includes trips that are between study corridor market sheds and UP-NW market sheds (in either direction of travel), but excludes commuters traveling between UP-NW market sheds.

Figure 5-15. Harvard-Beloit-Rockford: Existing Commuters by Origin & Destination



Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least 10 miles air-line distance apart. Milepost-distance filtering not applied. Includes trips that are between study corridor market sheds and UP-NW market sheds (in either direction of travel), but excludes commuters traveling between UP-NW market sheds, as those travelers are already served by the existing Metra service.



Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Includes trips that are between study corridor market sheds and UP-NW market sheds (in either direction of travel), but excludes commuters traveling between UP-NW market sheds. Orange dashed line approximates the breakpoint between origin locations that would be included in the Rockford Extension versus the Harvard-Beloit route.

Table 5-11. Harvard-Madison (East) Existing

	Destination Station																																	
Origin Station	Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Janesville-Southeast	Janesville-Downtown	Janesville-North	Milton	Edgerton	Stoughton	McFarland	Madison-Beltline	Madison-Alliant	Madison-Kohl Center	Total
23. Sharon	16	0	0	0	0	0	0	0	0	0	10	0	0	0	0	4	0	0	4	12	41	0	0	0	12	44	16	0	0	0	0	0	0	4	163
24. Clinton	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	42	0	0	0	121	158	8	18	20	4	0	0	28	407
25. Janesville-Southeast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	14	44	20	0	0	23	111
26. Janesville-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	15	66	0	0	0	0	127	87	19	23	24	248	613
27. Janesville-North	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	74	0	0	0	0	53	68	15	4	0	188	406
28. Milton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	49	0	0	0	0	26	8	0	20	102	227
29. Edgerton	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	36	313	54	0	0	47	52	44	0	307	861
30. Stoughton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	64	86	0	22	0	0	122	44	1,210	1,556
31. McFarland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	30	19	10	0	0	0	0	0	0	79
32. Madison-Beltline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	34	10	0	4	108	0	0	0	0	160
33. Madison-Alliant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	75	0	0	0	0	90
34. Madison-Kohl Center	69	0	0	0	0	20	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	15	76	24	0	14	340	0	0	0	0	568
Total	89	0	0	4	0	20	0	0	0	0	10	0	10	4	0	4	0	0	4	12	45	46	15	166	159	682	367	28	252	815	118	193	88	2,175	5,306

Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Note that the origins along the UP-NW are not shown here due to their small number: about 1% of the total, most originating from Downtown Chicago.

Table 5-12. Harvard-Madison (East) 2050

	Destination Station																																	
Origin Station	Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Janesville-Southeast	Janesville-Downtown	Janesville-North	Milton	Edgerton	Stoughton	McFarland	Madison-Beltline	Madison-Alliant	Madison-Kohl Center	Total
23. Sharon	17	0	0	0	0	0	0	0	0	0	11	0	0	0	0	4	0	0	5	17	57	0	0	0	42	40	18	0	0	0	0	0	0	4	215
24. Clinton	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	72	0	0	0	136	187	16	21	21	4	0	0	29	497
25. Janesville-Southeast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	16	44	25	0	0	24	121
26. Janesville-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	18	119	0	0	0	0	146	89	24	23	28	272	725
27. Janesville-North	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	168	0	0	0	0	62	69	19	4	0	191	518
28. Milton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	157	0	0	0	0	26	10	0	22	109	369
29. Edgerton	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	121	465	71	0	0	48	63	44	0	316	1,142
30. Stoughton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	47	118	0	25	0	0	122	55	1,267	1,665
31. McFarland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	33	19	12	0	0	0	0	0	0	129
32. Madison-Beltline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	27	10	0	4	110	0	0	0	0	164
33. Madison-Alliant	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	76	0	0	0	0	124
34. Madison-Kohl Center	72	0	0	0	0	22	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	48	61	33	0	16	348	0	0	0	0	611
Total	93	0	0	5	0	22	0	0	0	0	11	0	11	5	0	4	0	0	5	17	63	78	18	342	525	809	456	40	290	831	145	193	105	2,279	6,347

Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts. Note that the origins along the UP-NW are not shown here due to their small number: about 1% of the total, most originating from Downtown Chicago.

Table 5-13. Harvard-Madison (West) Existing

	Destination Station																															
Origin Station	Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Janesville-Southeast	Janesville-Downtown	Evansville	Brooklyn	Oregon	Fitchburg	Madison-Beltline/Badger	Madison-Monona	Total
23. Sharon	16	0	0	0	0	0	0	0	0	0	10	0	0	0	0	4	0	0	4	12	41	0	0	0	12	44	0	0	0	0	0	0	143
24. Clinton	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	42	0	0	0	121	34	0	4	0	4	28	241
25. Janesville-Southeast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	4	0	8	15	47
26. Janesville-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	15	148	0	0	380	35	10	33	74	297	1,000
27. Evansville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	41	234	0	0	65	98	84	300	826
28. Brooklyn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	22	14	0	0	0	30	106	340	516
29. Oregon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	14
30. Fitchburg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	29	40	20	0	0	0	0	104
31. Madison-Beltline/Badger	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	19	20	75	0	0	0	0	144
32. Madison-Monona	34	0	0	0	0	20	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	29	96	49	4	0	0	0	0	242
Total	70	0	0	4	0	20	0	0	0	0	10	0	10	4	0	4	0	0	4	12	45	46	15	156	129	571	543	134	83	161	276	1,035	3,332

Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Table 5-14. Harvard-Madison (West) 2050

	Destination Station																															
Origin Station	Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Janesville-Southeast	Janesville-Downtown	Evansville	Brooklyn	Oregon	Fitchburg	Madison-Beltline/Badger	Madison-Monona	Total
23. Sharon	17	0	0	0	0	0	0	0	0	0	11	0	0	0	0	4	0	0	5	17	57	0	0	0	42	40	0	0	0	0	0	0	193
24. Clinton	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	72	0	0	0	136	40	0	5	0	5	30	299
25. Janesville-Southeast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	4	0	9	16	52
26. Janesville-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	6	18	297	0	0	478	92	10	68	93	353	1,420
27. Evansville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	146	267	0	0	76	203	98	330	1,130
28. Brooklyn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	76	21	0	0	0	62	127	375	665
29. Oregon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12
30. Fitchburg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	23	55	53	0	0	0	0	179
31. Madison-Beltline/Badger	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	17	27	197	0	0	0	0	295
32. Madison-Monona	35	0	0	0	0	22	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	94	85	66	11	0	0	0	0	324
Total	74	0	0	5	0	22	0	0	0	0	11	0	11	5	0	4	0	0	5	17	63	78	18	311	438	601	689	353	95	333	332	1,161	4,626

Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Table 5-15. Harvard-Beloit-Rockford Existing

Origin Station	Destination Station: Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Beloit-East	Beloit-Downtown	Rockton	Roscoe	Rockford-Elmwood	Rockford-North	Rockford-Downtown	Total
1. Ogilvie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
2. Clybourn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
3. Irving Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	**25**
4. Jefferson Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	**15**
5. Gladstone Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
6. Norwood Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
7. Edison Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
8. Park Ridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
9. Dee Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
10. Des Plaines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	**15**
11. Cumberland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
12. Mount Prospect	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13. Arlington Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	**10**
14. Arlington Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	**20**
15. Palatine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
16. Barrington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
17. Fox River Grove	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	4	**14**
18. Cary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	**4**
19. Pingree Rd.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
20. Crystal Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	10	0	0	0	10	4	**49**
21. Woodstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	4	0	0	0	45	**73**
22. Harvard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	4	30	0	75	**124**
23. Sharon	16	0	0	0	0	0	0	0	0	0	10	0	0	0	0	4	0	0	4	12	41	0	0	0	4	30	12	0	0	0	4	**137**
24. Clinton	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	42	0	0	0	28	12	0	4	0	14	**108**
25. Beloit-East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	55	19	**112**
26. Beloit-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	10	32	0	0	0	0	18	59	193	**331**
27. Rockton	4	0	0	0	0	0	0	0	15	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	299	**385**
28. Roscoe	4	0	0	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	4	15	39	0	0	0	0	0	0	0	0	424	**531**
29. Rockford-Elmwood	24	0	0	0	0	15	0	0	50	0	0	10	0	10	0	0	0	0	0	10	24	15	0	20	4	49	0	0	0	0	0	**231**
30. Rockford-North	42	0	0	0	4	10	0	0	4	0	0	10	15	10	15	4	0	0	0	0	10	0	0	0	100	188	252	0	0	0	0	**664**
31. Rockford-Downtown	65	0	0	0	0	0	0	0	0	4	4	0	24	0	4	0	0	10	35	20	14	34	0	35	50	220	336	0	0	0	0	**855**
	155	**0**	**0**	**4**	**4**	**25**	**0**	**0**	**114**	**4**	**14**	**20**	**39**	**20**	**23**	**8**	**0**	**10**	**39**	**46**	**108**	**149**	**10**	**87**	**208**	**574**	**631**	**4**	**90**	**187**	**1,130**	3,703

Source: CTPP (2012-2016). TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Table 5-16. Harvard-Beloit-Rockford 2050

Destination Station

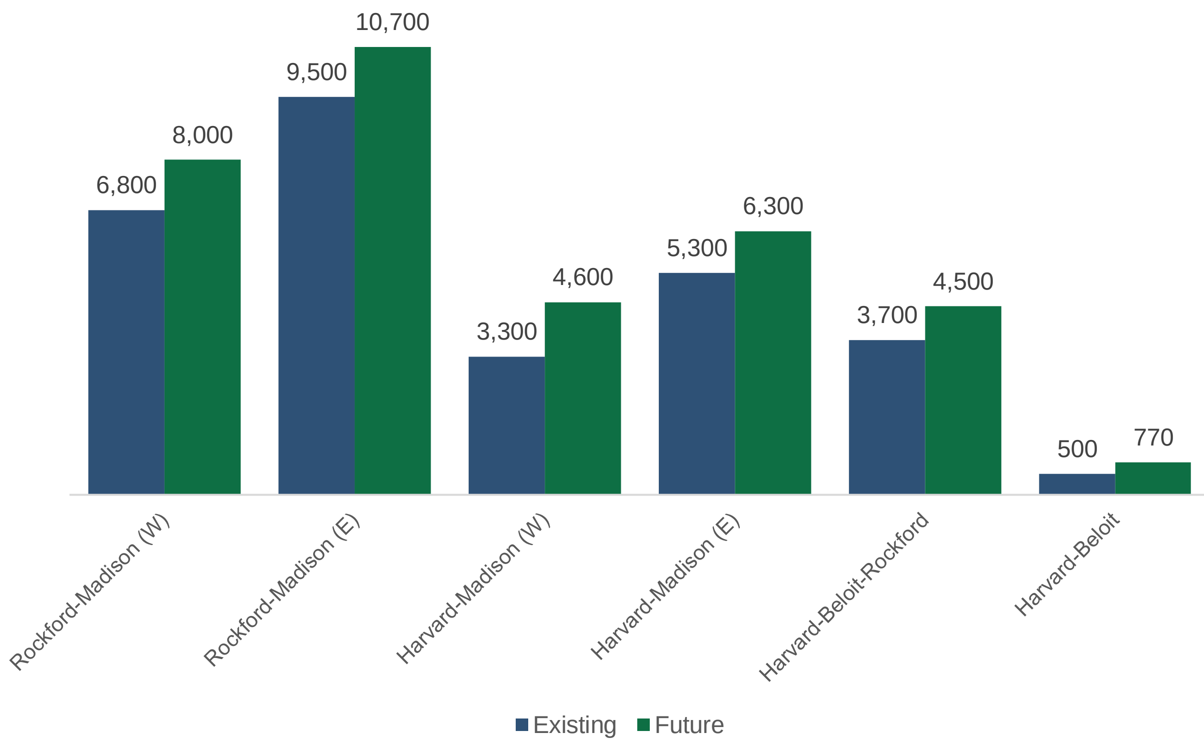
Origin Station	Ogilvie	Clybourn	Irving Park	Jefferson Park	Gladstone Park	Norwood Park	Edison Park	Park Ridge	Dee Road	Des Plaines	Cumberland	Mount Prospect	Arlington Heights	Arlington Park	Palatine	Barrington	Fox River Grove	Cary	Pingree Rd.	Crystal Lake	Woodstock	Harvard	Sharon	Clinton	Beloit-East	Beloit-Downtown	Rockton	Roscoe	Rockford-Elmwood	Rockford-North	Rockford-Downtown	Total
1. Ogilvie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Clybourn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Irving Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26
4. Jefferson Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	21
5. Gladstone Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Norwood Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Edison Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Park Ridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Dee Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10. Des Plaines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	0	0	0	0	0	0	39
11. Cumberland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. Mount Prospect	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. Arlington Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9
14. Arlington Park	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
15. Palatine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Barrington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17. Fox River Grove	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	4	30
18. Cary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
19. Pingree Rd.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. Crystal Lake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	9	0	0	0	10	6	115
21. Woodstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	4	0	0	0	46	75
22. Harvard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	4	30	0	77	126
23. Sharon	17	0	0	0	0	0	0	0	0	0	11	0	0	0	0	4	0	0	5	17	57	0	0	0	10	35	12	0	0	0	4	172
24. Clinton	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	72	0	0	0	29	12	0	4	0	13	141
25. Beloit-East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	55	19	115
26. Beloit-Downtown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	12	66	0	0	0	0	18	59	198	394
27. Rockton	5	0	0	0	0	0	0	0	16	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	310	398
28. Roscoe	4	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	5	21	58	0	0	0	0	0	0	0	0	437	575
29. Rockford-Elmwood	25	0	0	0	0	17	0	0	53	0	0	12	0	13	0	0	0	0	0	12	31	24	0	22	14	50	0	0	0	0	0	273
30. Rockford-North	47	0	0	0	4	11	0	0	4	0	0	12	19	13	16	5	0	0	0	0	12	0	0	0	307	220	258	0	0	0	0	928
31. Rockford-Downtown	70	0	0	0	0	0	0	0	0	5	4	0	26	0	4	0	0	11	46	29	18	58	0	67	161	233	347	0	0	0	0	1,079
Total	168	0	0	5	4	28	0	0	123	5	15	24	45	26	24	9	0	11	51	63	145	253	12	155	647	631	648	4	93	187	1,164	4,540

Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

Alignment Evaluation

As summarized in Figure 5-16, there were a wide range of total commuters across the study alignments—from 500 in the Harvard-Beloit alignment to 9,500 in the Rockford-Madison (E) alignment. As described previously in this section and illustrated in Figure 5-8 on page 35, each alignment's commuter market was assessed independently due to instances of overlapping market sheds.

Figure 5-16. Total Existing and 2050 Commuters by Alignment (all modes)



Source: CTPP (2012-2016) with MPO-generated employment growth rates assigned at the destination TAZ to estimate 2050 commuter flows. TAZ origin-destination pairs have been filtered to include those at least (a) 10 miles air-line distance apart and (b) assigned to origin and destination stations with at least 10 miles between their respective mileposts.

The Harvard-Beloit alignment was not advanced to undergo ridership assessment, due to the low potential evinced in the total commuter flows. The Harvard-Beloit-Rockford alignment demonstrated enough commuter potential to warrant ridership assessment, but with the caveat that the indirect routing between Rockford and the Chicago region would likely negatively impact the attractiveness of the service. It is worth noting that the 2002 Metra – UP Northwest Line Commuter Rail Extension Feasibility Study concluded that extending service to Clinton would be feasible; however, the 2002 study did not include a detailed market analysis, relying instead on a survey-based approach to estimate demand. Appendix D provides additional details related to the 2002 study.

When comparing the two alignment options between Janesville and Madison (i.e., the West alignment via Evansville versus the East alignment via Milton), the East alignment demonstrated a larger number of potential commuters in the market sheds. Additionally, the East alignment has track that is intact and in use, while there is a gap in the West alignment north of Evansville, which would require a capital investment to make service along the West alignment possible. For these reasons, only the East alignment was advanced to the ridership assessment phase.

To summarize the preceding paragraphs, the alignments removed from further analysis include:

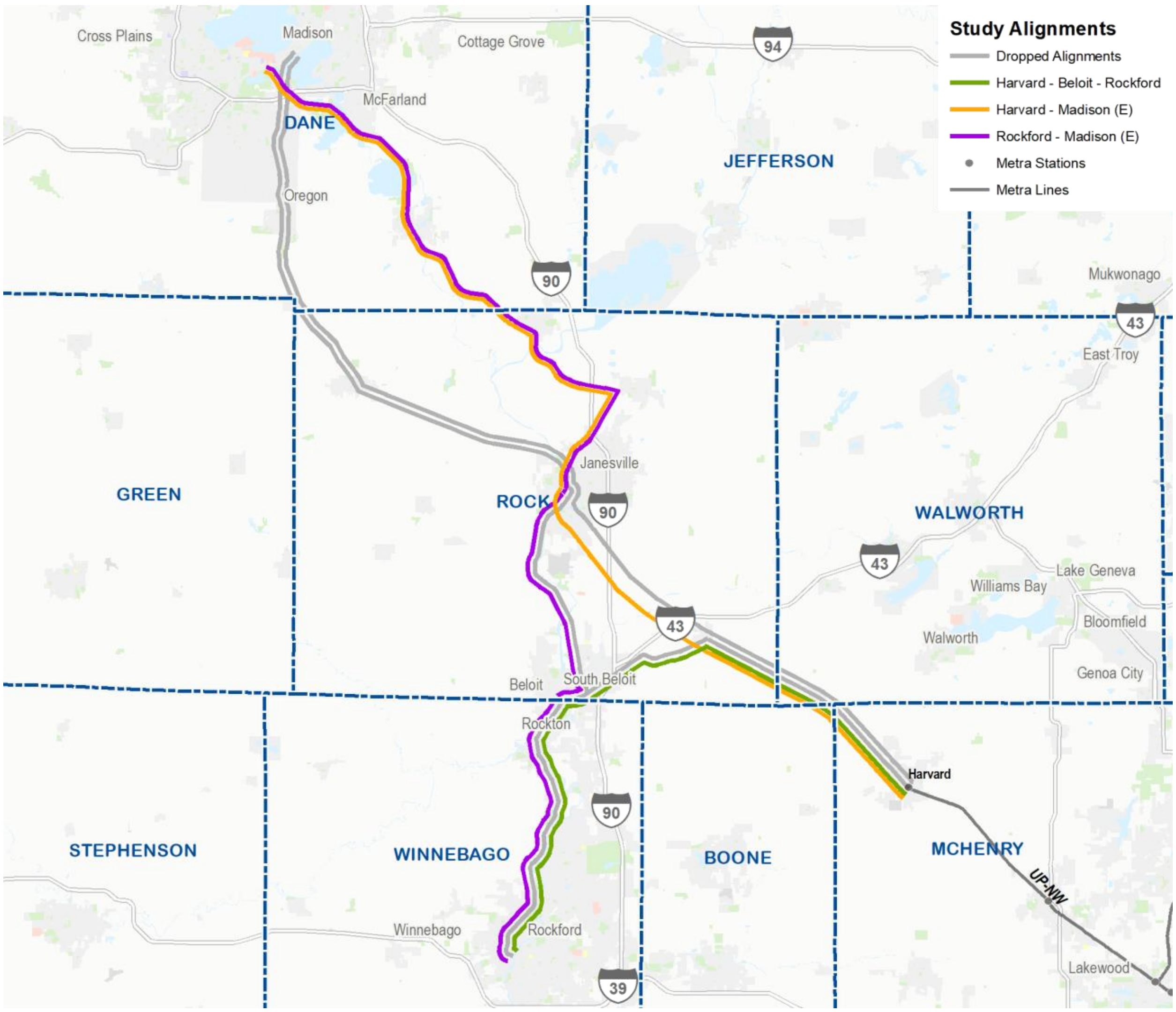
- Rockford-Madison (W)
- Harvard-Madison (W)
- Harvard-Beloit

The alignments advanced to the next level of analysis include:

- Rockford-Madison (E)
- Harvard-Madison (E)
- Harvard-Beloit-Rockford

A depiction of the three alignments to advance to ridership assessment is provided in Figure 5-17.

Figure 5-17. Alignments to Advance to Ridership Assessment



Source: AECOM.

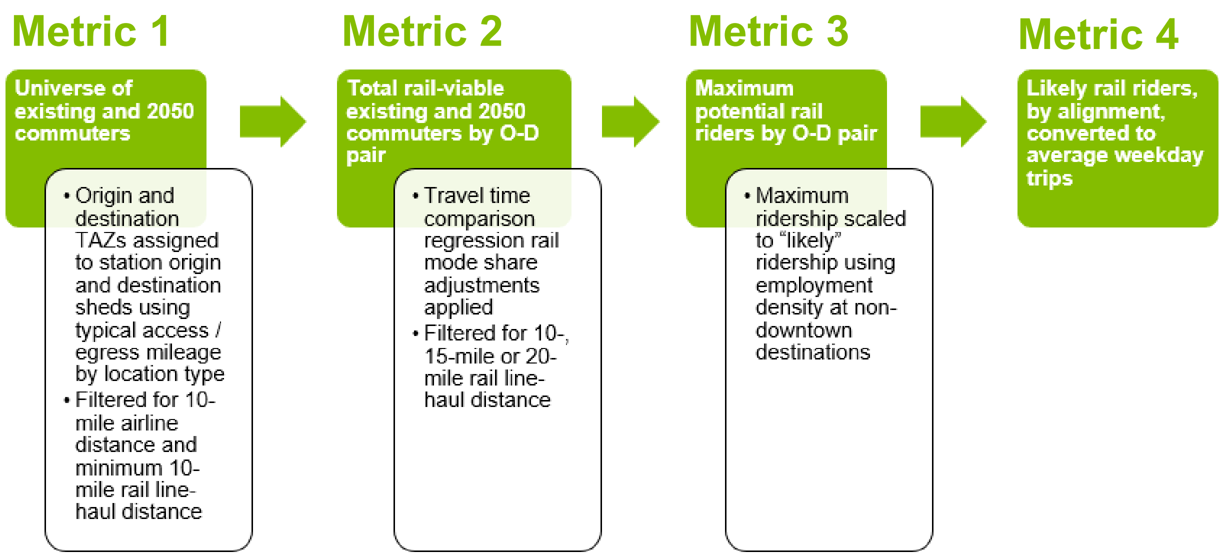
6. Study Area Ridership Assessment

This section outlines the methodology used to identify commuters living and working in proximity to one of the study alignments that would ultimately be likely to select rail as their preferred travel mode, should passenger rail service be introduced.

6.1 Market Assessment Overview

An overview of the analytical process of assessing the ridership market of the study area is provided in Figure 6-1. While the commuter market begins with the universe of all commuters in the study area (including trips of any length or location, **Metric 1**), this market is progressively filtered to identify the commuters most likely to use a rail service introduced along one of the study corridors (ultimately, **Metric 4**). Further description of analytical filters applied to estimate these metrics are provided below the figure and in following subsections.

Figure 6-1. Market Assessment Process Overview



In the first step (described in Section 5.2), origins and destination TAZs are assigned to potential station locations based on expected maximum access- and egress-trip length (i.e., 7-10 miles for alignment boarding locations and 0.5-1.0 mile for alighting locations). With the boarding and alighting stations identified, the least conservative distance filter (i.e., minimum 10-mile air-line distance between origin and destination TAZ and 10-mile minimum milepost distance between boarding and alighting station) is applied to calculate the total "rail-viable" commuters of any current travel mode (**Metric 2**)—i.e., the number of commuters whose commute origin and destination are proximate to potential station locations and who are traveling far enough to potentially justify selecting rail as their travel mode. These totals were tabulated by alignment and boarding/alighting station in Section 5.2.

In the next step, desktop analysis tools (specifically, R programming and Excel) were used to conduct a linear regression to estimate the commuter rail mode share between a given origin location and destination location based on the tradeoff in travel times by rail and driving in the greater Chicago region. Travel time and mode share data for commuters traveling from origin locations near existing outlying Metra stations to downtown Chicago were used to develop intercepts and coefficients that were applied to the travel flows along the three study alignments that advanced to the ridership assessment. In addition to the 10-mile minimum milepost distance thresholds, a pair of more conservative distance filters were also applied (15-mile and 20-mile rail milepost minimum distance) to yield a reasonable range of maximum potential rail ridership for a given origin-destination pair (**Metric 3**). Expanding the 10-mile minimum milepost distance threshold to 15 or 20 miles has the effect of reducing the number of potential commuters to draw from, which is what makes it a more conservative estimate.[6] [7]

Finally, it is necessary to adjust the modeled rail ridership reflect the fact that few locations can attract distant workers the same as downtown Chicago, due to its density of (often high-wage) employment. In the previous step, the downtown rail commuter regression results were applied to all origin-destination pairs (including commuters destined for locations that would be considered origin/boarding stations due to their low-density development patterns and comparative lack of worksites nearby). Commuter flows and travel modes between existing Metra boarding stations and non-downtown destinations were analyzed to determine the rail mode share from an origin location to non-downtown destinations of varying levels of employment densities along the same rail line. These proportions were averaged by location types and employment density bins, and then applied to the study area's travel flows based on the employment density at the destination location. The result of this analytical process is the likely rail ridership, converted to average weekday trips (**Metric 4**).

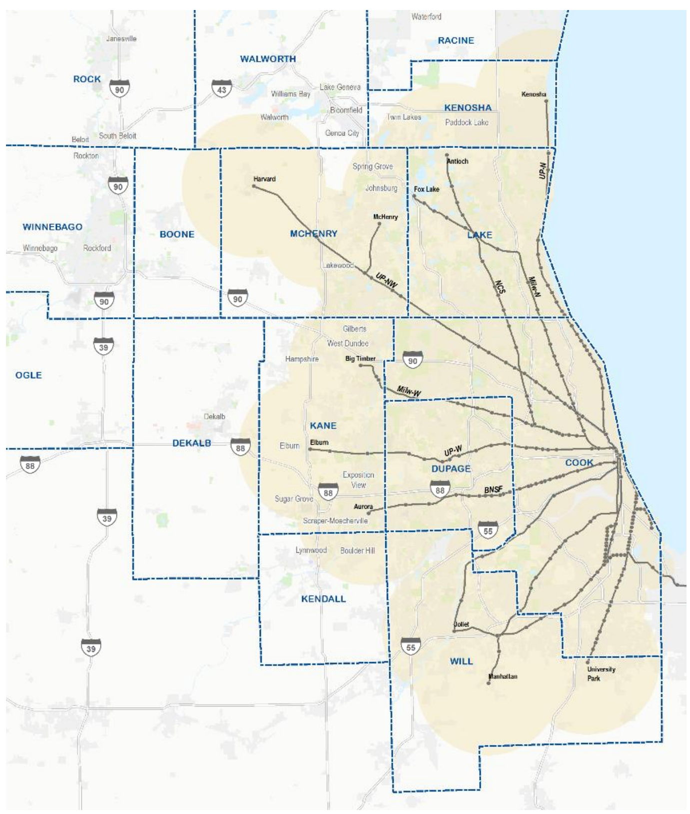
6.2 Metra Market Area Regression Analysis

Data Preparation

The key data inputs to the regression analysis are the CTPP commuter mode share by origin-destination pair (the dependent variable) and the associated travel times by rail and by driving (which are the independent variables). For the purpose of this analysis, the geographies for the origin-destination pair are the origin TAZ and the destination station.[8]

CTPP data were analyzed for the greater Chicago area to identify travel flows between origins within access distance (i.e., three to ten miles, varying by distance from downtown) of a Metra station and destinations in downtown Chicago to determine the commuter count and mode share. A depiction of the origin sheds for the Metra stations (using the same variable radii methodology as described in Section 5.2) is provided in Figure 6-2.

Figure 6-2. Metra Station Origin Sheds



[6] This filtering of commuter markets to those traveling a minimum milepost distance along the rail line is consistent with recent Metra station feasibility studies (e.g., Niles, Des Plaines).
[7] For comparison purposes, analysis of peer rail agencies shows that the average distance traveled typically falls around 17 to 21 miles (Chicago, Nashville, Denton County), though depending on the infrastructure and markets served, distances can vary greatly (e.g., 8 miles in Portland, OR, to 36 miles in Albuquerque-Santa Fe, NM). See Appendix C for more details.
[8] The TAZ destination sheds are collapsed to the single destination station location since most workplaces are a short distance from the destination station and thus unlikely to have a significant impact on travel time comparisons.

To achieve the most realistic locations for the origin TAZ, the weighted centroid of the Census TAZ was estimated using the block-group daytime population totals sourced from Esri Business Analyst. This data preparation step was conducted in order move the absolute centroid of the TAZ to a location that was nearer to the population (and thus roadways) of the TAZ. While not typically necessary in dense urban locations, for more rural locations (where substantial portions of the TAZ may have a very low density of roadways and intersections), this step mitigates the problem of inflated drive times due to any potential mismatch between the geographic centroid and an uneven population distribution.

The resulting weighted centroid latitude and longitude were used to assign TAZs to the nearest station (and later to determine drive times from the Google Maps Application Programming Interface [API]). In order to assign TAZs to boarding stations, a road network was built in ArcGIS using centerlines from Esri Business Analyst, and the Network Analyst Nearest Facility tool was used to calculate the shortest path from the TAZ weighted centroid to an existing Metra station.[9]

Three travel time components needed to be assembled to calculate the travel time tradeoffs between driving and taking commuter rail from a given location to downtown Chicago:

A. **Drive travel time:** Google Maps drive time from origin TAZ to downtown Chicago

B. **Rail travel time:** Google Maps drive time from origin TAZ to boarding station + Train travel time from boarding station to downtown Chicago

A Python script was written in Jupyter notebook that pulls origin and destination latitude and longitude data from a prepared CSV file and uses this to request the associated drive times for a typical Wednesday AM peak (under congested traffic conditions) from the Google Maps API. Each row in the CSV is a valid O-D pair (i.e., with a non-zero commuter count for the designated origin and destination geography). For this analysis, two different CSVs were prepared: one with the origin TAZ coordinates and downtown Chicago coordinates (for the drive-commute travel time), and one with the origin TAZ coordinates and boarding station coordinates (for the access portion of the rail commute travel time).

The travel times (in minutes) and the associated trip length (in miles) gathered from the Google Maps API were then assembled in a spreadsheet, together with the CTPP commuter totals and mode share information, and the average rail line-haul travel times between the boarding station and downtown terminal based on (pre-COVID) existing Metra schedules. The drive-access travel times and line-haul rail travel times were summed to estimate the total rail commute travel time to downtown.[10]

[9] Additionally, transit access travel times were calculated in ArcGIS using March 2020 General Transit Feed Specification feeds for CTA and Pace, analyzed in Network Analyst. However, due lack of universal feeder transit coverage in more rural locations, many trips between home TAZs and boarding Metra stations could not be completed by CTA/Pace. For this reason, the analysis focuses on drive-access travel times, rather than splitting out drive- and non-drive (i.e., walk/transit) access travel times.

[10] Driving and transit cost data were also assembled for each O-D pair. Driving costs were estimated by multiplying miles traveled (according to Google Maps API) by per mile metrics ($0.10 per mile conservative, $0.25 per mile standard), round trip, and adding average daily downtown parking ($15 conservative, assuming mid-range monthly parking pass, $20 standard). Transit costs were estimated by doubling the average daily fare from the boarding station to downtown and adding the average daily parking cost for the boarding station (weighted by permit type). These costs were converted into minutes using the common $10/hour rate. This data was included in the regression analysis, but ultimately proved less robust than using travel time alone, and for that reason it was not used in the final analysis.

Statistical Analysis

Several linear regression models (ordinary least squares (OLS)) were constructed for different combinations of independent variables to estimate the expected rail mode share for a given origin-destination pair. These models were also segmented by the distance of the boarding station from downtown Chicago. The parameters are provided as follows:

- **Variables**
  - Bivariate[11]
    - Time/cost difference (standard)
    - Time/cost difference (conservative)
    - Time only difference
  - Multivariate
    - Drive commute time/cost (standard); Rail commute time/cost
    - Drive commute time/cost (conservative); Rail commute time/cost
- **Segments**
  - 20 - 30 miles from downtown Chicago
  - 30 - 40 miles from downtown Chicago
  - 40+ miles from downtown Chicago

The standard errors and p-values were compared across models to determine which model intercept and coefficients to apply to the study alignment market sheds. The bivariate model segmented by distance using the Time only difference as the independent variable was statistically significant and provided reasonable results, the details of which are provided in Table 6-1. In this model, p-values were less than 0.05, indicating statistical significance, and the mode share standard error is reasonably small (<2%). Additionally, given that the anticipated fares for a commuter rail service operating in the SLATS Rail Study area are undetermined, it removes another source of uncertainty to exclude cost from the independent variables. As an aid to interpreting the table, for the 40+ Miles from downtown segment, the base rail mode share is 58% (assuming no difference between drive and rail commute travel times), and this is adjusted by -0.5% for each minute longer the rail commute is vis-à-vis drive commute.

Table 6-1. Bivariate OLS Model (Segmented by Distance)

Segment	Term	Estimate	Standard Error	T-Statistic	P-Value
40+ Miles from Downtown	(Intercept)	58.2%	0.024	24.45	3.24E-75
	Time Difference	-0.5%	0.002	-3.22	1.43E-03
30-40 Miles from Downtown	(Intercept)	66.1%	0.016	40.67	3.16E-162
	Time Difference	-0.5%	0.001	-4.02	6.76E-05
20-30 Miles from Downtown	(Intercept)	57.7%	0.012	46.32	9.30E-229
	Time Difference	-0.9%	0.001	-7.84	1.43E-14

Source: AECOM, using data from CTPP (2012-2016), Google Maps API, Metra.

[11] The drive metric is subtracted from the rail metric the bivariate analysis to result in a single "difference" metric that effectively encompasses both.

6.3 Study Area Ridership Potential by Alignment

Regression Application

The total rail-viable commuters (**Metric 2**, summarized in Section 5.2) for the three study alignments that advanced for further analysis (i.e., Rockford-Madison (E), Harvard-Madison (E), Harvard-Beloit-Rockford) were assembled and summarized by origin TAZ-destination station pair. Each O-D pair was categorized by 10-, 15-, or 20-mile milepost distance.

Next, the study area travel time and distances (for the drive access trip to boarding station and the door-to-door drive commute times) were sourced from the Google Maps API using the same methodology as in the Metra statistical analysis previously described in subsection 0. The line-haul rail times for the three study alignments were estimated using the runtimes from the 2008 SCWCTS study (Table 6-2, Table 6-3, Table 6-4).

Table 6-2. Rockford – Madison (East) Runtimes

Seq	Segment	From	To	Minutes
01	Rockford-Beloit	Rockford-Downtown	Rockford-North	6.4
02	Rockford-Beloit	Rockford-North	Rockford-Elmwood	4.2
03	Rockford-Beloit	Rockford-Elmwood	Roscoe	13.5
04	Rockford-Beloit	Roscoe	Rockton	6.9
05	Rockford-Beloit	Rockton	Beloit-Downtown	7.5
06	Rockford-Beloit	Beloit-Downtown	Beloit-Downtown (Jct.)	3.4
07	Beloit-Janesville	Beloit-Downtown (Jct.)	Town Line Road	13.2
08	Beloit-Janesville	Town Line Road	Janesville-Downtown	18.5
09	Janesville-Madison (E)	Janesville-Downtown	Janesville-North	7.0
10	Janesville-Madison (E)	Janesville-North	Milton	7.9
11	Janesville-Madison (E)	Milton	Edgerton	16.7
12	Janesville-Madison (E)	Edgerton	Stoughton	20.9
13	Janesville-Madison (E)	Stoughton	McFarland	19.6
14	Janesville-Madison (E)	McFarland	Madison-Beltline	7.9
15	Janesville-Madison (E)	Madison-Beltline	Madison-Alliant	0.9
16	Janesville-Madison (E)	Madison-Alliant	Madison-Kohl Center	4.9
				159.5

Source: AECOM, based on SCWCTS (2008) findings.

Table 6-3. Harvard – Madison (East) Runtimes

Seq	Segment	From	To	Minutes
01	Harvard – Clinton	Harvard	Sharon	11.4
02	Harvard – Clinton	Sharon	Clinton	10.5
03	Clinton – Janesville	Clinton	Janesville-Southeast	11.8
04	Clinton – Janesville	Janesville-Southeast	Janesville-Downtown	6.5
05	Janesville-Madison (E)	Janesville-Downtown	Janesville-North	6.5
06	Janesville-Madison (E)	Janesville-North	Milton	7.9
07	Janesville-Madison (E)	Milton	Edgerton	16.7
08	Janesville-Madison (E)	Edgerton	Stoughton	20.9
09	Janesville-Madison (E)	Stoughton	McFarland	19.6
10	Janesville-Madison (E)	McFarland	Madison-Beltline	7.9
11	Janesville-Madison (E)	Madison-Beltline	Madison-Alliant	0.9
12	Janesville-Madison (E)	Madison-Alliant	Madison-Kohl Center	4.9
				125.5

Source: AECOM, based on SCWCTS (2008) findings.

Table 6-4. Harvard – Beloit – Rockford Runtimes

Seq	Segment	From	To	Minutes
01	Harvard - Clinton	Harvard	Sharon	12.8
02	Harvard - Clinton	Sharon	Clinton	11.8
03	Clinton - Beloit	Clinton	Beloit-East	10.6
04	Clinton - Beloit	Beloit-East	Beloit-Downtown (Jct.)	2.8
05	Rockford - Beloit	Beloit-Downtown (Jct.)	Beloit-Downtown	2.4
06	Rockford - Beloit	Beloit-Downtown	Rockton	7.5
07	Rockford - Beloit	Rockton	Roscoe	6.9
08	Rockford - Beloit	Roscoe	Rockford-Elmwood	13.5
09	Rockford - Beloit	Rockford-Elmwood	Rockford-North	4.2
10	Rockford - Beloit	Rockford-North	Rockford-Downtown	6.4
				79.0

Source: AECOM, based on SCWCTS (2008) findings.

Using the drive and rail travel time difference as the independent variable, the regression coefficients were applied to estimate the rail mode share for each O-D pair. This mode share was then applied to the existing and 2050 commuter counts to estimate the maximum potential rail commuters, filtered to the minimum milepost distance thresholds of 10,15, or 20 miles (**Metric 3**, shown in Table 6-5). For reference, the milepost distances between stations/junctions are illustrated in Figure 6-3 and Figure 6-4. The 20-mile threshold has the effect of reducing the maximum potential of rail commuters by the largest margin—not because these longer-distance commuters are less likely to choose rail, but rather because the 20-mile threshold excludes more potential commuters who are traveling shorter distances. For example, the milepost distance between downtown Beloit and Rockford stations, between Janesville and Beloit stations, or Stoughton and downtown Madison stations are between 15 and 20 miles, rendering them viable commutes within the 15-mile threshold group but non-viable (and thus excluded) within the 20-mile threshold group. To reiterate, the purpose of creating these thresholds is to ensure that the benefit of using commuter rail for the majority of the trip distance is sufficient to offset the potential cost or inconvenience of driving a potentially significant distance to access a station and board a train for the remainder of the trip.

Table 6-5. Maximum Potential Rail Commuters, Filtered by Minimum Milepost Distance (Existing, 2050)

	Total Commuters		Maximum Potential Rail Commuters					
			Min. 10 miles		Min. 15 miles		Min. 20 miles	
	Existing	*2050*	*Existing*	*2050*	*Existing*	*2050*	*Existing*	*2050*
Rockford-Madison (E)	9,500	10,700	4,160	4,460	2,920	3,350	1,010	1,080
Harvard-Madison (E)	5,300	6,300	2,320	2,790	1,940	2,290	820	920
Harvard-Beloit-Rockford	3,700	4,500	1,600	1,950	710	1,000	380	560

Source: AECOM.

As demonstrated in Table 6-5, the Rockford-Madison (E) alignment continues to show the greatest potential, with 1,080 to 4,460 maximum potential future rail commuters, depending on distance thresholds applied. The UP-NW extension from Harvard to Madison (E) follows, with 920 to 2,790 maximum potential future rail commuters. The Harvard-Beloit-Rockford alignment is estimated at 560 to 1,950 maximum potential future rail commuters.

Figure 6-3. Milepost Distances (North Section)

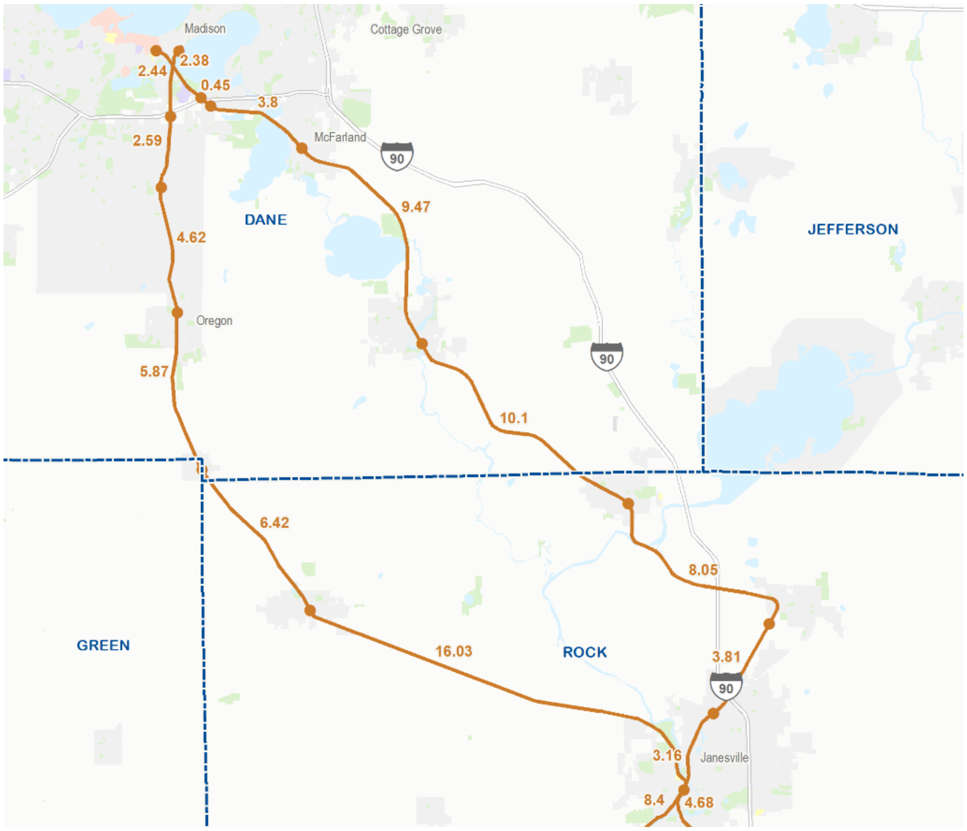
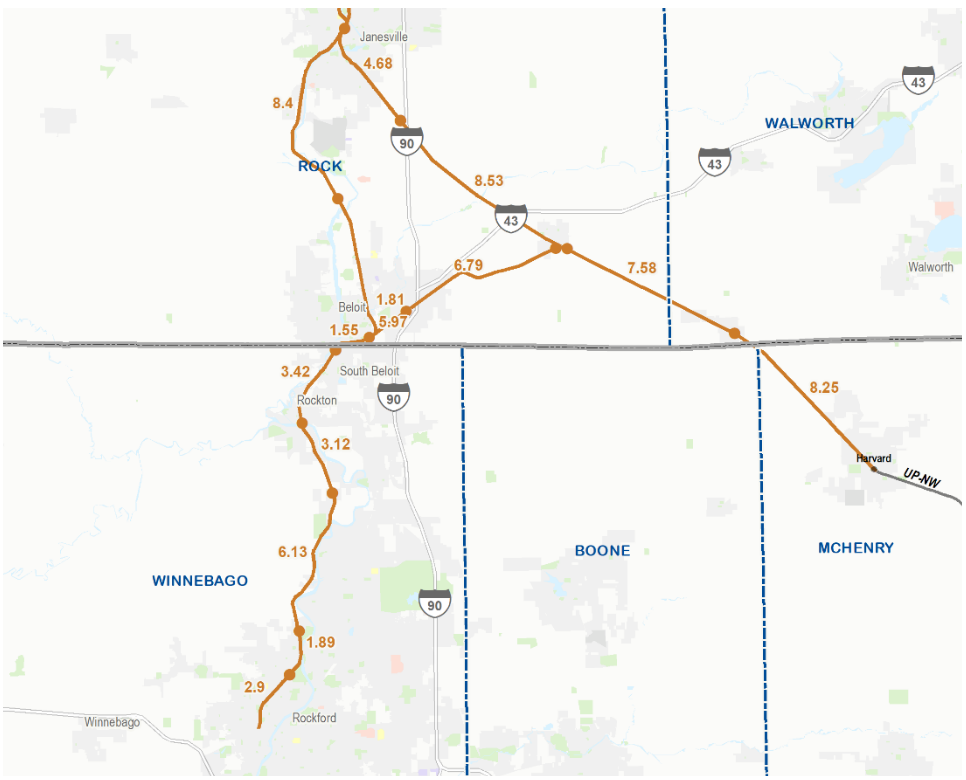


Figure 6-4. Milepost Distances (South Section)



Ridership Scaling by Destination Type

As noted in subsection 6.1, the application of the regression analysis results that quantify the relationship between mode-specific travel times and mode share for suburban downtown commuters should not be applied “as-is” to all travel markets. The high development density and worker occupational profile of downtown Chicago confers an unusual ability to attract distant rail commuters. In comparison, the ease of driving to and parking at many of the potential SLATS Rail Study area stations—as well as the lower density of attractive high-wage jobs—suggests that the estimate of rail commuters should be scaled down accordingly. Therefore, a scaling exercise was conducted to convert the maximum potential rail commuters to likely rail commuters.

To quantify the appropriate degree of scaling, Metra market data were analyzed—this time focusing on the non-downtown rail commute market. For context, on average 8% of Metra trips in 2018 were classified as “intermediate passenger trips,” defined as inbound trips with passengers alighting at a non-downtown location or outbound (i.e., reverse commute) trips. Metra lines with high-frequency inbound service and adequate reverse commute service tend to have higher shares of intermediate trips (e.g., UP-N, with 18%), while lines with lower-service levels like Heritage Corridor and SouthWest Service have less than 2% intermediate trips. These service considerations should be acknowledged when evaluating the final ridership estimates and are discussed in Section 7.

CTPP data for non-downtown destinations near existing Metra stations were analyzed to determine the scale of these trips in comparison with the downtown market—in particular, to gain insight into the impact of the non-downtown stations’ employment density levels on their ability to attract rail commuters. The commuter counts and mode information were gathered for the origin-destination pair linking the overlapping variable-buffer origin station market shed to the non-downtown destination station market shed, and then filtered for origins and destinations along the same line.

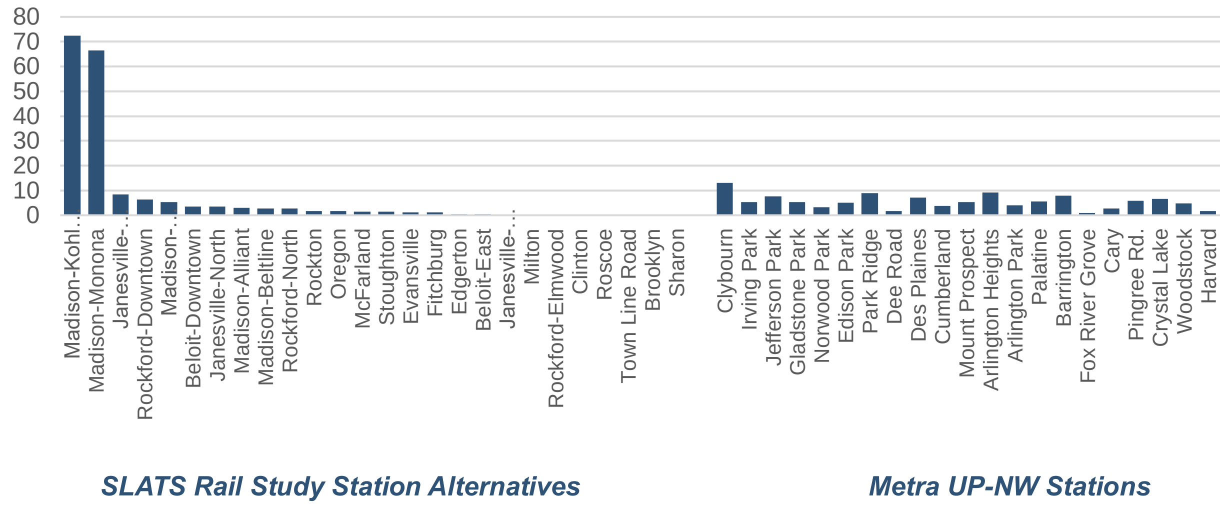
These data were then joined to the destination station employment density, and grouped into the following bins:

- <1 job per acre
- 1-5 jobs per acre
- 5-10 jobs per acre
- 10+ jobs per acre

For reference, the employment density for the study area stations and the Metra UP-NW line are provided in Figure 6-5, with the study area stations ordered by decreasing density, and the UP-NW stations in outbound order. The rail mode share for commuters traveling between a given origin Metra station and non-downtown Metra stations on the same line of a given employment density category were calculated and averaged (weighted by commuters), and converted into a proportion of the origin station’s downtown rail mode share. Overall, the proportions for all origin stations at least 10 miles from downtown Chicago were:

- 1% for destinations of 1-5 jobs per acre
- 5% for destinations 5-10 jobs per acre
- 12% to destinations of 10+ jobs per acre

Figure 6-5. Employment per Acre within Station Half Mile Radius



Source: Esri Business Analyst Total Employees (2018).

The rail mode share for commuters traveling between a given origin Metra station and non-downtown Metra stations on the same line of a given employment density category were then calculated and averaged (weighted by commuters), and then converted into a proportion of the origin station's downtown rail mode share. Overall, the proportions for all origin stations at least 10 miles from downtown Chicago were: 1% for destinations of one to five jobs per acre, 5% for destinations five to ten jobs per acre, and 12% to destinations of ten or more jobs per acre. A more detailed breakdown by origin station location is provided in Table 6-6.

Table 6-6. Non-Downtown Rail Mode Share Scaling by Employment Density and Location

Origin Station Distance from Downtown	1-5 Jobs/Acre	5-10 Jobs/Acre	10+ Jobs/Acre
10 - 20 miles	2%	4%	15%
20 - 30 miles	1%	4%	9%
30 - 40 miles	1%	5%	8%
40+ miles	1%	11%	10%

Source: AECOM, using data from CTPP (2012-2016), Metra, Esri Business Analyst (2018).

As the final step, the following proportions were applied to the study area existing and 2050 commuter flows by O-D pairs according to the job density category that the destination station falls within:

- <1 job per acre 0%
- 1-5 jobs per acre 1%
- 5-10 jobs per acre 10%
- 10-50 jobs per acre 10%
- 50+ jobs per acre 100%

These proportions roughly approximate those of the 40+ mile origin station category from the Metra data, with the additional breakpoint of 50 jobs per acre in recognition of the fact that the downtown Madison stations have much higher density than any other stations outside of downtown Chicago and are thus more attractive to rail commuters.

The results of this final step in the market assessment process, moving from maximum potential rail ridership (**Metric 3**) to likely rail ridership (**Metric 4**) is shown in Figure 6-6, keeping the 10-mile and 20-mile minimum milepost distance thresholds as the maximum and minimum ends of the range, respectively (see Table 6-7, Table 6-8, and Table 6-9). The ranges of likely rail riders are also provided graphically in Figure 6-7.

Figure 6-6. Ridership Assessment Filtering Process (Metrics 2, 3, and 4)

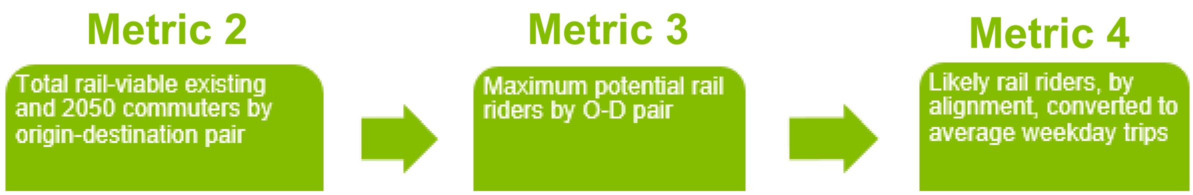


Table 6-7. Summary Metrics, 10-mile Minimum Milepost Distance

	Total Commuters All Modes		Maximum Potential Rail Commuters		Likely Potential Rail Commuters	
	Existing	*2050*	*Existing*	*2050*	*Existing*	*2050*
Rockford-Madison (E)	9,500	10,700	4,160	4,460	**1,070**	1,130
Harvard-Madison (E)	5,300	6,300	2,320	2,790	**1,020**	1,070
Harvard-Beloit-Rockford	3,700	4,500	1,600	1,950	**85**	90

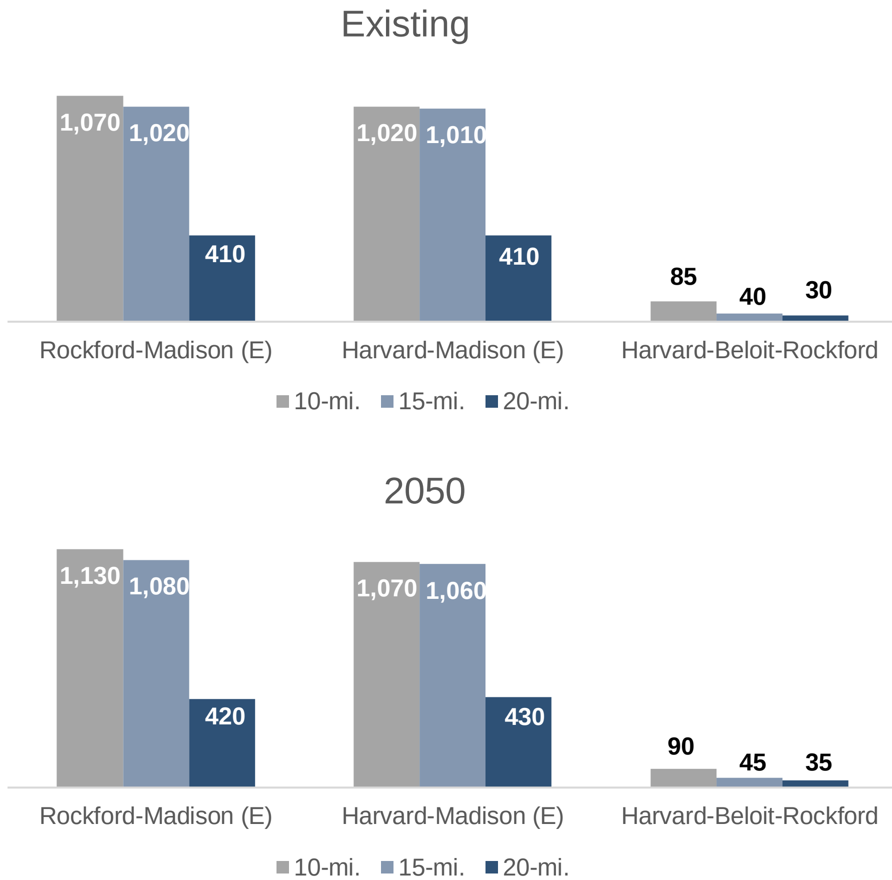
Table 6-8. Summary Metrics, 15-mile Minimum Milepost Distance

	Total Commuters All Modes		Maximum Potential Rail Commuters		Likely Potential Rail Commuters	
	Existing	*2050*	*Existing*	*2050*	*Existing*	*2050*
Rockford-Madison (E)	9,500	10,700	2,920	3,350	**1,020**	1,080
Harvard-Madison (E)	5,300	6,300	1,940	2,290	**1,010**	1,060
Harvard-Beloit-Rockford	3,700	4,500	710	1,000	**40**	45

Table 6-9. Summary Metrics, 20-mile Minimum Milepost Distance

	Total Commuters All Modes		Maximum Potential Rail Commuters		Likely Potential Rail Commuters	
	Existing	*2050*	*Existing*	*2050*	*Existing*	*2050*
Rockford-Madison (E)	9,500	10,700	1,010	1,080	**410**	420
Harvard-Madison (E)	5,300	6,300	820	920	**410**	430
Harvard-Beloit-Rockford	3,700	4,500	380	560	**30**	35

Figure 6-7. Range of Existing and 2050 Likely Rail Commuters



Assuming these riders would make one round trip by rail every weekday on Metra-like levels of service, the estimated average weekday trips in future are provided in Table 6-10. For the two alignments serving downtown Madison, the approximate range is 850 to 2,220 average weekday trips in future, using the 2050 socioeconomic projections currently available. The extension of the UP-NW line to Beloit and on to Rockford could be expected to have fewer than 200 daily riders. The results of the market analysis indicate that the Madison commuter market is a key driver in the ridership estimates of the two potentially viable alignments: Rockford-Madison (E) and Harvard-Madison (E).

Table 6-10. Estimated Future Weekday Trips (minimum and maximum)

	Minimum	Maximum
Rockford-Madison (E)	840	2,260
Harvard-Madison (E)	860	2,140
Harvard-Beloit-Rockford	70	180

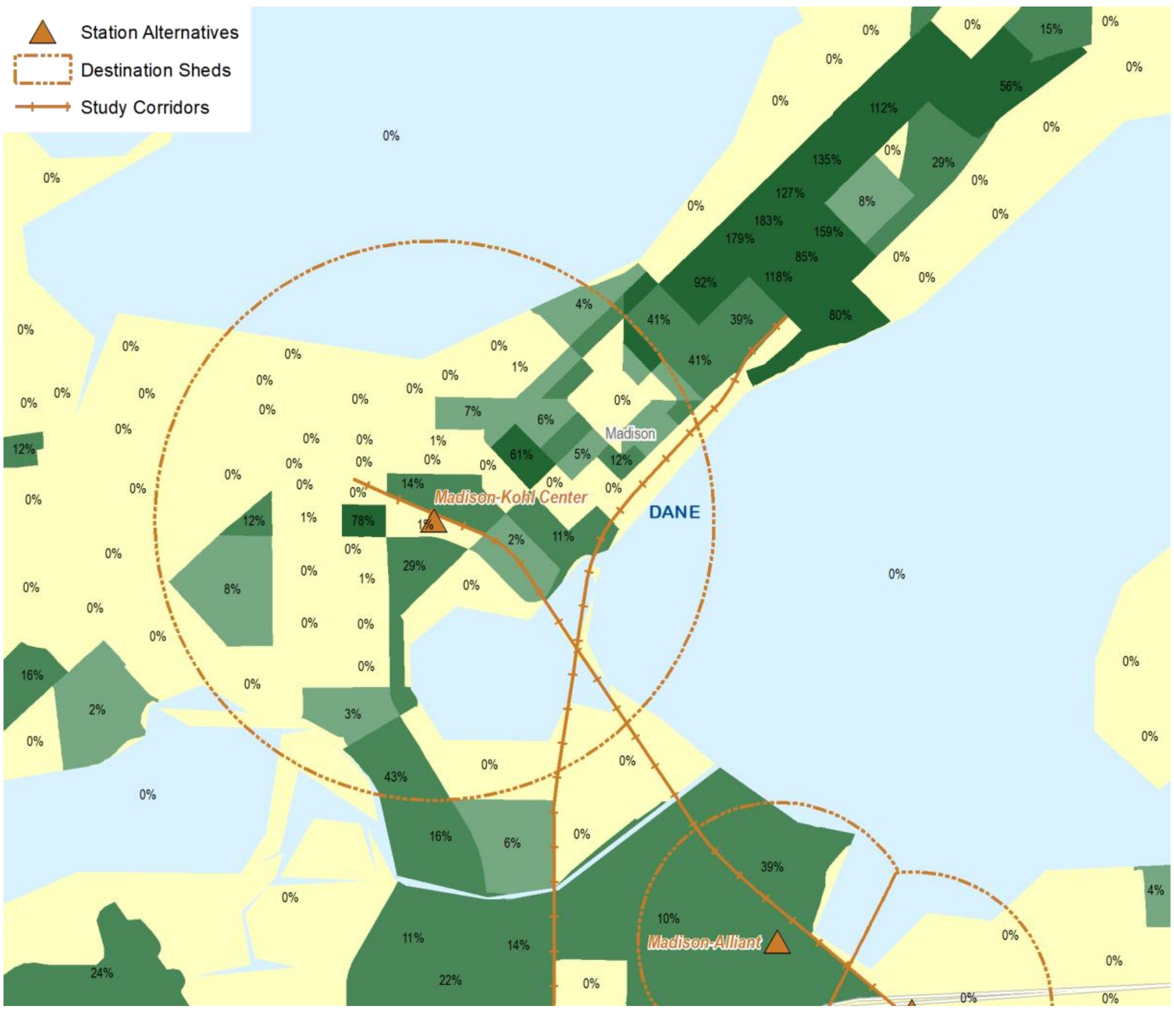
Source: AECOM.

Additional Considerations

The ridership estimation techniques in this market analysis rely on parsing the relationships between home and workplace distribution, travel times by mode, and development patterns in the greater Chicago region. As such, the service quality and frequency of Metra commuter rail underpins much of the analysis. A passenger rail service established in the SLATS Rail Study area may or may not have similar service quality, and this can be expected to impact potential ridership. Service levels as they are applied to rail service models is explored more fully in Section 7. The discussion is provided in the context of peer services, both in terms of commuter, hybrid, and intercity rail, as well as the relationship between service levels, ridership, trip distances, and agency financial performance and sustainability.

Estimated future ridership levels are reliant on the growth projections provided by the MPOs. In particular, most of the potential ridership market is driven by trips to high-density downtown Madison locations, and thus the growth projections for this location have a large impact on the future ridership estimates. Examination of the socioeconomic projections for downtown Madison reveals modest employment growth near the downtown terminus of the East alignment between Janesville and Madison—approximately 3% in total over the 30-year horizon. An illustration of the employment growth is provided in Figure 6-8, with the labels indicating the estimated percent growth. Should employment increase in this area more than originally projected, this can be expected to have a notable impact on the estimated future ridership.

Figure 6-8. Estimated Employment Growth in Downtown Madison by TAZ (2020-2050)



Source: Madison MPO, AECOM analysis.

It is also worth noting that alternative routing of the East alignment should be revisited to consider a different Madison terminus, should the alignment advance to further feasibility study. Currently the East alignment terminates at the Kohl Center, near the University of Wisconsin (UW) campus, and the West alignment terminates at the Monona Center, capturing more of the isthmus and areas anticipated for relatively greater economic growth. As the analysis stands, it is not possible to precisely separate which factors have a greater impact on the East alignment's higher estimated commuter totals: the number of commuters originating on the East alignment in station locations such as Stoughton, Edgerton, and Milton, or the number of commuters destined for the UW campus area versus the isthmus. Given that in Janesville-Downtown (i.e., the first station area with identical origin sheds for both the East and West alignments), Monona Center attracts more commuters than Kohl Center, there is reason to suspect that the East alignment may actually have greater potential with a terminus at the Monona Center. However, as part of this study it is not possible to verify as the alignments are currently structured.

Beloit Findings

While commutes made to and from Beloit—and particularly trips between Beloit and Janesville—were a significant proportion of the overall commuter market (Metric 1), as described in Section 5, they play a less impactful role in the estimated likely ridership totals due to the lower density at these destinations (three to eight employees per acre, versus about 70 in Madison. Typically, it is density at the workplace location—and the consequential challenges in terms of roadway congestion and parking costs—that drives commuter rail mode share by making it sufficiently costly to use a personal vehicle for daily commuting purposes.

Nevertheless, Beloit, Janesville, and other locations play a significant role as generators of likely rail trips at the origin. For example, for the Harvard-Beloit-Rockford alignment, greater Beloit supplies 60% of the commuter origins. For Rockford-Madison (E), Beloit and Janesville supply about 30% of origins. And for Harvard-Madison (E), greater Janesville supplies about 20% of the origins.

7. Ridership Benchmarking

The estimated weekday ridership for Rockford-Madison (E) and Harvard-Madison (E) each range between about 850 and 2,,200 future passenger trips per day.[12] As noted in subsection 5.2, a connection at Harvard to serve Beloit and Rockford would attract significantly fewer riders and was dropped from further consideration. Based on the high-level market analysis, these two alignments that serve Madison could potentially have enough future ridership (based on 2050 projections) to warrant additional planning activities to assess feasibility, cost-benefit, and stakeholder interest.

One way of assessing whether the estimated demand resulting from this market analysis is sufficient to justify devoting additional planning resources is to compare the ridership estimates contained herein to other passenger rail systems nationally. The following peer comparison should be viewed as an early initial step as a host of factors will need to be explored and considered before deciding to advance a project.

7.1 Peer Services

Peer agencies included here encompass a cross section of passenger rail services, emphasizing commuter travel. The set of peers does not include intercity rail services, primarily Amtrak, which have limited ability to serve commuter markets. In addition, heavy rail/rapid transit and traditional light rail services were also excluded since these services commonly operate in more densely developed urban areas. Three groups of services were used as benchmarks, including:

- **Commuter Rail in the Region |** As part of the study's super region, Metra service serves as a logical comparison.
- **Commuter Rail Systems Elsewhere |** While commuter rail operations have historically served major east coast cities and Chicago, in the more recent past cities in other parts of the country have implemented commuter rail services.
- **Hybrid Rail |** This is a more recent passenger rail mode, which uses smaller capacity vehicles. These services combine characteristics of commuter rail and light rail.

Metra Benchmarks

The Metra network is made up of eleven lines in a hub-and-spoke configuration, with downtown Chicago as the hub and the principal destination of users. Most Metra lines offer a full schedule of service seven days a week. The eight full-service lines have weekday ridership levels ranging from 21,000 to 55,000 (pre-COVID-19) and evolved as legacy services over decades of operation. Three lines provide more limited schedules and attract commensurately lower levels of use. The North Central Service opened in 1996, and the SouthWest Service was extended and expanded in 2006. These two lines plus the Heritage Corridor are identified as peers for the SLATS Rail Study. Relevant statistics are included in Table 7-1, with weekday boardings in 2018 ranging from approximately 2,700 to 8,800.

[12] The Harvard-Madison (E) alignment would not have a direct connection in the city of Beloit but would be accessible from a nearby station in Clinton.

Table 7-1. Metra Weekday Ridership Benchmarks

Line	Service Route	Route Miles	Stations	Trains per Weekday	2018 Avg Passenger Trip Length	2018 Weekday Boardings
Heritage Corridor	Joliet-Union Station	37.2	7	7	27.4	**2,749**
North Central Service	Antioch-Union Station	52.8	18	19	30.5	**6,357**
SouthWest Service	Manhattan-Union Station	40.8	13	30	19.0	**8,818**

Source: Metra (2018).

Commuter Rail Benchmarks

The commuter rail mode consists of travel between outlying suburbs and a central city. Such rail service, using either locomotive-hauled or self-propelled railroad passenger cars, frequently shares tracks with freight trains. Commuter rail is sometimes referred to as regional rail.

The 2019 FTA NTD reported 27 agencies providing commuter rail service nationwide. Five of the agencies with the fewest riders are listed in Table 7-2. As shown, these services:

- All directly connect to city centers;
- Most were implemented in the last fifteen years;
- Have few stations relative to the length of the route;
- Provide a limited schedule of trains; and
- Have passengers who tend to make long trips.

Table 7-2. Commuter Rail Systems with the Fewest Riders

Agency	Service	City Center Served	Service Start	Route Miles	Stations	Trains per Weekday	2019 Average Passenger Trip Length	2019 Average Weekday Trips
RTA	Music City STAR	Nashville	2006	31.4	7	12	15.7	**1,115**
Sonoma-Marin RTD	SMART	San Francisco	2017	42.9	10	26	25.6	**2,420**
CTDOT	Hartford Line	New York	1992	50.6	9	12	26.9	**2,043**
Rio Metro RTD	Rail Runner	Albuquerque	2008	96.6	15	22	46.4	**2,583**
Metro Transit	Northstar	Minneapolis	2009	39.0	7	12	24.7	**2,739**

Source: 2019 NTD.

Hybrid Rail Benchmarks

Hybrid rail systems primarily operate on the national system of railroads, but do not have the same characteristics of commuter rail. This service typically operates with smaller-capacity light rail-type vehicles called diesel multiple-unit trains (DMUs). These trains do not meet FRA crash-worthiness standards and must operate with temporal separation from freight rail traffic. Six hybrid rail systems reported statistics to the FTA's 2019 NTD.

Several observations can be drawn from the attributes of the hybrid rail systems shown in Table 7-3. Only one of the hybrid systems directly serves a city center (i.e., Austin). Two connect to another rail line that serves a city center (i.e., A-Train in Denton County, TX, and East Contra Costa connection to BART). In comparison to commuter rail, these services tend to be shorter, have higher levels of service, and have passengers who make shorter trips compared to the commuter mode.

Table 7-3. Hybrid Rail Systems

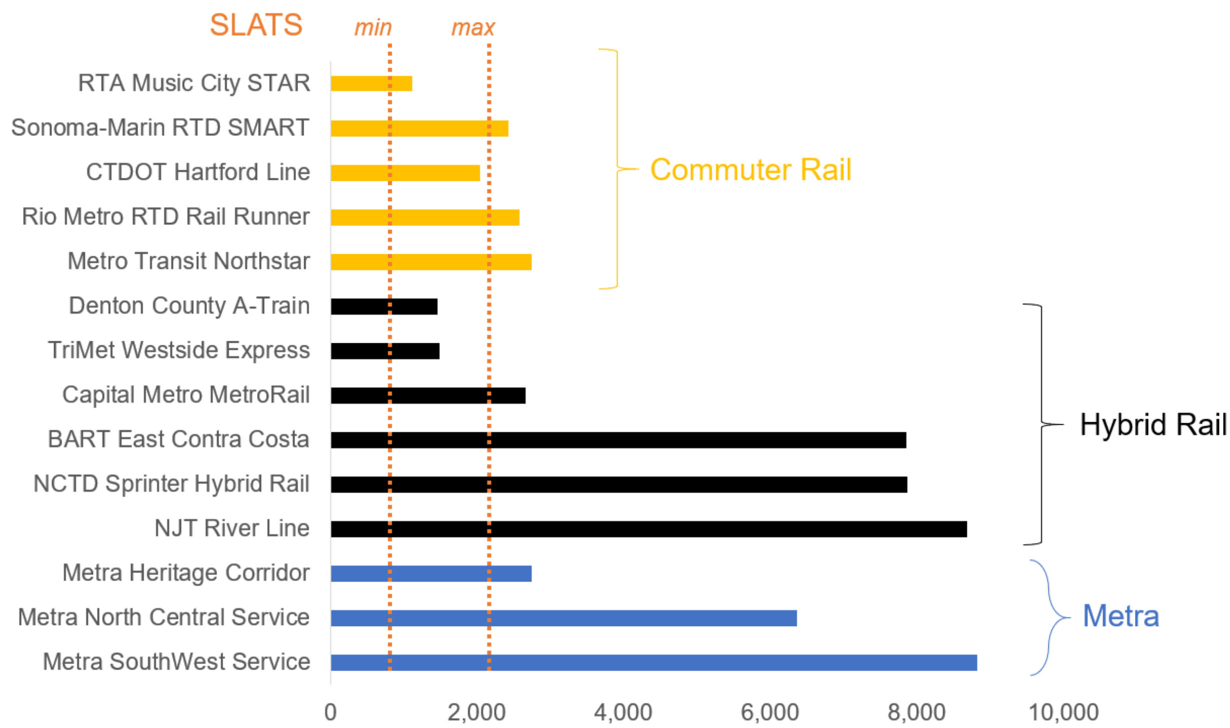
Agency	Service	Service Start	Route Miles	Stations	Trains per Weekday	2019 Average Passenger Trip Length	2019 Average Weekday Trips
Denton County, TX	**A-Train**, Denton-Trinity Mills, Dallas, Fort Worth Region	2011	21.3	5	43	14.0	**1,461**
TriMet	**Westside Express**, Beaverton-Wilsonville, Portland Region	2009	14.7	5	28	8.5	**1,490**
Capital Metro	**Metro Rail**, north suburbs to downtown Austin	2010	32.1	9	33	15.3	**2,654**
BART	**East Contra Costa BART** connection to Antioch	2008	8.7	3	82	6.9	**7,855**
North County Transit Dist.	**Sprinter Hybrid Rail**, Oceanside to Escondido, San Diego Region	2008	22.0	15	68	8.6	**7,865**
New Jersey Transit	**River Line**, Camden-Trenton	2004	34.9	21	94	14.9	**8,687**

Source: 2019 National Transit Database.

7.2 Comparative Results

Figure 7-1 summarizes weekday ridership for the peer rail services considered for the SLATS Rail Study. The estimated average daily ridership range for each of the two corridors in this study (i.e., Rockford-Madison and Harvard-Madison) were similar, with an approximate range of the 850 to 2,200 trips per day (future year). This range is reflected in the dashed vertical lines in the figure. As shown, the minimum level (850 trips) is exceeded by all peer services, while the maximum (2,200 trips) is higher than four of the peer services.

Figure 7-1. SLATS Region Weekday Ridership of Peer Rail Services



Source: NTD (2019), Metra (2018).

Table 7-4 compares the ten lowest ridership peer services with the ridership for the two analyzed alignments. The upper range is between 92% higher and 22% lower than peers.

Table 7-4. Study Area Estimated Ridership Comparison to Selected Rail Service Peers

Peer Service	Service Type	Average Weekday Trips	Difference from Minimum		Difference from Maximum	
Average Estimated Rockford-Madison and Harvard-Madison Daily Ridership			***Min:850***		***Max:2,200***	
RTA Music City STAR	Commuter Rail	1,115	-265	-24%	1,085	97%
Denton County A-Train	Hybrid Rail	1,461	-611	-42%	739	51%
TriMet Westside Express	Hybrid Rail	1,490	-640	-43%	710	48%
CTDOT Hartford Line	Commuter Rail	2,043	-1,193	-58%	157	8%
Sonoma Marin RTD SMART	Commuter Rail	2,420	-1,570	-65%	-220	-9%
Rio Metro RTD Rail Runner	Commuter Rail	2,583	-1,733	-67%	-383	-15%
Capital Metro MetroRail	Hybrid Rail	2,654	-1,804	-68%	-454	-17%
Metro Transit Northstar	Commuter Rail	2,739	-1,889	-69%	-539	-20%
Metra Heritage Corridor	Commuter Rail	2,749	-1,899	-69%	-549	-20%

Source: National Transit Database (2019), Metra (2018), AECOM.

While the estimated ridership of the study corridors is within the approximate range of these peer rail systems, an obvious question is whether these peer services perform to an acceptable level to serve as useful benchmarks. Table 7-5 provides common measures of transit cost-effectiveness for the peer rail services. Farebox Recovery Ratio is the fraction of operating expenses that are met by the fares. Deficit per Passenger Trip is the total cost less revenue per passenger trip. This measure usually also includes non-fare revenues as another cost offset, but NTD does not break out system-generated revenues from sources other than fares by mode. Table 7-5 also shows performance for all commuter and all hybrid rail services to compare these more lightly used services. As shown, peer recovery ratios are all lower than the commuter rail average and deficits per trip are higher. Peer performance is more in line with the average for all hybrid systems, although this class of rail service is much smaller. A service on one of the study alignments would probably perform at similar levels as these peers.

Table 7-5. Cost-effectiveness Performance of Rail Peers

Peer Service	Rail Mode	2019 Weekday Trips	2019 Farebox Recovery Ratio	2019 Deficit per Passenger Trip
RTA Music City STAR	Commuter Rail	1,115	21%	$13
Denton County A-Train	Hybrid Rail	1,461	5%	$37
TriMet Westside Express	Hybrid Rail	1,490	4%	$17
CTDOT Hartford Line	Commuter Rail	2,043	5%	$62
Sonoma-Marin RTD SMART	Commuter Rail	2,420	15%	$33
Rio Metro RTD Rail Runner	Commuter Rail	2,583	7%	$35
Capital Metro MetroRail	Hybrid Rail	2,654	8%	$24
Metro Transit Northstar	Commuter Rail	2,739	15%	$19
All Commuter Rail			*50%*	*$6*
All Hybrid Rail			*13%*	*$10*
Metra System			*47%*	*$7*

Source: NTD (2019). Note that financial performance for Metra is only available at the system level, and not by line.

See **Appendix C** for further information about the infrastructure and commuter patterns in a subset of the rail peer agencies.

7.3 Peer Agency Outreach

Data from commuter and hybrid passenger rail systems were used in deriving benchmarks that a proposed SLATS regional service could be compared. The objective of this comparison was to determine if the potential demand (daily ridership) estimated by this study would be enough for SLATS and other area agencies to consider additional steps to advance the concept of passenger rail service. The primary agency metric presented above was weekday boardings, and this and other information for rail operations nationally are readily available through the FTA's National Transit Database (NTD).

During the course of this comparative analysis, it was thought that learning the experiences of other agencies who have implemented commuter or hybrid rail service in the last 20 years could be useful to SLATS and other area agencies in contemplating next steps. For this reason, it was decided to conduct a short survey of agencies to gain insights on pursuing a rail project. Questions were emailed to agencies that operate commuter rail (four) and hybrid rail (three). The agencies surveyed are summarized in Table 7-6 and responses were received from Sonoma-Marin Area Rail Transit District (SMART), Metro Transit for the Northstar commuter rail line, and the Regional Transportation Authority (RTA) for the Music City Star regional commuter rail line.

Table 7-6. Peer Agencies Surveyed

Service	Service Type	Trips per Day	Start
RTA Music City STAR (Nashville)	**Commuter Rail**	**1,115**	**2006**
Denton County, TX A-Train	Hybrid Rail	1,461	2011
TriMet Westside Express (Portland, OR)	Hybrid Rail	1,490	2009
Sonoma-Marin Area Rail Transit District (SMART)	**Commuter Rail**	**2,420**	**2017**
Rio Metro Regional Transit District Rail Runner	Commuter Rail	2,583	2008
Capital Metro, MetroRail (Austin)	Hybrid Rail	2,654	2010
Metro Transit Northstar (Minneapolis)	**Commuter Rail**	**2,739**	**2009**

Bold text indicates survey responses received.

Sonoma-Marin Area Rail Transit District (SMART) Findings

The SMART commuter rail line serves Marin and Sonoma Counties north of San Francisco. The current 45-mile line began service in 2017. SMART reported 2,400 average weekday passenger trips in 2019, and a farebox recovery ratio of 15%.

History

- Original concepts for the service were first envisioned in the late 1980s when the railroad right of way was preserved by public agencies.
- Voter approval occurred in 2008 (Measure Q).
- The 2008 recession led to decision to phase the project from 70 miles to an initial 35-mile route; later extended through contract negotiations and additional grants to 43 miles when service began in August 2017.
- Elected officials in both counties were champions of the project for the decades in its planning. The Measure Q sales tax referendum had active campaign efforts. Throughout, there have also been project opponents, including several who still actively oppose the service's existence.

Project Justification Reasons

- Much of the housing development in the corridor has been centered around SMART stations.
- Service has succeeded in helping people find greater access to economic opportunity.
- Effective in lowering greenhouse gas emissions.

Meeting Expectations

Due to changes in stations from original plans as well several major fires in the corridor, there is no true 'apples to apples' comparison of ridership predictions and actuals. However, ridership in early 2020 was up 30% and was averaging 3,000 weekday riders. The arrival of the COVID pandemic changed those successes, as for every transit agency in the country.

COVID-19 Impacts

SMART is uncertain of the long-term impacts of the pandemic. They anticipate recovery but it may involve different riders. Workers from elsewhere in the region are relocating to Sonoma County to live and work remotely. They believe that the work from home model will continue, but with workers using a combination of commuting to an office and working from home.

Lessons Learned

- Keep the rider in mind through all of your project development phases.
- Allowing bicycles on board for riders to use in first and last mile access is helpful.
- Approximately 11% of our riders are youth under 18; many traveling to middle and high schools along the corridor.
- People love the onboard staff and there is a genuine sense of community and family onboard.

Metro Transit Northstar Findings

The Metro Transit Northstar commuter rail line serves downtown Minneapolis and the corridor northwest to Big Lake, stopping at stations in Elk River, Ramsey, Anoka, Coon Rapids and Fridley. Service on the 39-mile line began in 2009. Metro Transit reported 2,739 average weekday passenger trips in 2019 and a farebox recovery ratio of 15%. The line is owned, and service is operated, by the BNSF Railway under contract to Metro Transit. Plans to extend the line another 27 miles to the larger community of St. Cloud are in progress.

Metro Transit's response to the information request was to send several documents, including the formal FTA Before-and-After Study published in November 2013. Before conditions were effective in 2008, and After conditions were as of 2011. The following summary draws from this document and others that were provided.

History

- Planning for the line began in 1997 when the Northstar Corridor Development Authority (NCDA) was formed.
- The project emerged from a Major Investment Study (MIS) in 1998 in which commuter rail was chosen as the Locally Preferred Transportation Investment Strategy. This study considered an 82-mile service between Minneapolis and Rice, MN.
- As a result of concerns about cost-effectiveness, it was later decided to reduce the line to the Big Lake terminus.
- A chronological summary of project milestones included:
    - June 2000 - Entry to FTA New Starts Preliminary Engineering,
    - December 2002 – FTA issues Record of Decision (ROD) to Final Environmental Impact Statement (FEIS),
    - December 2007 – Full Funding Grant Agreement (FFGA) signed with FTA,
    - November 2009 – Start revenue operations.

As Built Project

- The commuter line shares the BNSF double-tracked mainline freight railroad; commuter passenger cars are compliant with safety regulations of the FRA.
- Very little track construction for the commuter rail line was required.
- The operating easement agreement provided that modifications to signal and communication systems to accommodate commuter rail would be made by BNSF.

- The six stations outside of downtown Minneapolis each have a park-and-ride lot and provisions for kiss-and-ride and bus access. The park-and-ride lots total 2,800 spaces. Each station platform is 425 feet long and has a mini-high platform that provides level boarding using a bridge plate for one car on each train.
- The downtown Minneapolis station is located at Target Field, home of the Minnesota Twins baseball club. The ballpark incorporated the vertical circulation elements of the pedestrian connection between the Northstar station and a new light-rail station. These elements were designed, funded, and built as part of the ballpark's construction outside the FTA New Starts grant.
- The new maintenance facility at Big Lake includes a 50,000 square-foot building to support daily maintenance, operations, and administrative offices. A train-wash facility is adjacent to the maintenance building and a train yard provides overnight storage for the entire Northstar fleet.

Ridership

Table 7-7 summarizes projections and reported boardings from the Before-and-After Study. In addition, the table includes 2019 average weekday Northstar boardings as reported to the FTA National Transit Database. At the FFGA milestone, opening year ridership projections anticipated 4,100 weekday boardings. Metro Transit subsequently developed a revised projection (3,400) based on the finalized fare policy, which set fares at higher levels than anticipated at the FFGA. As shown, actual boardings have been at levels below projections.

Table 7-7. Northstar Boardings – Projected and Reported

Period / Source	Type	Weekday Boardings
2030 - Full Funding Grant Agreement	projection	5,900
Opening Year - Full Funding Grant Agreement	projection	4,100
Opening Year - Projected with Finalized Fare Policy	projection	3,400
2010 - Weekday Boardings	reported	1,949
January 2011 Weekday Boardings	reported	2,186
March 2011 Weekday Boardings	reported	2,217
Average 2019 National Transit Database	reported	2,739

Source: Metro Transit NorthStar Before-and-After Study.

The Before-and After Study offered several explanations for this ridership performance and lessons learned, including:

- The FFGA ridership projections anticipated a travel time of 43 minutes from Big Lake to Target Field, compared to the actual 51 scheduled minutes in 2011.
- The FFGA forecast assumed a conversion of riders from express bus Route 850. One-way Route 850 fares were $3.00 compared with the $4.00 Northstar fare from the Coon Rapids-Riverdale Station; as a result, no conversion occurred.
- Anticipated increases in population, employment and highway congestion did not occur. This was partly due to the significant economic downturn that began in 2008.
- Additionally, actual fares were slightly higher in 2011 than were assumed in the forecast.

To counter these factors, Metro Transit lowered fares in August 2012 and added a new station at Ramsey in November 2012. The lower rates put Northstar fares more in line with express bus fares from comparable distances.

Summary Outcomes

A summary provided in the Before-and-After Study included these points:

- The Northstar project was delivered in November 2009, ahead of the grant agreement scheduled implementation of January 2010 and under budget.
- Commuter rail customer feedback has been very positive. Customers enjoy a 95+ percent on-time reliability of service, well-maintained rail cars and stations, and convenient fare payment.
- Northstar success is illustrated by growing commuter ridership and strong special event ridership.

RTA Music City STAR Line

The Regional Transportation Authority of Middle Tennessee (RTA) oversees the 32-mile Music City Star commuter rail line that serves downtown Nashville and communities to the east. There are six stations: Riverfront (Nashville terminal), Donelson, Hermitage, Mt. Juliet, Martha, and Lebanon. The line operates on track owned by the Nashville & Eastern Railroad Authority. Tracks, signals, and bridges were upgraded/replaced and various grade crossings have been improved as part of the commuter rail line. Three trains provide weekday morning and evening service each peak period. Music City STAR began service in 2006. The line averaged 1,115 weekday passenger trips in 2019; farebox recovery ratio of 21% was reported to the NTD.

Agency Roles and Responsibilities

- The RTA was established in 1988 to serve the counties in the Metro Nashville area to plan, finance, construct, operate, maintain, and manage mass transit systems in response to the growing need for regional solutions to traffic congestion.
- The RTA contracts with the Nashville Metropolitan Transit Authority (MTA) to manage the RTA's daily operations. In addition to the commuter rail route, RTA also oversees ten regional commuter bus routes and vanpool services.
- The commuter rail service is operated under a 3-party agreement between the RTA, the Nashville & Eastern Railroad Authority and the rail line operator, RJ Corman Railroad Group (a for-profit freight and passenger rail operator). The service is financially supported by contributions from the member jurisdictions, federal funding, fares, and the State of Tennessee.

Decision-Making Process

- Key dates
  - First envisioned – mid-1990, demonstration service was provided at different times to showcase potential future service before the launch of the project.
  - Decision to seek funding - 1999, including establishing the RTA as a federal funding recipient agency.
  - Construction began – 2005
  - Service launch – 2006

- Planning Studies - A feasibility study by the MTA in the mid-1990s. Considered different rail corridors in the region to assess potential. The report focused on attributes of each corridor, as well as issues and challenges.
- Reasons for Justifying Project - Several factors including ridership potential, cost of operations, capital costs, traffic congestion levels (i.e. positive impact upon), air quality benefits, and alignment ownership were considered in evaluating alignments. The East Corridor was not the top performer in any category; however, it was the "easiest" for implementation due to being publicly owned, low freight traffic, and rail operator was willing to accommodate passenger rail service.
- Managing Project Support - In addition to RTA board members, the main champions were: Mayor of Nashville, the Nashville-area Congressman, and the Nashville Area Chamber of Commerce. The Chamber included transit as a main topic for their peer-city visits to help educate elected officials and leaders on the subject.

Project Financing

- FTA Small Starts program, contributions by the impacted municipalities, and the State of Tennessee. No dedicated funding source currently exists for the service.

Negotiation Process for use of Rail Corridor and Operation

- The biggest negotiation challenge of the 3-party operating and construction agreement was that there was no local frame of reference. Parties were concerned with the possible financial outcomes. RTA brought in outside Counsel that was intimidating to the local parties and added to the uncertainty that someone might be out maneuvered or slighted.
- Also contributing to the challenges was that the public rail authority had given control to the present operator. Local entities weren't aware of certain FTA provisions of passenger service, versus their familiarity with FRA guidelines.

Meeting Expectations

- Ridership - Has not reached original estimates of up to 2,000 trips/day. However, it has steadily grown over time before COVID-19. Some of the reasons for lower ridership:
  - Limited number of trips (only 3 round trips a day),
  - Single track with only one passing siding limits frequency,
  - Shared operation with freight limits opportunities for service expansion,
  - Corridor growth and development has been limited, with only in recent years new development taking place.
- Financial - The capital project costs were low, making it the most inexpensive project of its kind in the country. The operating and maintenance costs have been as expected since the service design has remained generally the same. Revenues have been below expectations when compared to initial ridership estimates. The lack of dedicated funding makes the financial commitment from the partnering municipalities as key to sustaining operations.
- As far as growth, in August 2018 the RTA opened its first TOD station at Hamilton Springs. This $4.1 million station was also the region's first joint public-private transit

development with contributions from the MPO (flexed to FTA), State, City of Lebanon, RTA, and the private developer.
- The RTA's strategic plan identifies future capital improvement projects including implementation of Positive Train Control (PTC) to be able to accommodate more trips and expand service.

Host Railroad Performance - The track has been maintained in a state of good repair and there have been no conflicts between freight and passenger rail service. The service is extremely reliable and on-time typically 99% of the time.

Third Party Operator Performance - The operating company is knowledgeable and dependable. They've grown over time into the operational complexities of the service and we have developed a positive, cooperative rapport.

COVID-19 Impacts - The pandemic has led to a 90 percent decline in ridership, forcing the cancellation of one round trip a day. Because commuter-oriented nature of demand, it is unknown when ridership will return and to what level. The agency continues to monitor the trends and demand to be able to react once the trend starts upward again.

Lessons Learned

- Establish solid and realistic capital and operating cost agreements with all partners involved.
- Explore implementation of a reliable, dedicated funding source early on.
- Identify committed project champions across the region including federal, state, local, and business community members.

8. Conclusion and Next Steps

8.1 Summary of Findings

The rail alignments evaluated as part of the SLATS Rail Study, based on work completed in 2008 SCWCTS, include:

1. Rockford-Beloit-Janesville-Evansville-Madison, labeled as Rockford-Madison (West)
2. Rockford-Beloit-Janesville-Milton-Madison, labeled as Rockford-Madison (East)
3. Harvard-Janesville-Evansville-Madison, labeled as Harvard-Madison (West)
4. Harvard-Janesville-Milton-Madison, labeled as Harvard-Madison (East)
5. Harvard-Beloit (with an optional connection to -Rockford)

The SLATS Rail Study broadly assessed the market potential of passenger rail service within the SLATS MPA and surrounding MPOs, generally referred to as the super region. The study examined potential passenger rail alignments that would directly serve Beloit via a Rockford-Madison connection (Alignments 1 and 2), or an extension of the Metra UP-NW commuter rail line via Harvard-Beloit (Alignment 5). The study also examined the market potential of a passenger rail alignment that would indirectly serve Beloit via a West and East Harvard-Madison connection (Alignments 3 and 4). Under this alignment, residents of the Beloit would not have direct access to passenger rail service but would still benefit from the ability to drive to a nearby rail station, likely in Clinton or stations in the Janesville area. Furthermore, SLATS has discussed the potential of extending the MPA boundary east to include Clinton, which would provide direct access to the SLATS MPA.

Alignments Removed from Further Analysis

The market analysis concluded that of the two eastern alignment options between Janesville and Madison, the rail alignment via Milton (i.e., Alignments 2 and 4), were stronger in terms of potential ridership demand than via Evansville (i.e., Alignments 1 and 3). The West alignment also includes a gap in rail infrastructure north of Evansville, while the publicly owned rail alignment via Milton is intact and in use. As a result, Alignments 1 and 3 were dropped from consideration.[13]

Alignment 5, connecting Harvard and Beloit with an optional extension to Rockford, showed significantly lower levels of ridership demand compared to the other alignments, and was also dropped from further consideration.

Alignments Advanced for Further Analysis

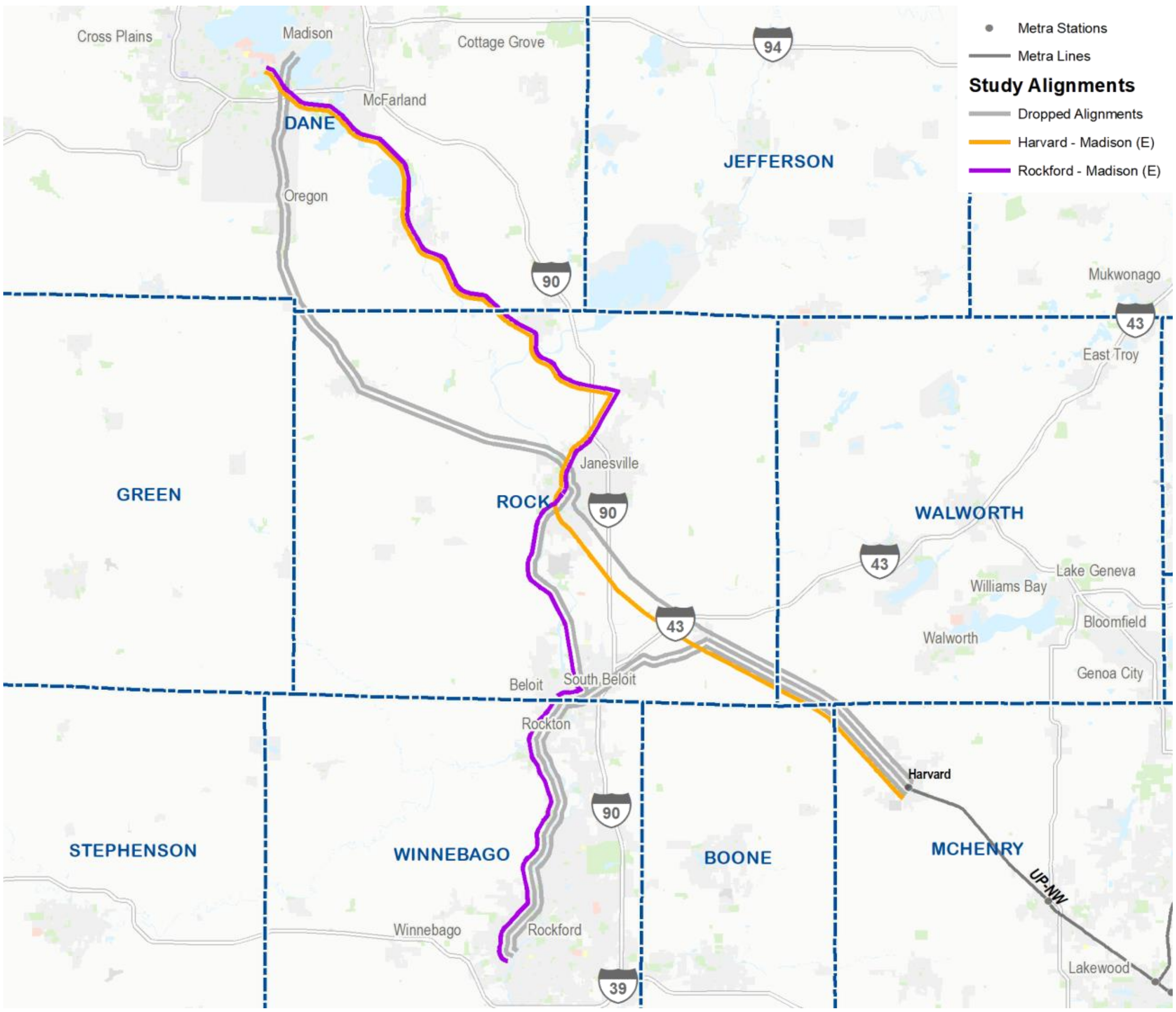
A depiction of the alignments to advance is provided in Figure 8-1. Ridership estimates for Rockford-Madison (East, Alignment 2) and Harvard- Madison (East, Alignment 4) were very similar, each approximately between 850 and 2,150 trips per weekday by 2050. The higher end of this range is comparable to some passenger rail operations nationally, although these systems generally have the lowest levels of ridership and cost-effectiveness among all rail systems. A key reason for the higher estimated demand for these two alignments is the connection to Madison, which is a major destination for commute trips. For example, Census-reported corridor commuter trips showed that 25%of the Rockford-Madison destinations were in

[13] It is worth noting that should studies that introduce passenger rail service to the area be advanced, the Janesville-Madison west alignment could be revisited, especially if other considerations or new information is identified.

Madison, and 40% of the Harvard-Madison destinations. This compares to the portions of the alignments that would operate in Madison, representing 7% of the route miles of each of alignment.

The principal reason for Madison's importance as a destination is the concentration of jobs in proximity to the potential Madison station. Reported 2018 jobs per acre in the half-mile radius of the Madison-Kohl station location was over 70, compared to the next highest stations of fewer than ten jobs per acre for the downtown areas of Janesville and Rockford. While having a lower density, it is worth noting that the Beloit and Janesville stations serve as important work destinations, and origins, for commuters. Ultimately, the overall success (in large part measured by achieving viable ridership levels) of a passenger rail service within the super region is not dependent on one large destination/station, instead all stations along the rail alignment contribute to the overall success.

Figure 8-1. Study Alignments to Advance



Source: AECOM.

In conclusion, additional analysis would be required to identify the most appropriate passenger rail alignment option for the super region (i.e., Alignment 2 Rockford-Madison versus Alignment 4 Harvard-Madison). Some important factors for consideration include:

- A direct rail connection between Madison and the corridor overall to the largest commercial center of the Midwest (i.e., Chicago) would expand regional access, especially to different job markets.
- Implementation will require the active involvement of all major governmental units affected. The interest and involvement of the states (Wisconsin and Illinois), counties, local governments, other MPOs within the super region, and other regional stakeholders.
- The willingness of railroad owners to consider hosting a passenger rail service could be another factor.
- Existing and future rail network capacity for passenger and freight needs.
- Alignment cost, including any right-of-way needs for stations and other supportive infrastructure (e.g., yards, maintenance facilities).

Beyond the identification of a preferred alignment, the larger and more immediate question is: does this level of estimated demand for either alignment offer enough compelling evidence to warrant additional planning activities to assess, for example, feasibility, cost-benefit, and stakeholder interest? To help answer this, we recommend conferring with other affected stakeholders, including MPOs and State DOTs, to gauge the level of interest in further exploring viable passenger rail options within the super region. Assuming there is support, the following section outlines the next steps that could be taken to advance the discussion.

8.2 Next Steps to Advance Passenger Rail Service

Before discussing next steps, it is important to reiterate that this study started near the beginning of the COVID-19 pandemic and the analysis is based on pre-COVID commuting patterns. As this study was completed while the pandemic was still on-going, it is difficult to predict the long-term impact COVID will have on commuting patterns, and the potential use of a passenger rail service. Since March 2020, transit ridership, including commuter rail service, has declined significantly across the United States and has yet to rebound to pre-COVID totals. At this point in time, it is too early to know if this trend is temporary, or if there will be extended impacts on transit usage. Other factors that need to be considered include: will individuals spend more time working remotely (and thus less time traveling into an office)? Could individuals decide to live a longer distance away from an office location if they only have to travel into an office a couple times per week, or per month? And, if so, could commuter rail serve as a desired travel mode?

Needless to say, the long-term impacts of COVID-19 are likely to affect the next steps to advance passenger rail service within the region. SLATS should continue to monitor the long-term travel and commuting impacts related to COVID-19; however, implementing any form of passenger rail service within the super region would require significant lead time to conduct robust technical analyses, engage and collaborate with stakeholders, define an institutional framework and execute a legal agreement, and design and construct all required infrastructure. As such, the following are some specific near-term actions that SLATS can take as a follow-up to this study.

Refine Market Analysis and Other Initial Planning Activities

- **Research Peers Follow-on |** As discussed in Chapter 7, the experiences of newer commuter and hybrid rail agencies to implement rail projects can be a useful source of information and insight. Follow-up with the agencies queried, or to reach out to additional agencies could be considered as needed.
- **Refine Demand Analysis** | The methodology employed for this study involved a high-level travel market analysis to determine the potential demand for passenger rail service. Exploring ways of refining the market analysis would likely include a means of incorporating level of service as a variable in the regression analysis. For example, previous commuter rail feasibility studies completed by the project team have shown that a statistical analysis of high-wage job density, number of morning trains, and walkability index values for non-downtown station areas produces robust daily alighting estimates in the Metra system. Boardings at Metra origin stations have similarly been estimated using service level variables such as rail travel time, daily trains, and midday headways, in addition to other infrastructure and socio-economic variables.
- **Monitor Socioeconomic Projections** | Another area of refinement are the 2050 socioeconomic projections, which should be further reviewed with MPOs to ensure that they reflect the most current expectations. As discussed in Section 6, the 2050 employment projections in downtown Madison have a significant impact on the overall ridership potential. A good time to revisit the ridership projections would be when MPOs within the region develop new population and employment projections, likely as part of future LRTP updates.
- **Define Service Models** | Identify possible service models that can be considered (e.g., commuter rail, hybrid rail, or intercity rail), and adjust the market analysis to account for variations in service levels, speeds, station spacing, and other factors that would be characteristic of each mode. Differences in service characteristics that could affect the demand analysis approach and data used include the following.
    - **Commuter Rail |** The market analysis in this report was based on replicating demand for Metra, that is, representative of commuter rail service, and the underlying data used was Census-reported work trips. Commuter rail assumes focus of travel is a center city and is characterized by frequent and fast peak period service (i.e., express trains), and less frequent and non-express service in the off-peak.
    - **Hybrid Rail** | This service is characterized by higher frequencies throughout the day, with more station-to-station travel, and less dependency on a single node like a center city. While work travel is likely the most important travel market, the higher frequencies and more opportunity for station-to-station travel can also attract higher levels of non-work travel than is the case for commuter rail. Expanding the statistical model used in this report to include frequency of service as another independent variable that would be beneficial. Use of CTPP data probably understates estimated demand for a hybrid rail-type service, but not significantly. If location-based or cell phone mobility data could be obtained for the analysis, this limitation could be minimized (e.g., StreetLight or AirSage).
    - **Intercity Rail** | Since intercity rail travel markets would not be focused on work travel, gauging demand would need to rely on different datasets than Census reported work travel statistics. Estimating demand would require an alternative analytic approach than used in this report and was not feasible as part of this study. Furthermore, as intercity rail service has greater spacing between stations

(i.e., fewer stations), this service is less likely to be an effective form of passenger rail for the two alignments identified for the super region.

- **Explore Passenger Rail Operations** | Research and evaluate the various models of operation that can be considered such as:
  - Formation of a regional transit authority, including responsibilities for funding and oversight, with operations provided under contract by an operating railroad or management firm.
  - Operation by a private company without public subsidy (see www.gobrightline.com as an example).
  - Bi-state service may have implications for the institutional and operational arrangements considered.
- **Run STOPS Model** | The analysis presented in the SLATS Rail Study is useful in gauging the potential market for rail service but providing a more robust estimate of demand will require use of a tool specifically designed for this purpose. The FTA's Simplified Trips-on-Project Software (STOPS) is recommended for this application, in part, because it quantifies the measures used by FTA to evaluate and rate transit projects, assuming that FTA could be a source for project funding. Setting up a STOPS model for the super region could involve adapting versions of STOPS developed for the Chicago or Madison metro areas. This could be an important early step, but only if other key stakeholders (e.g., MPOs and state DOTs) see benefit in advancing further studies of this concept.
- **Document Economic Benefits of Rail Investments** | Gaining the support of stakeholders to advance a rail project will require articulating the specific benefits that could accrue locally. In addition to improvements to the transportation system, estimating the potential localized economic benefits that could be generated will be an important metric to document. Potential areas of economic impact to explore include:
  - An enlarged labor pool that local employers can draw from, as more workers find themselves within the 90-minute commuter shed that enables regular commuting.
  - Transit investments support motivation for higher density transit-oriented development (TOD) and increased "value capture" (increases in property tax, sales tax, etc.) that stems from the investment.
  - Construction spending to upgrade rail, signal, and station infrastructure entails direct, indirect, and induced economic activity in the area.
  - Trends since 2010 (and now with the COVID-19 pandemic) argue that the future workforce will be more geographically flexible, with increased working from home arrangements. As communities vie to attract geographically flexible residents, access to employment centers via transit can be seen as an increasingly critical amenity in making housing decisions. It should be emphasized that the long-term impacts of COVID-19 remain uncertain, making it difficult to draw definitive conclusions on its influence on commuting.
  - In context with growing concern over climate volatility, growth in transit ridership drives reductions in vehicle trips, congestion, and greenhouse gas emissions.

- **Identify Funding Sources** | Should a project be deemed feasible and meet the FTA eligibility requirements for a Capital Investment Grant (e.g., New Starts program), FTA grants only fund up to half of the costs of implementation. Moreover, these grants would not fund the ongoing costs of operations and maintenance. As a result, identifying sustainable state, regional, and local funding sources will be a key issue to address. Tools to assess a range of funding alternatives against funding needs and other variables are available to aid in this effort.

- **Conduct Public and Stakeholder Outreach** | Develop a program to educate the public and stakeholders on the benefits of an investment in rail service to the area. This can include awareness and opinion surveys.

- **Incorporate the Project into the SLATS 2045 LRTP Update** | A requirement of the FTA New Starts program is that the locally preferred alternative of a project is included in region's fiscally constrained LRTP. Prior to the selection of a locally preferred alternative, the LRTP development process is an important vehicle to share the project vision and assess how it would fit into the future infrastructure network and system of transit services in the region.

Discussions with Railroads

Discussions with the potentially affected railroads are premature at this level of analysis, in part, because the analysis was able to build on the earlier SCWCTS work. However, should planning activities to assess feasibility continue, assessing the willingness of freight railroads to share their right-of-way and infrastructure with passenger operations and identifying their issues/areas of concern will be an important next step. Some initial work to support these discussions include:

- **Coordinate with Railroads** | Current freight railroad operations on the rail alignments studied are indicated in Section 3.2. Considering how dynamic the rail industry has been in the recent past, research is recommended to confirm current freight rail operators and owners of rail rights-of-ways. Points of contact should be collected on the affected freight rail operators and owners of the rail rights-of-way, if different. Data should be requested to build a more comprehensive profile of the alignments as shared passenger and freight corridors. Data should be requested to assess current and future available line capacity, levels of freight traffic, capital needs/deficiencies, and other relevant data to understand operational needs/issues/concerns.

- **Follow-up with Metra** | Initial contact with Metra was made as part of this study. Metra's position was that they would very likely not be a funding partner for a rail initiative due to significant capital improvement and renewal needs of the existing Metra network. Also, they noted that the Extra-Territorial provision of the RTA's enabling legislation generally limits use of service board public funds for improvements outside of six-county Chicago metro area. Finally, since the service concept envisioned would involve a Wisconsin-based service to connect with Metra service at Harvard, minimal coordination with Metra would be required. With this said, Metra is not opposed to SLATS exploring alternative passenger rail services that could connect to the Harvard Station.

- **Explore Issues Related to Shared Access and Operations** | Explore the potential of shared track access and other facilities with a passenger rail operation. Other facilities could include rail yards and maintenance facilities. If a shared arrangement is deemed not feasible, discuss the conditions that would be acceptable (e.g., build new track in the railroad right-of-way). It is also recommended that the feasibility of limiting freight movements to certain times of the day (e.g., to permit a hybrid rail service) be discussed.

Actions Should Passenger Rail Service Not be Pursued in the Near-Term

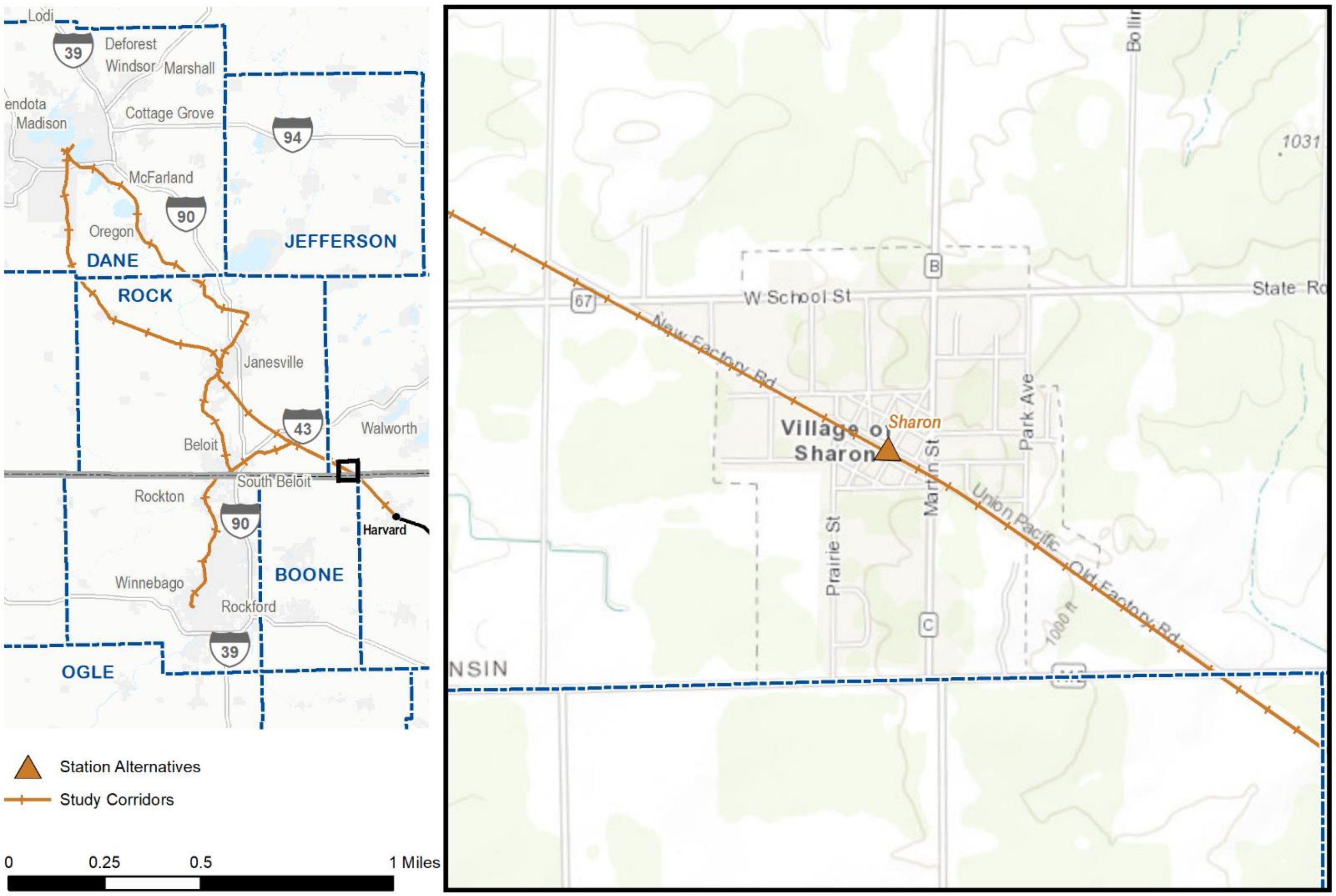
- **Create Rail Facility and Right-of-Way Preservation Plan** | Past investments in railroad facilities and corridor right-of-way would be extremely difficult and costly to replace if abandoned. Preserving railroad infrastructure for potential future use for passenger rail should be of critical importance. This would include researching the potential for loss or degradation of freight operations, including the resultant consequences. Coordination with the WisDOT Freight Rail Preservation Program is also recommended.

- **Support Transit-Oriented Development (TOD)** | TOD encourages mixed-use development by integrating housing, office, retail, parks, and other civic uses within a short walking distance of a train or bus station. This type of development can occur in anticipation of a transit project to help build the case for the investment and enhance the market demand for the service once implemented. It is also important to note that since TODs result in economically, socially and sustainable communities by creating walkable, vibrant places with a range of uses and diversity of people in close proximity, these developments can be beneficial even without transit. To the extent that the prospective rail station locations are in downtown areas or near other existing transit facilities (e.g., bus transfer centers), the benefits can be realized more quickly.

Appendix A | Stations

This appendix provides topographic maps of the station alternatives used in the SLATS Rail Study.

Sharon



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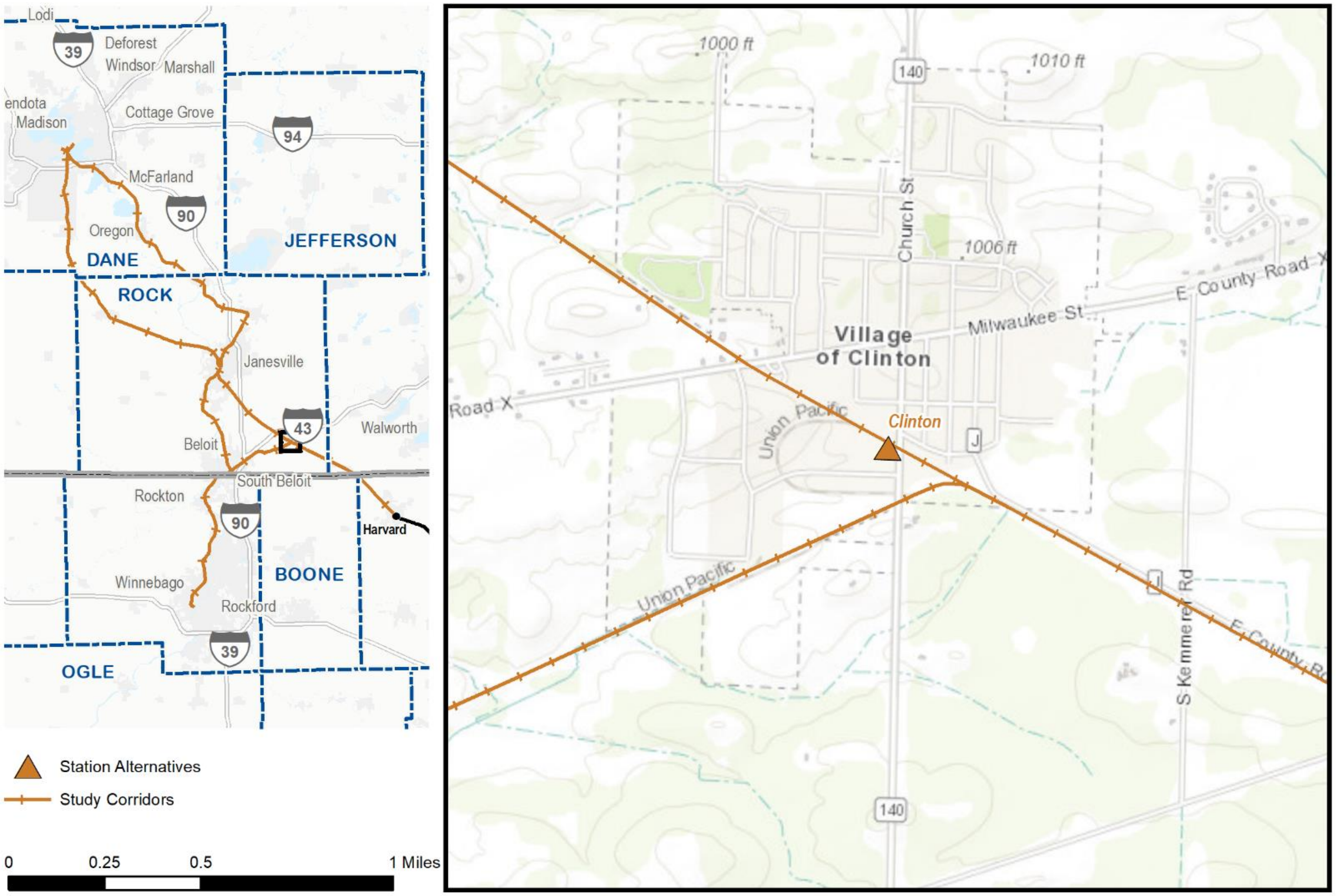

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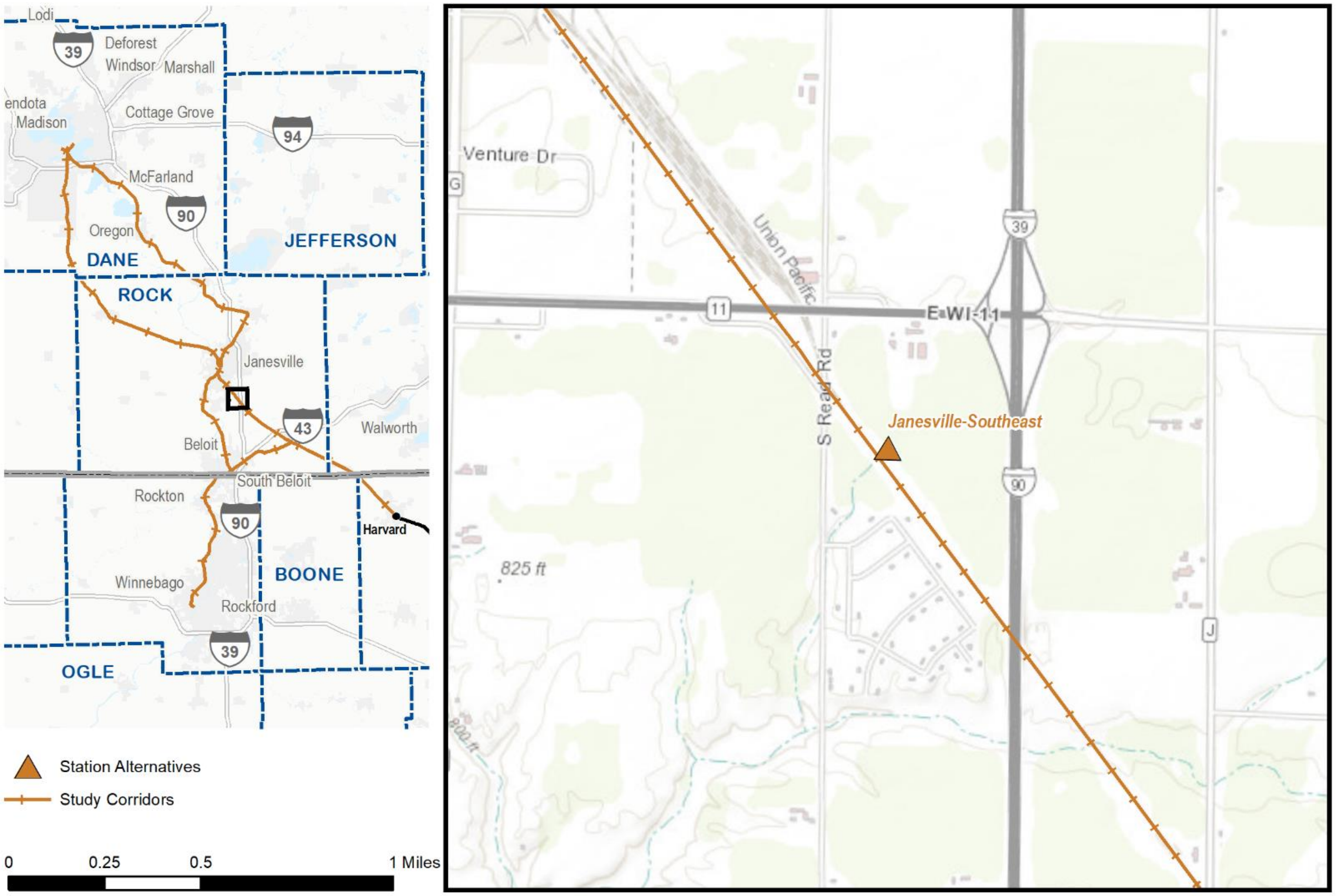
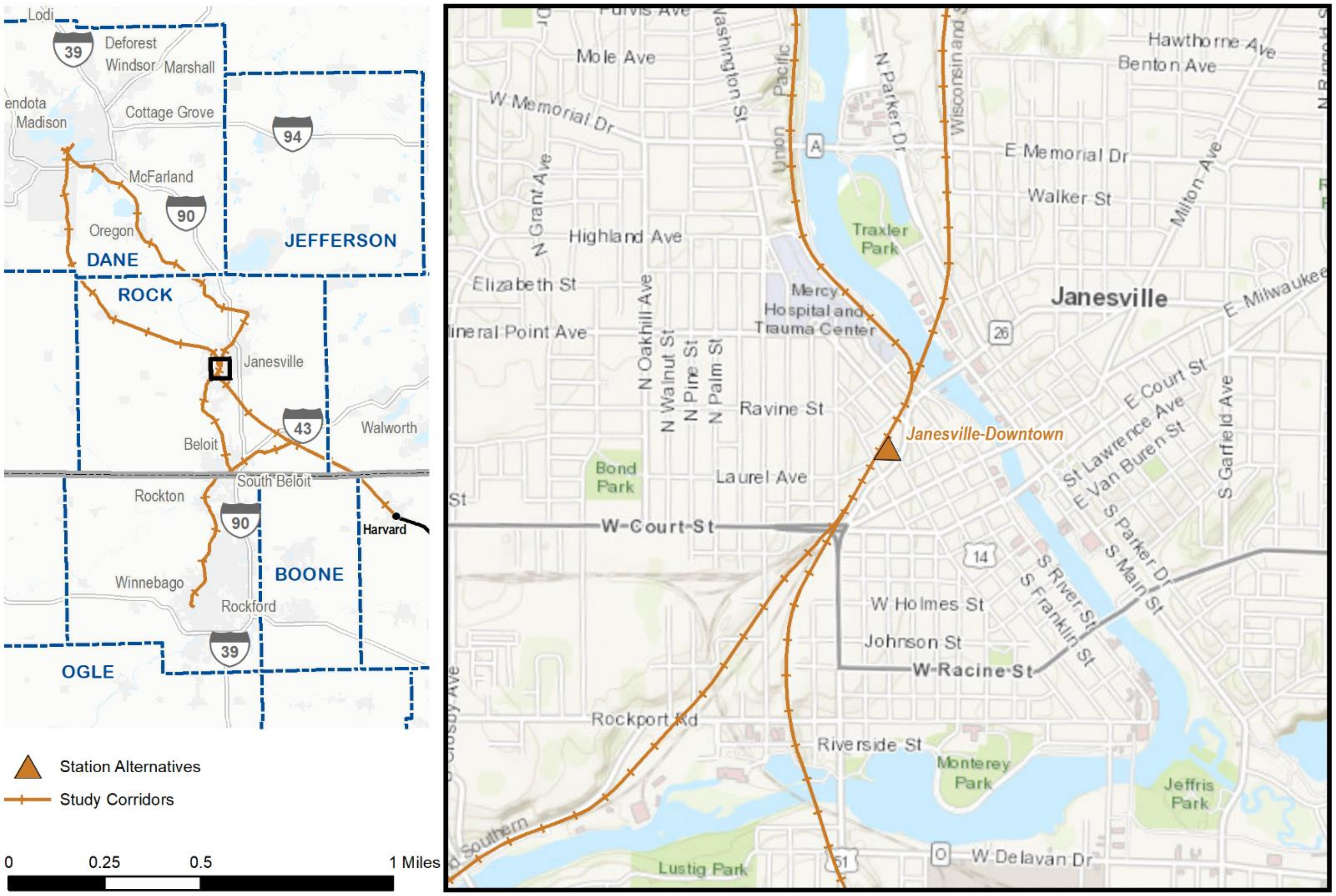
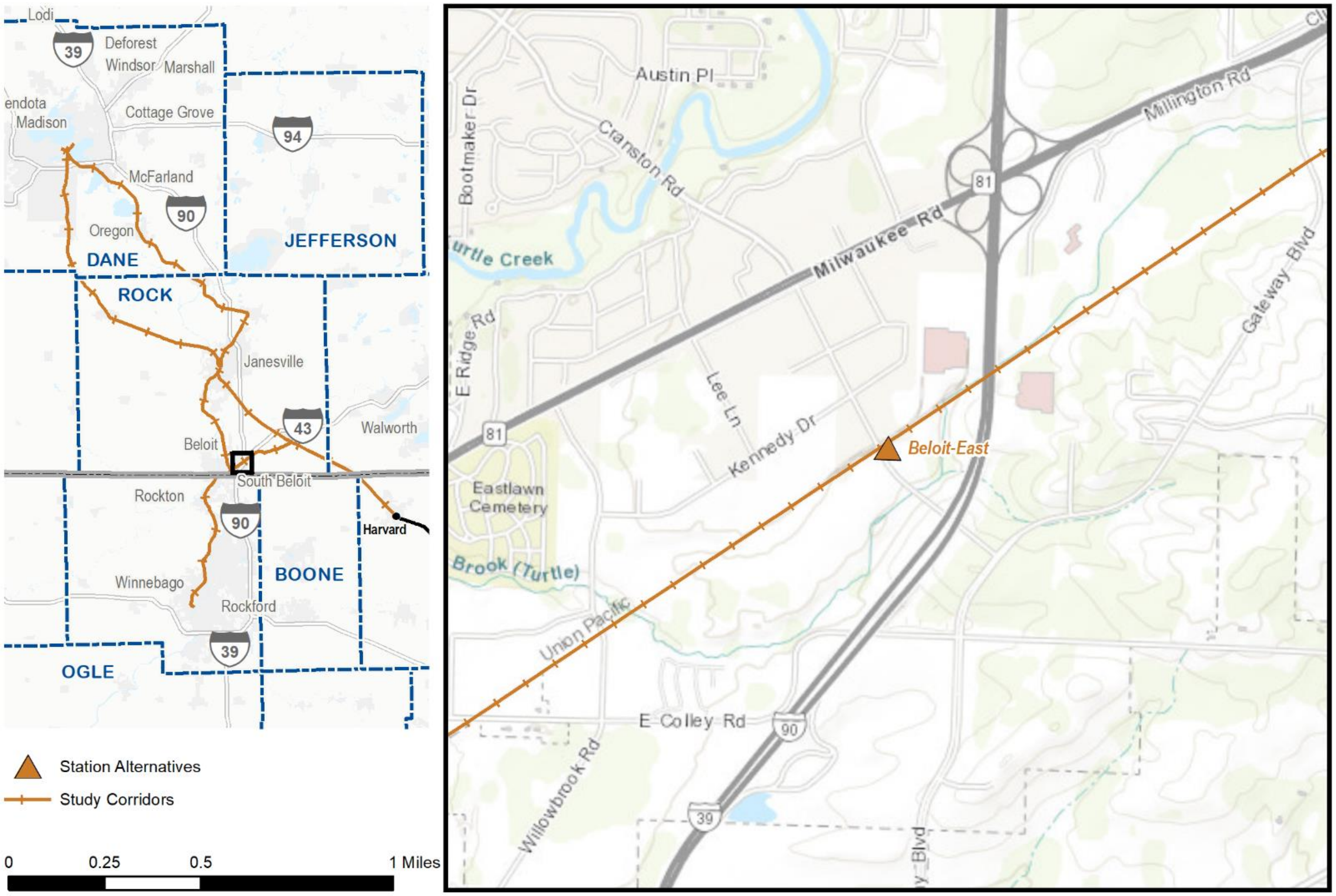
Janesville-Southeast



Janesville-Downtown



Beloit-East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Gateway Blvd
E Ridge Rd
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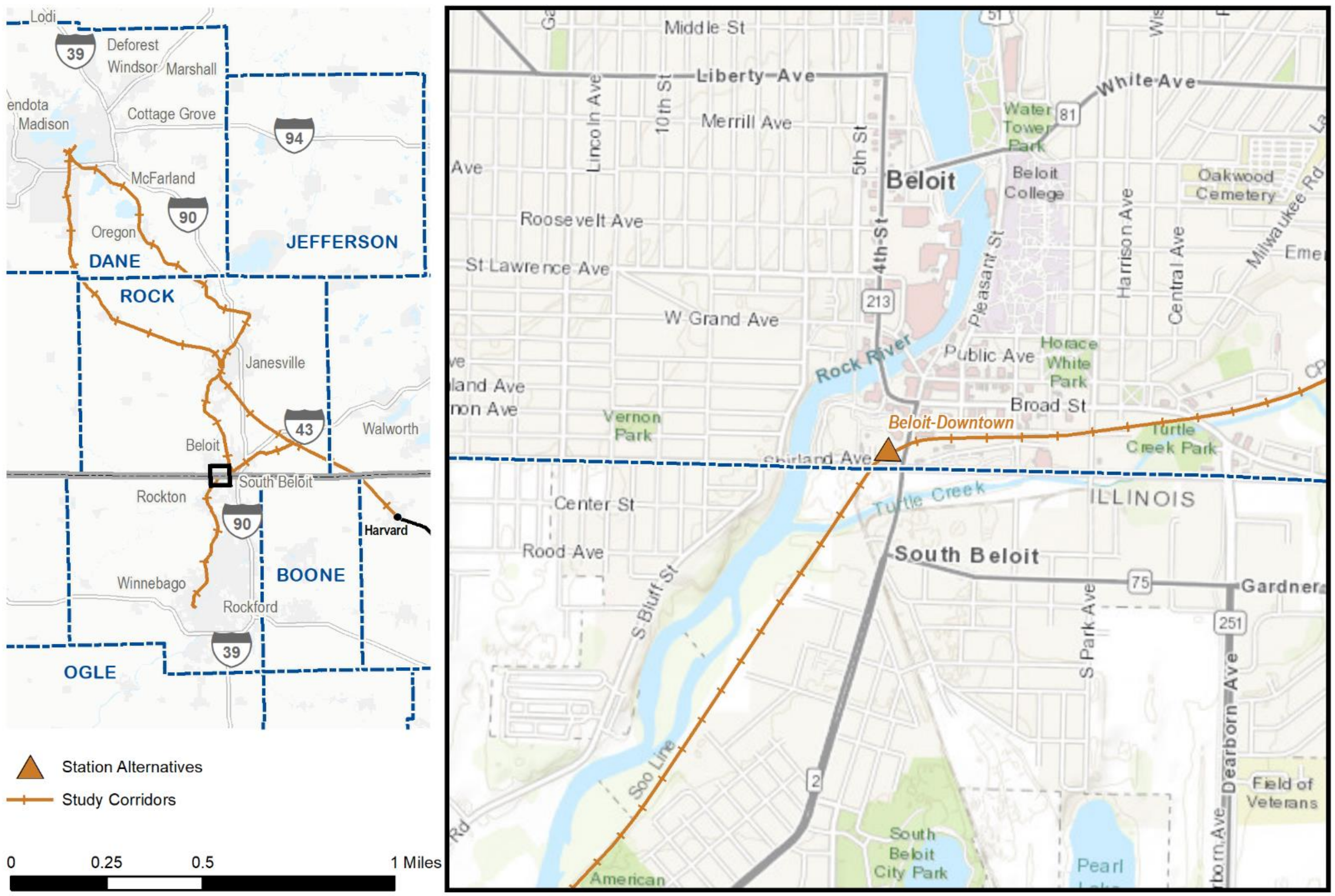
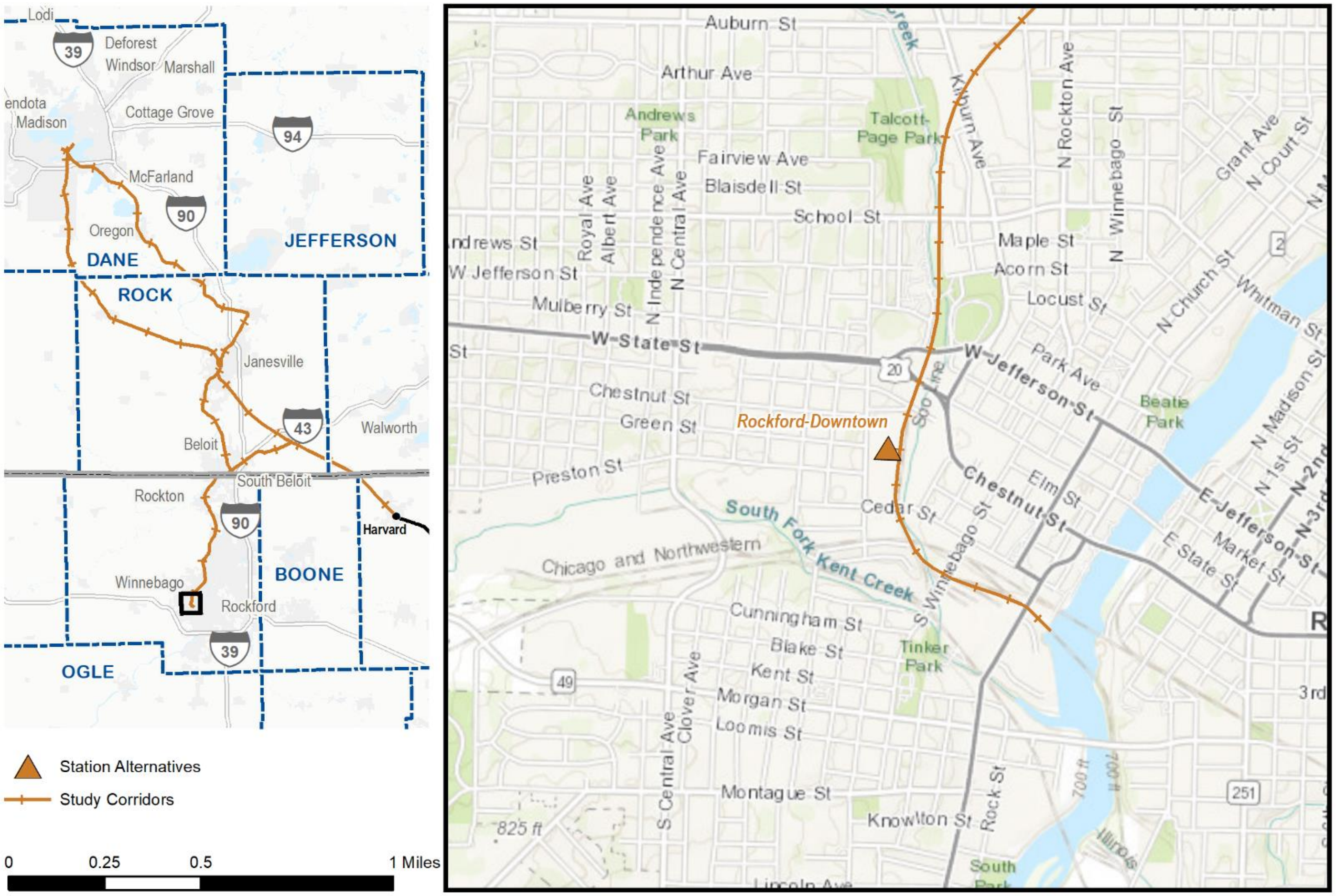
Kennedy Dr
Beloit-East
Eastlawn Cemetery
Union Pacific
E Colley Rd
Willowbrook Rd

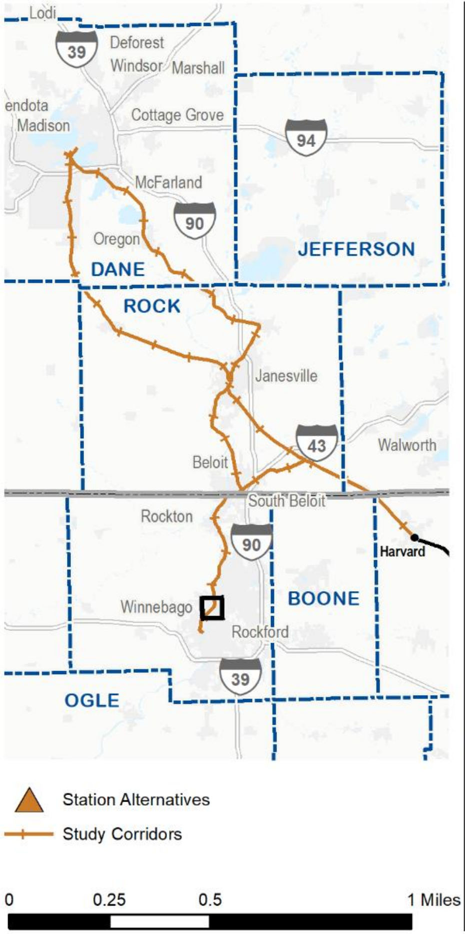
Beloit-Downtown

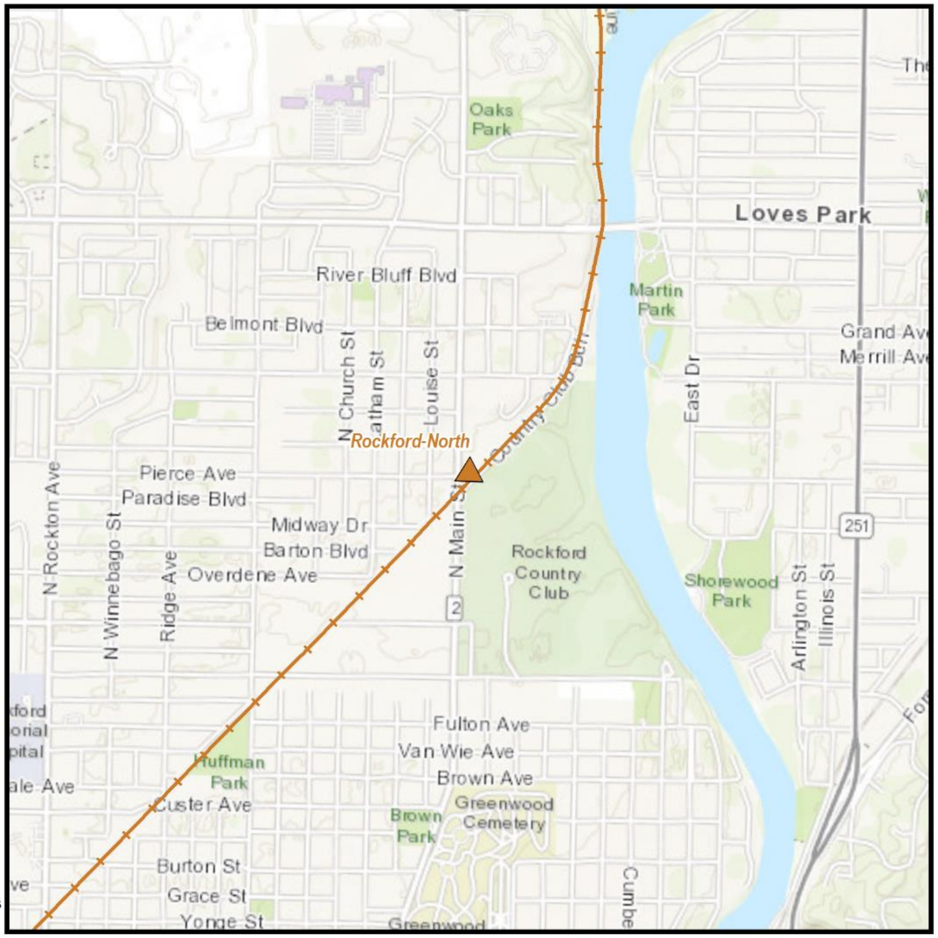


Rockford-Downtown



Rockford-North





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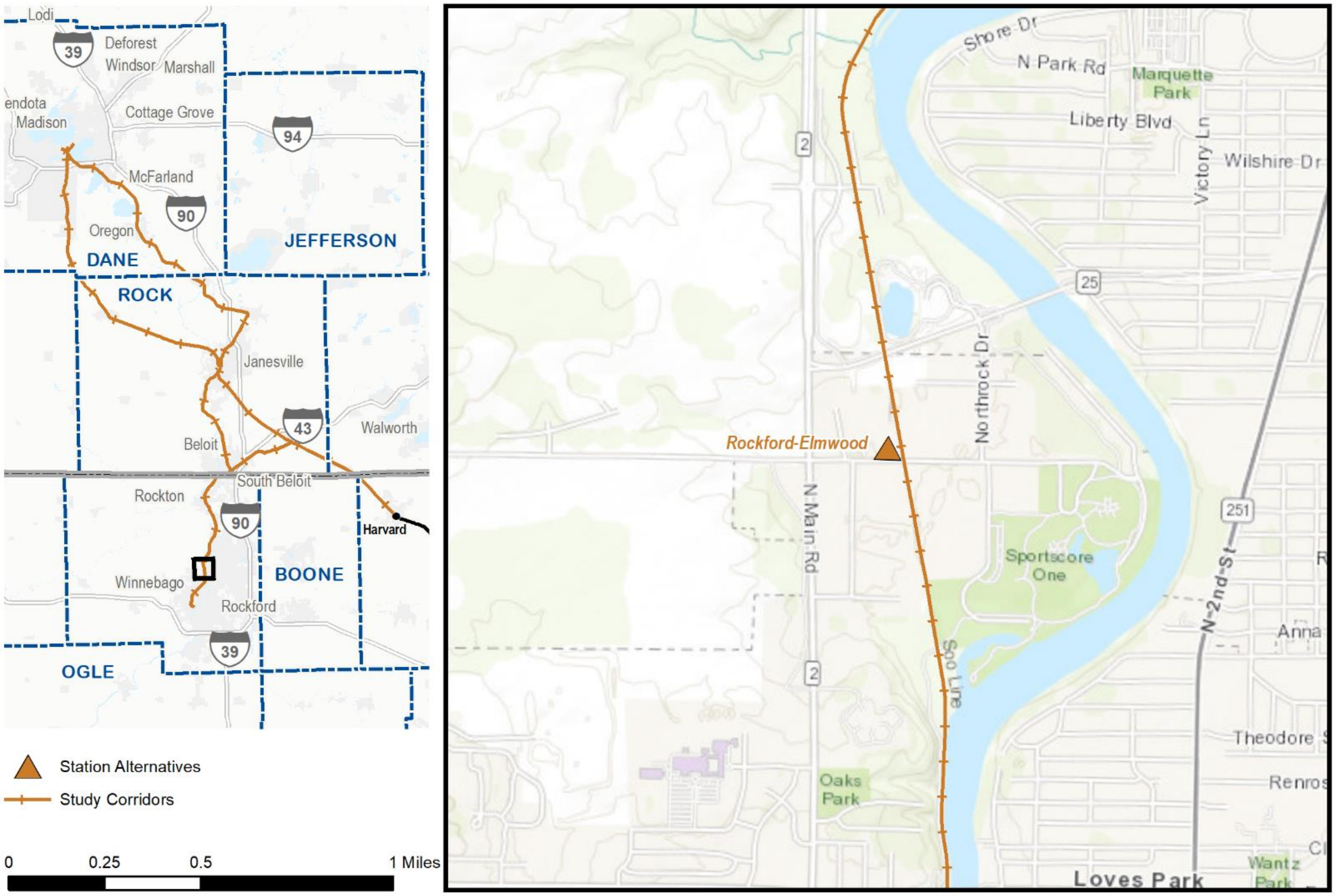

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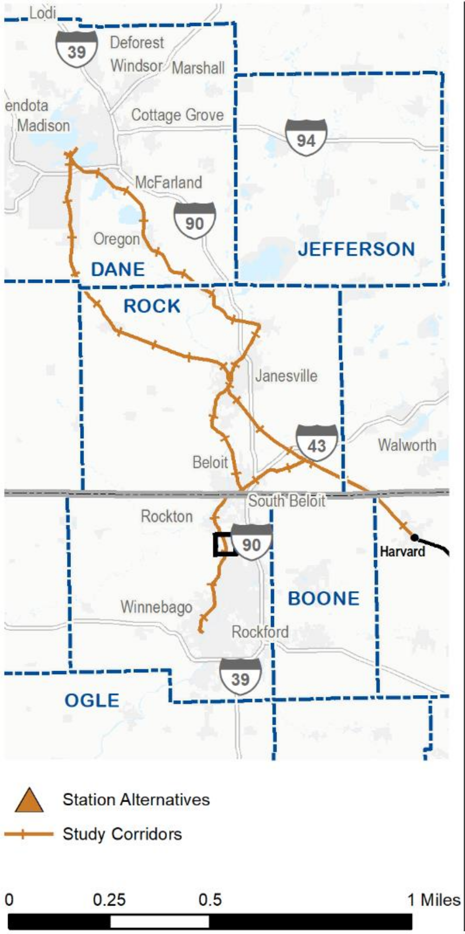
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Hawks Pointe Trl
Gleasman Rd
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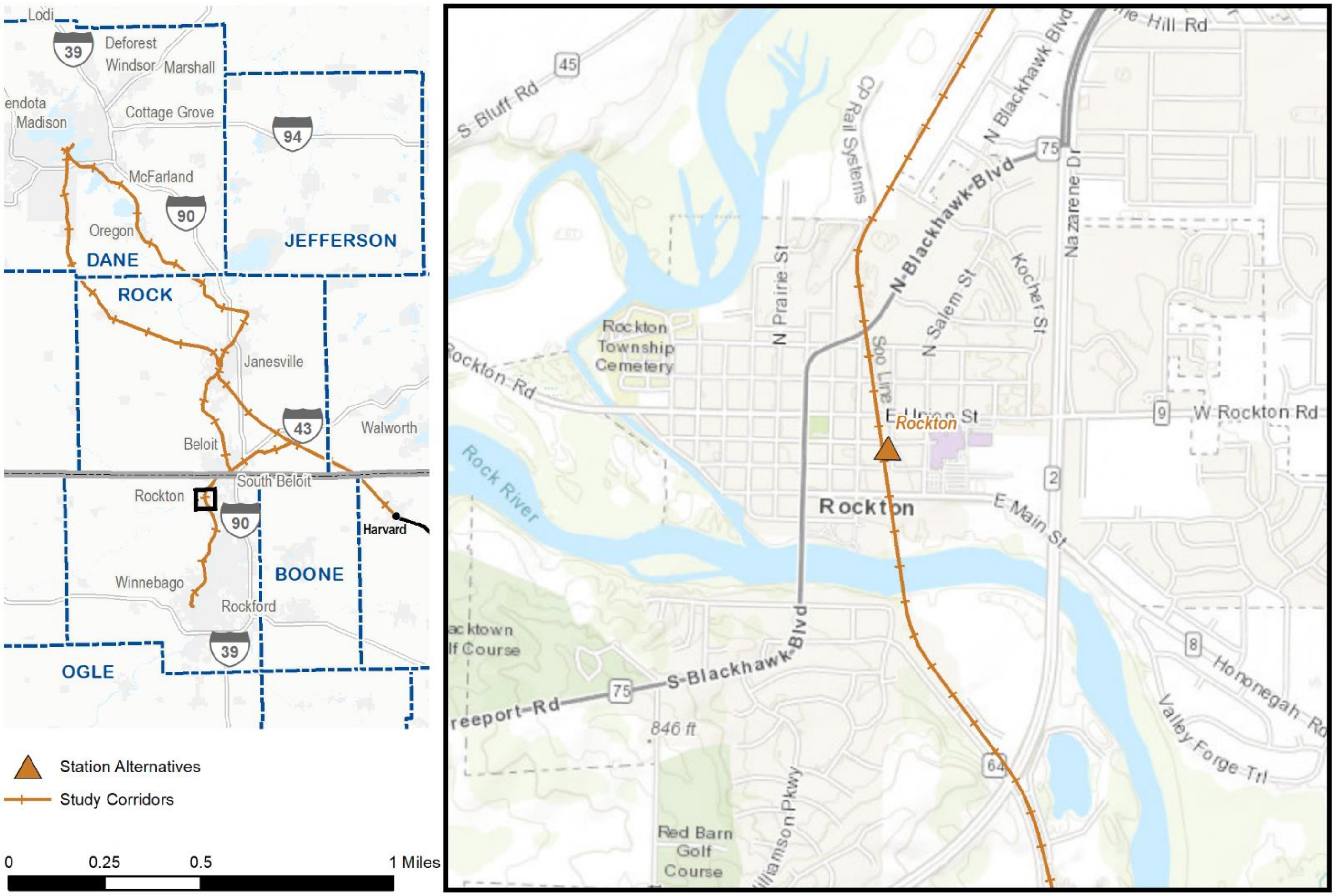
Gleasman Rd

Rockton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Hononegah Rd
Valley Forge Trl
S Blackhawk Blvd
Freeport Rd
846 ft
Williamson Pkwy
Red Barn Golf Course
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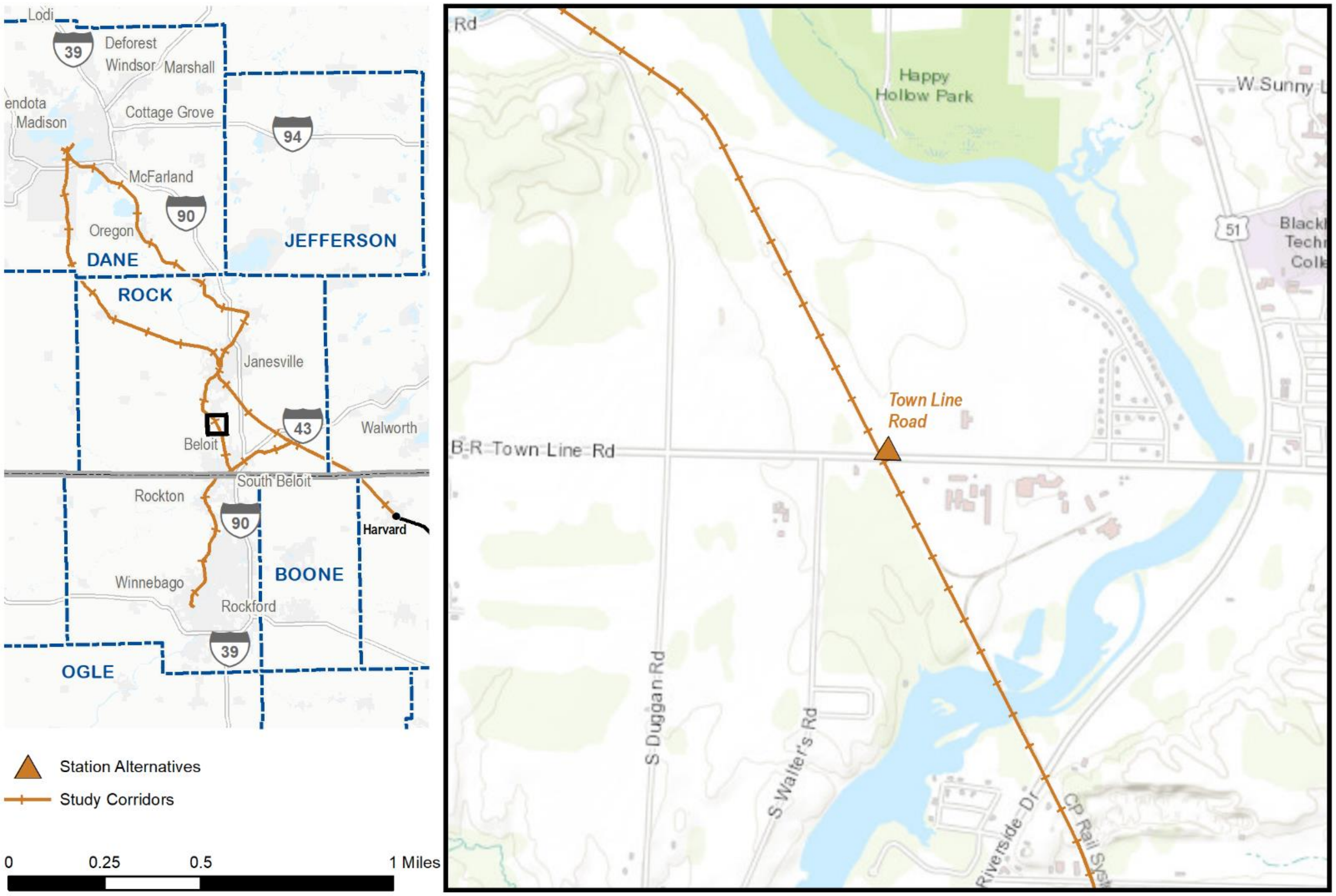
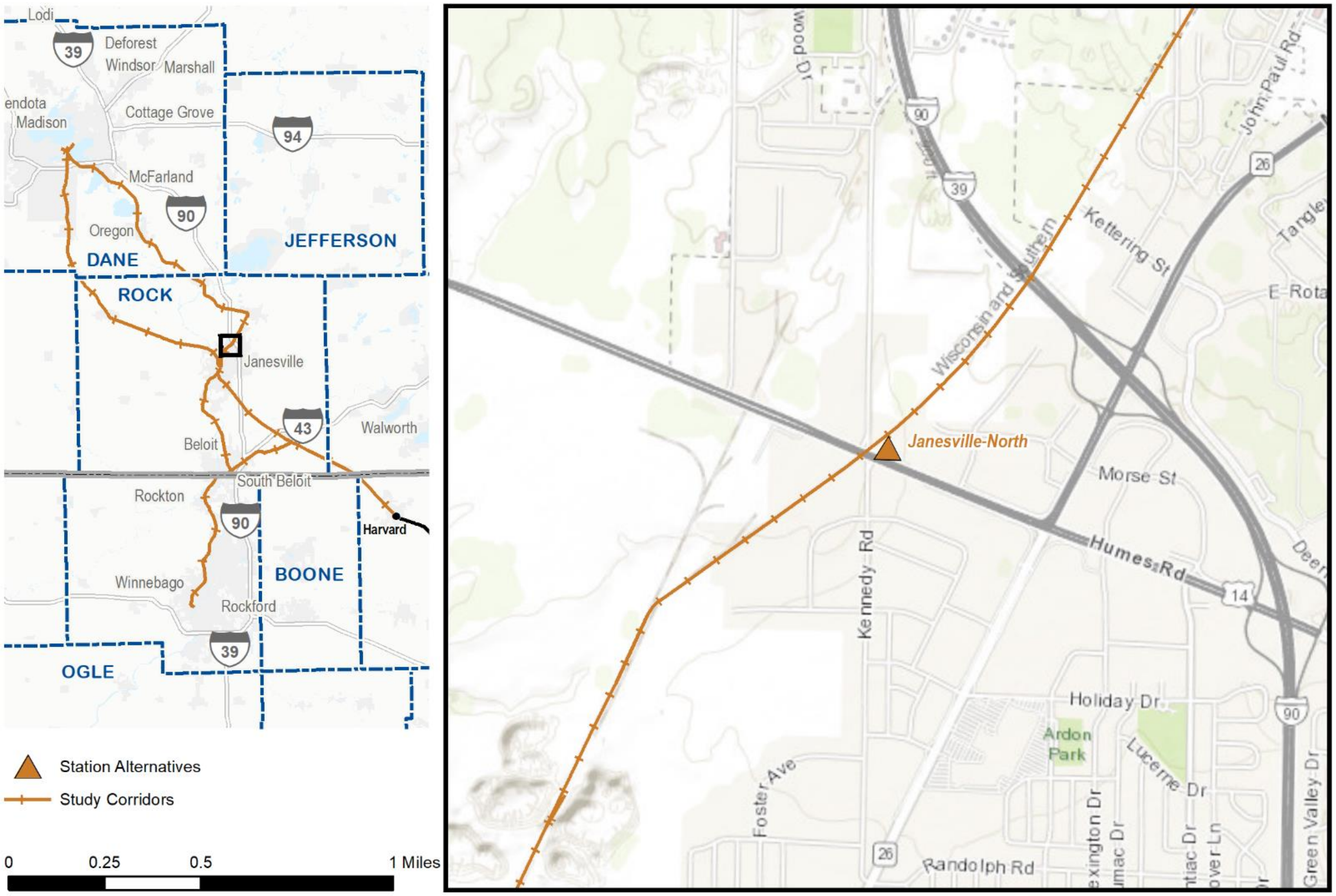
Town Line Road



Janesville-North



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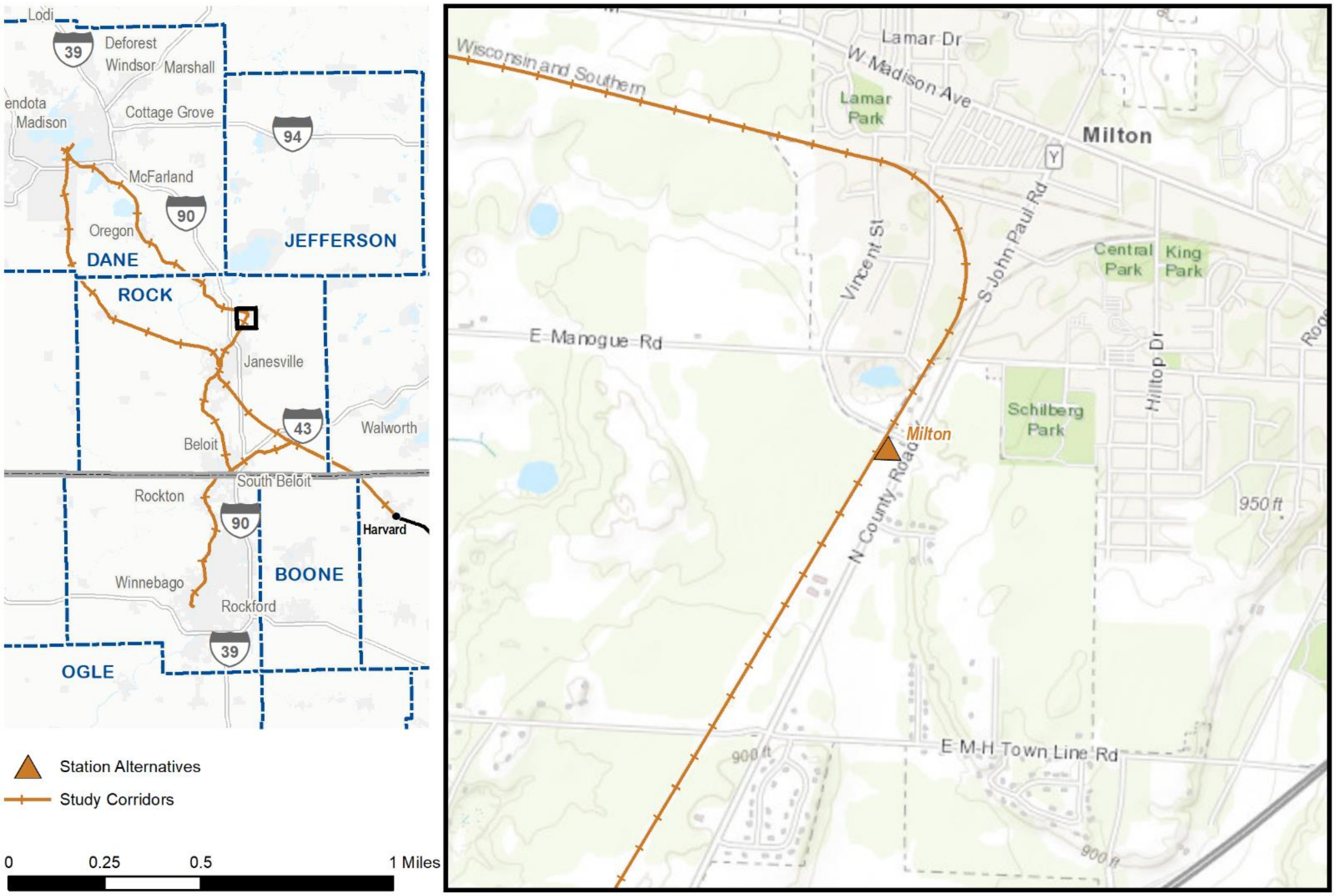
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Hilltop Dr
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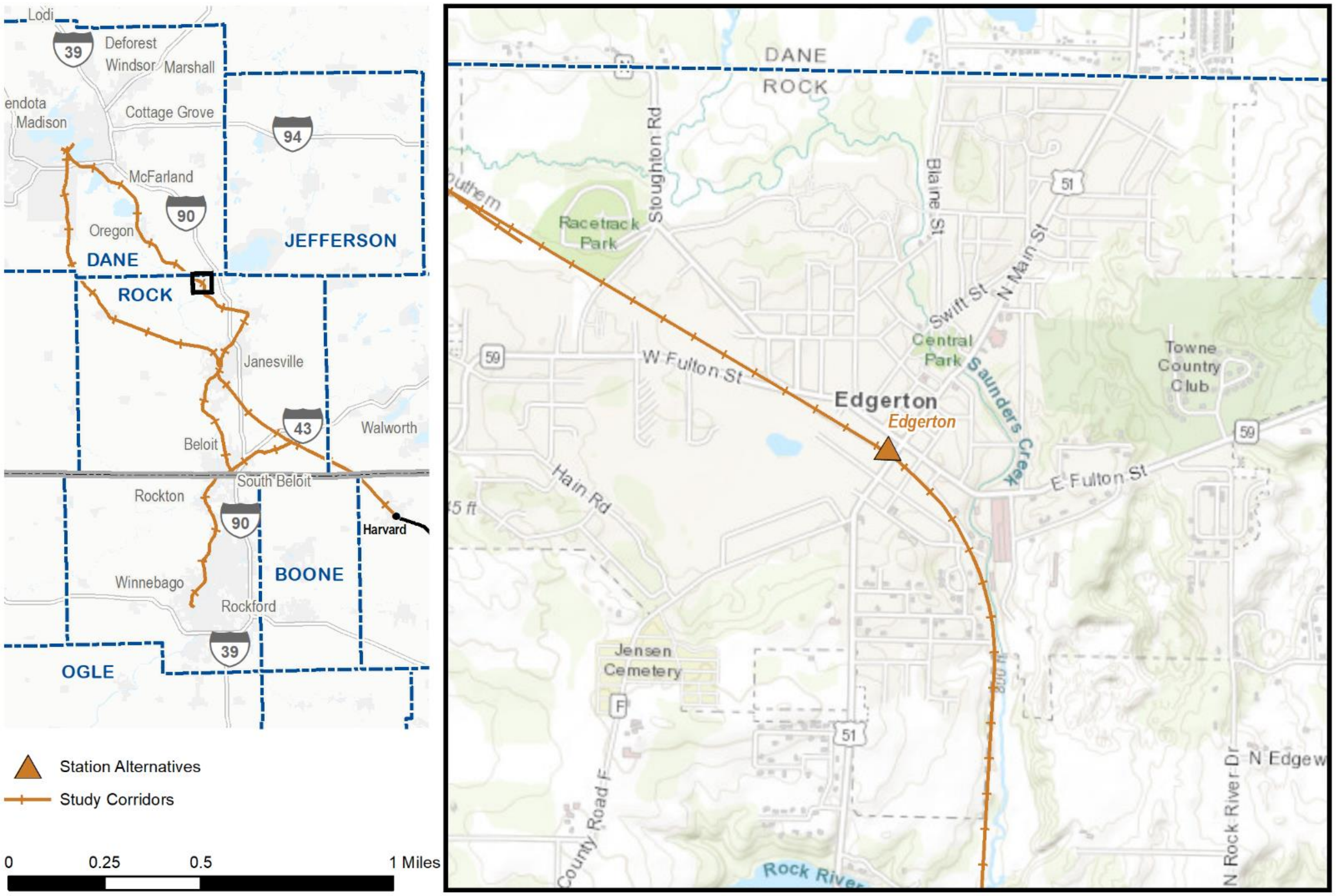
Edgerton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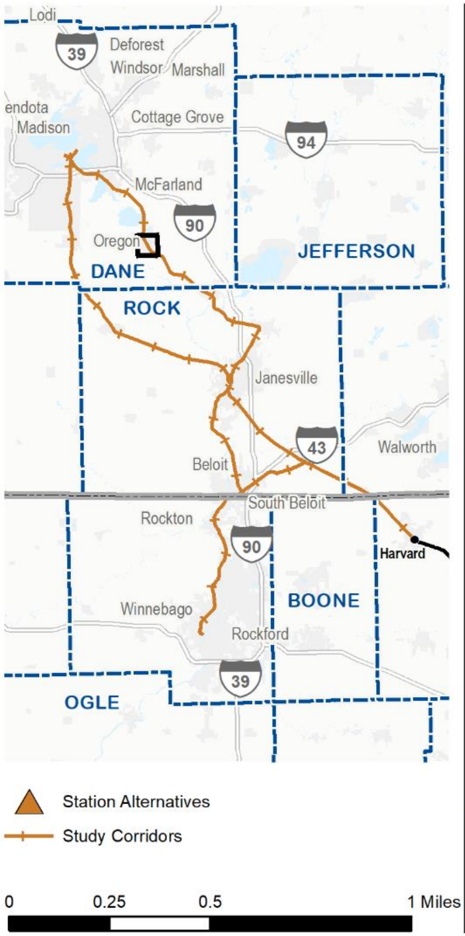
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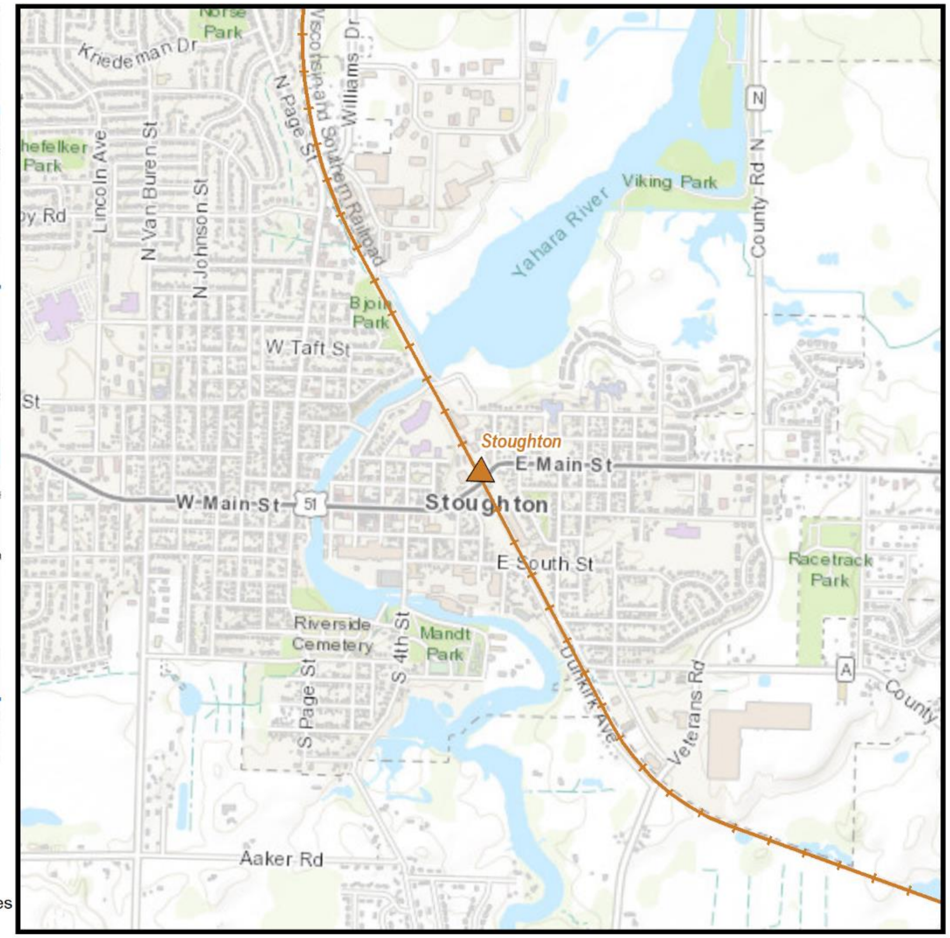
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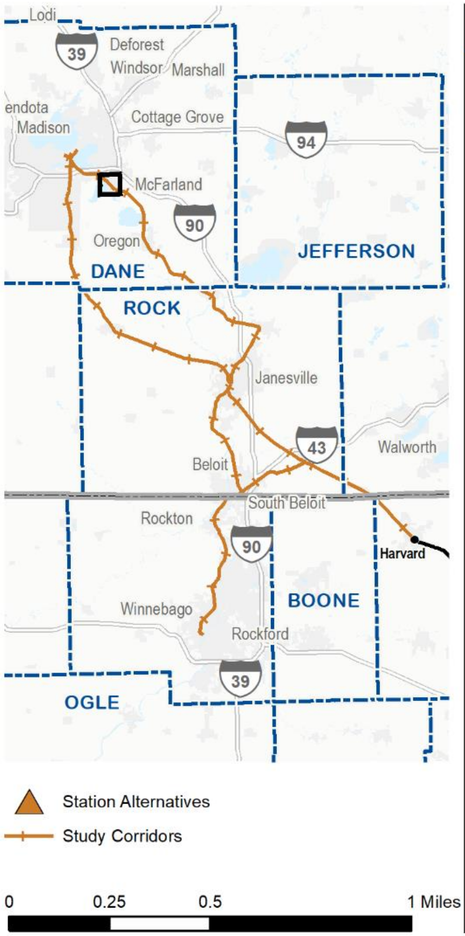
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Brandt Park
Stoughton Rd
McFarland
Valley Dr
Black Walnut Dr
Leanne Ln
Holscher Rd
Broadhead St
Waubesa
Village of McFarland
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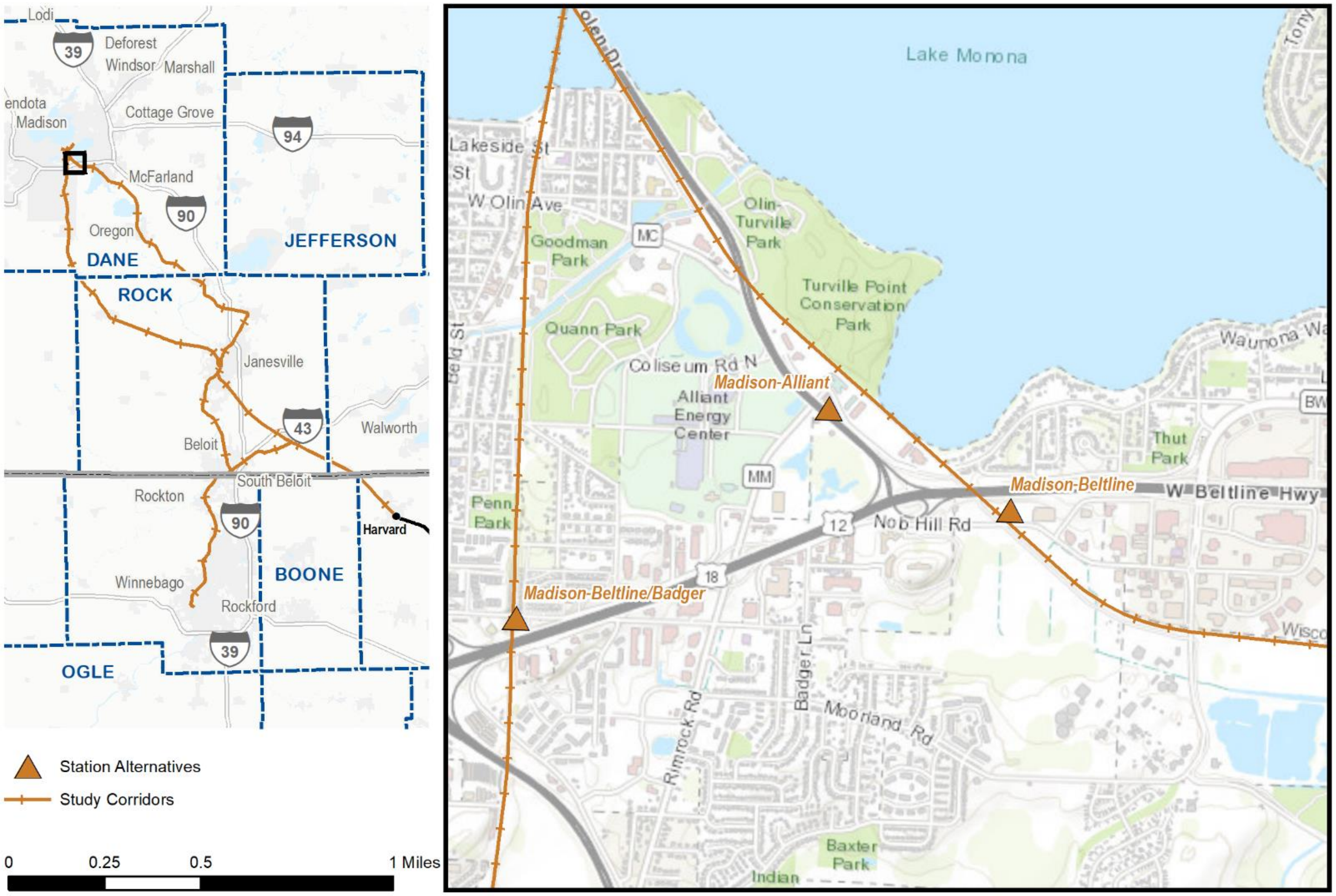
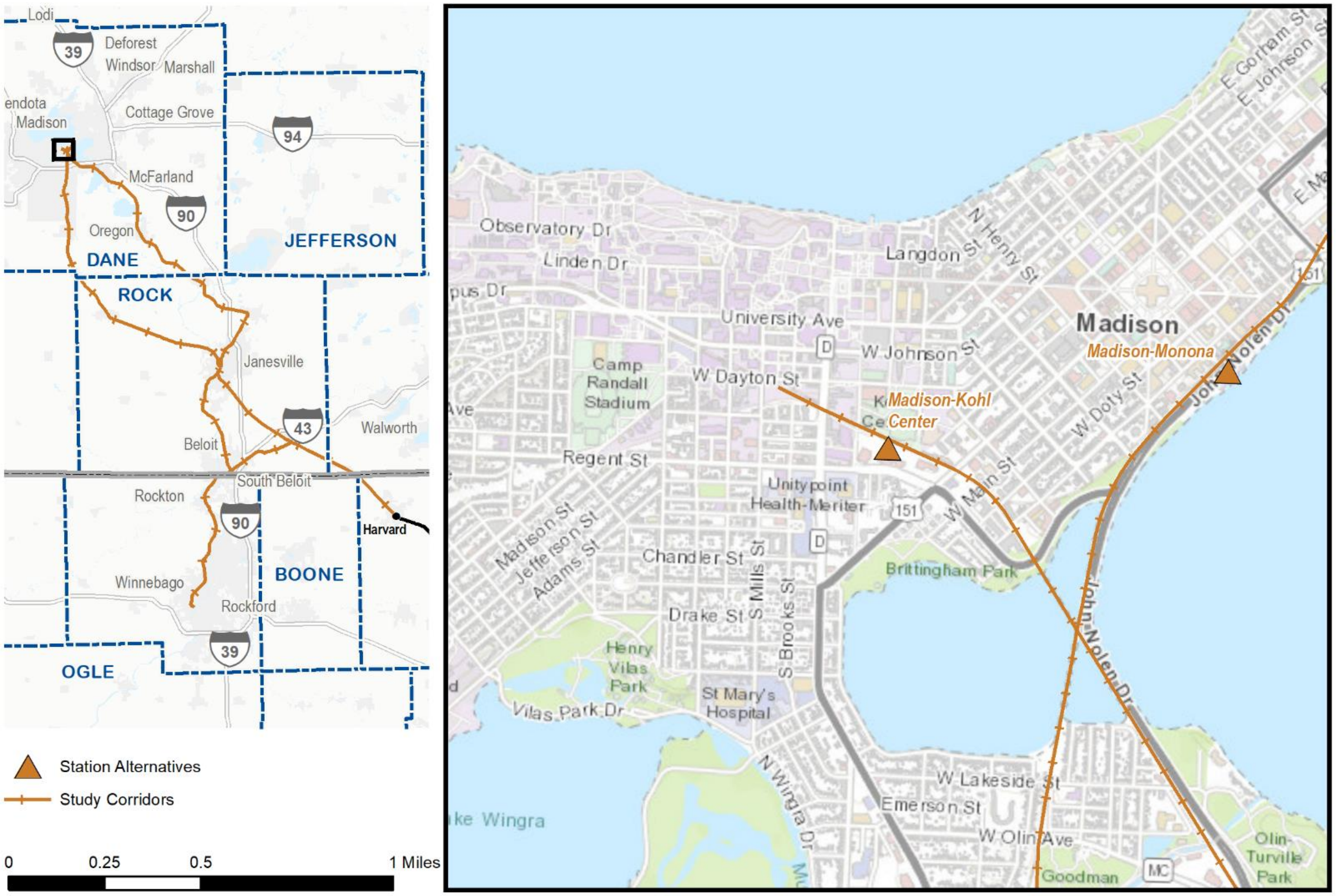
Creamery Rd
Indian Mound Park
Babcock Park
Lani Ln
Lewis Park
Legion
Farm Rd

Madison-Beltline, Madison-Alliant



Madison-Kohl Center



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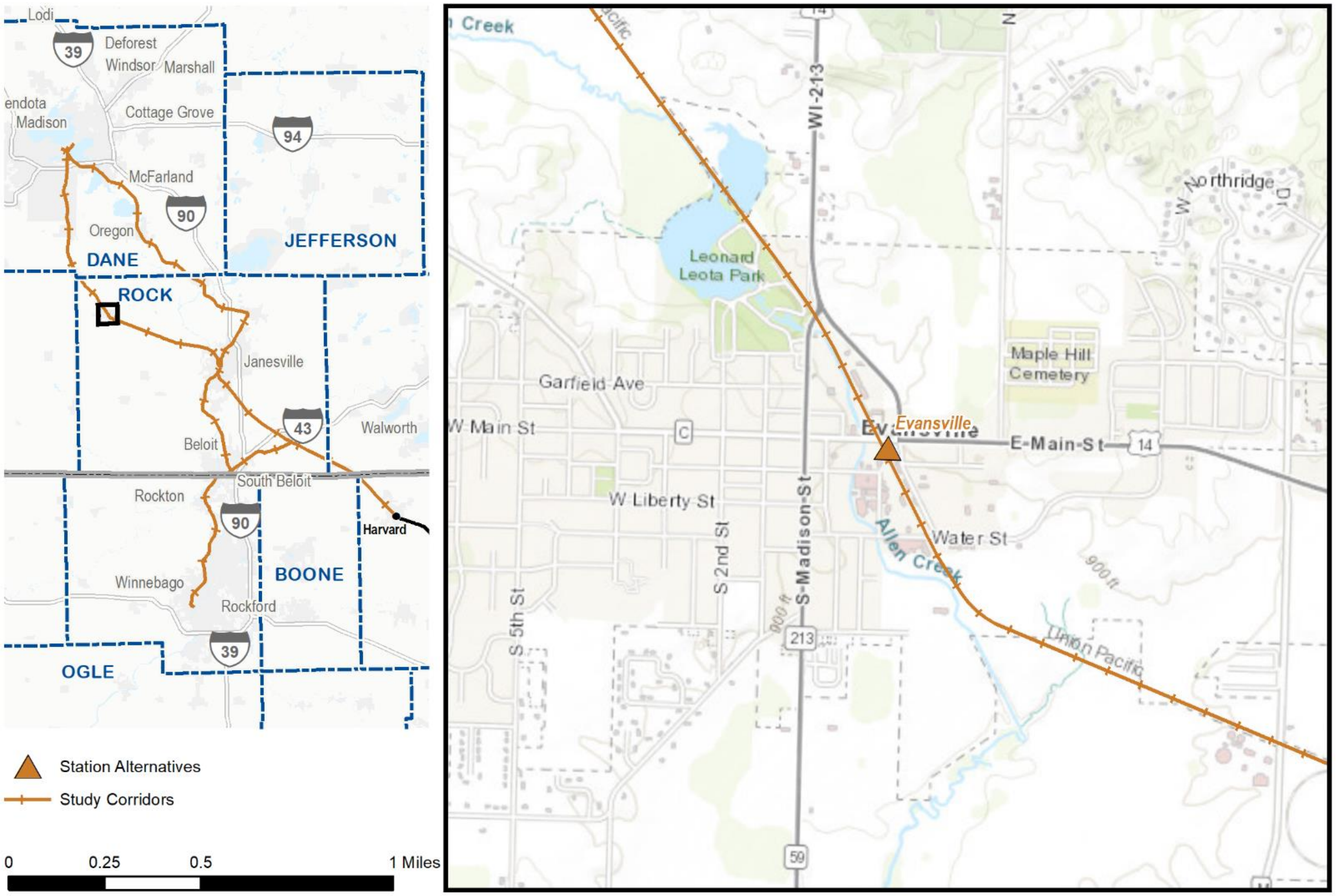
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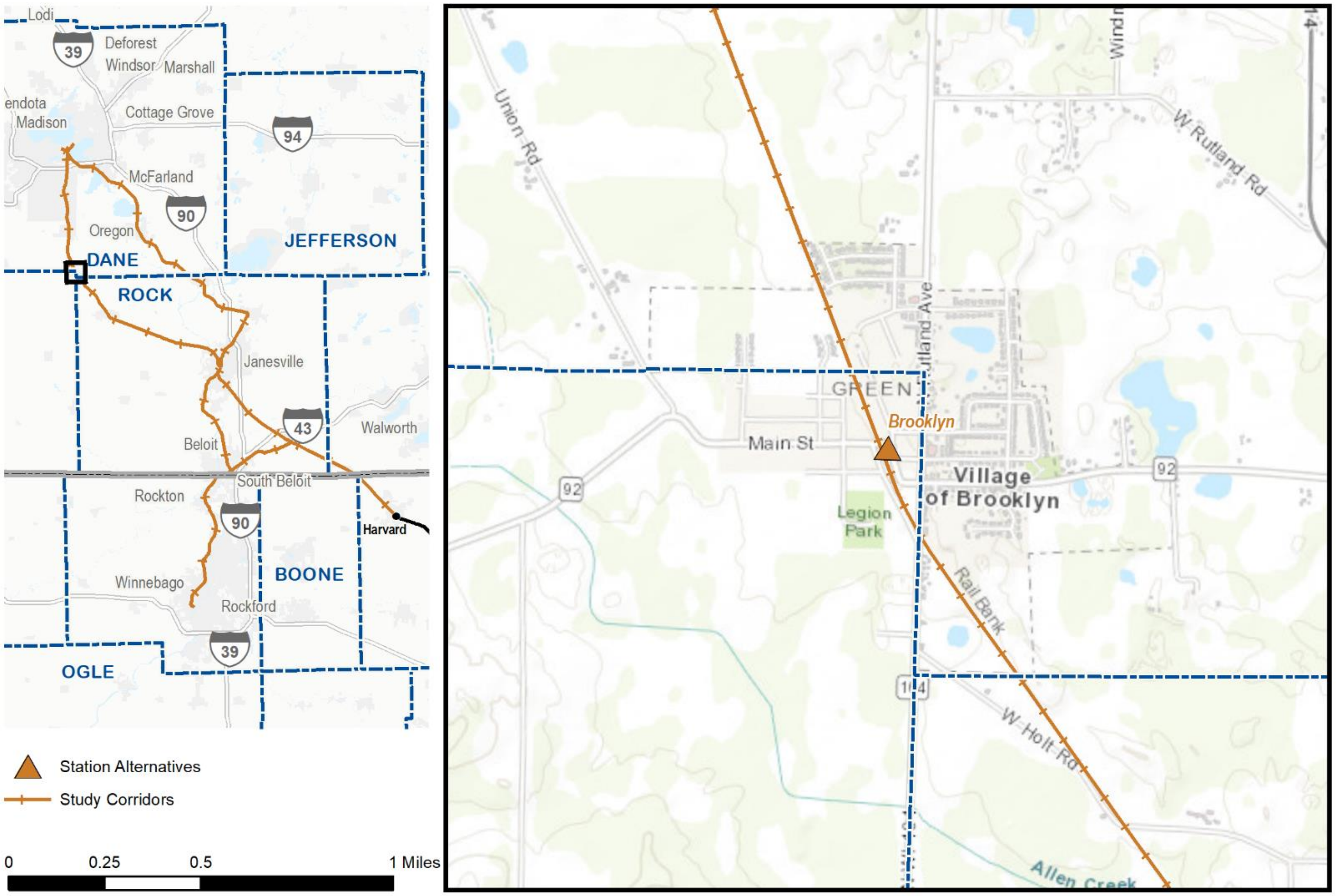
Oregon
DANE
JEFFERSON
ROCK
Janesville
Walworth
Beloit
South Beloit
Rockton
Harvard
BOONE
Winnebago
Rockford
OGLE
39
94
90
43
Station Alternatives
Study Corridors
0
0.25
0.5
1 Miles
Creek
WI-213
Leonard Leota Park
Garfield Ave
W Main St
Evansville
E-Main-St
14
Maple Hill Cemetery
Northridge Dr
W Liberty St
S 2nd St
S-Madison-St
S 5th St
Water St
Allen Creek
Union Pacific
213
59
900 ft

Brooklyn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South Beloit
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BOONE
Winnebago
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1 Miles
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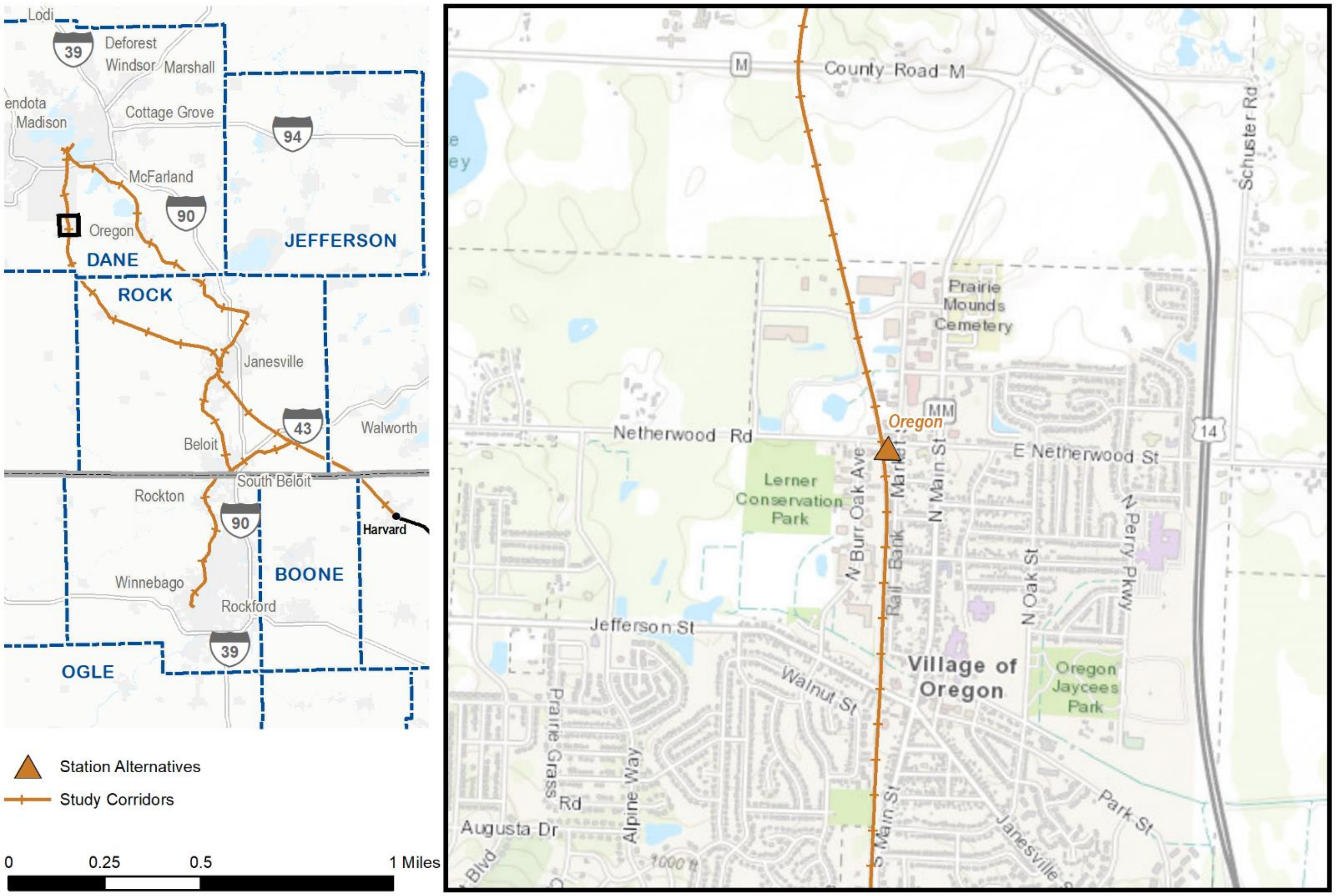
W Rutland Rd
Rutland Ave
GREEN
Brooklyn
Main St
92
Village
of Brooklyn
Legion
Park
Rail Bank
W Holt Rd
Allen Creek

Oregon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Walworth
Beloit
South Beloit
Rockton
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Harvard
BOONE
Winnebago
Rockford
39
OGLE
Station Alternatives
Study Corridors
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0.25
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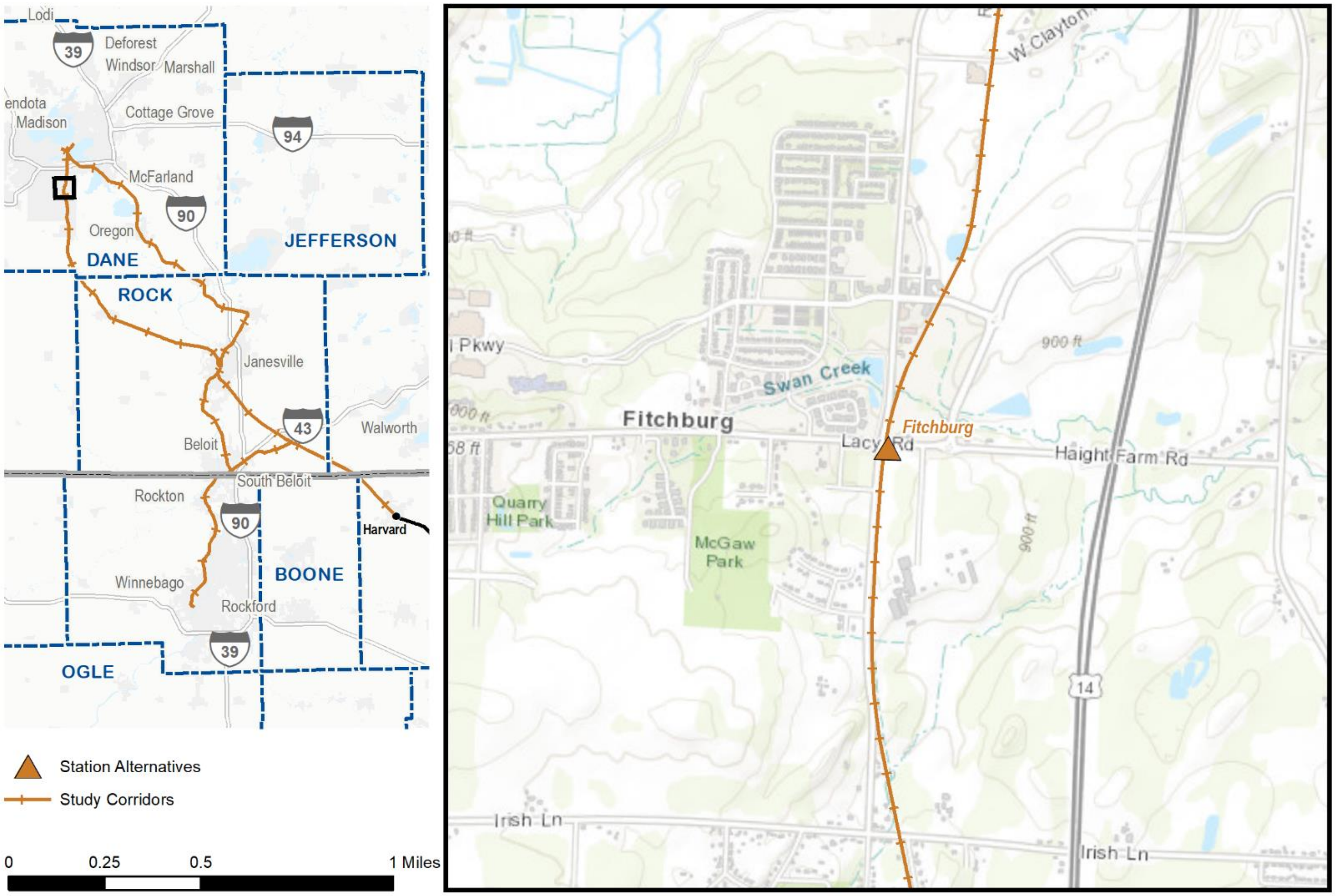
1 Miles
M
County Road M
Schuster Rd
Prairie Mounds Cemetery
MM
Oregon
14
Netherwood Rd
E Netherwood St
Lerner Conservation Park
N Burr Oak Ave
Rail Bank
N Main St
N Perry Pkwy
N Oak St
Jefferson St
Village of Oregon
Oregon Jaycees Park
Walnut St
Prairie Grass Rd
Alpine Way
Augusta Dr
S Main St
Janesville St
Park St
1000 ft

Fitchburg



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Cottage Grove
McFarland
Oregon
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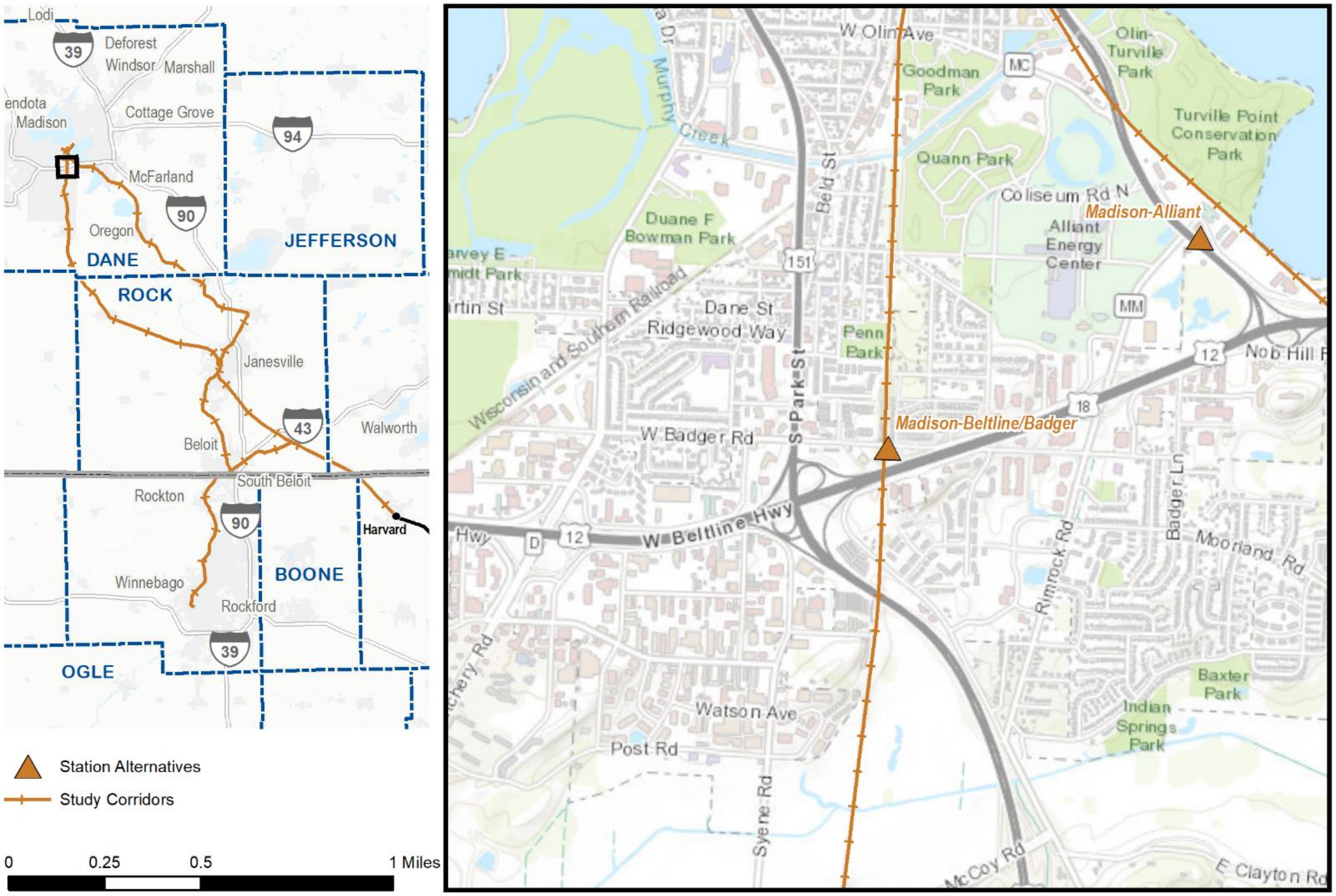
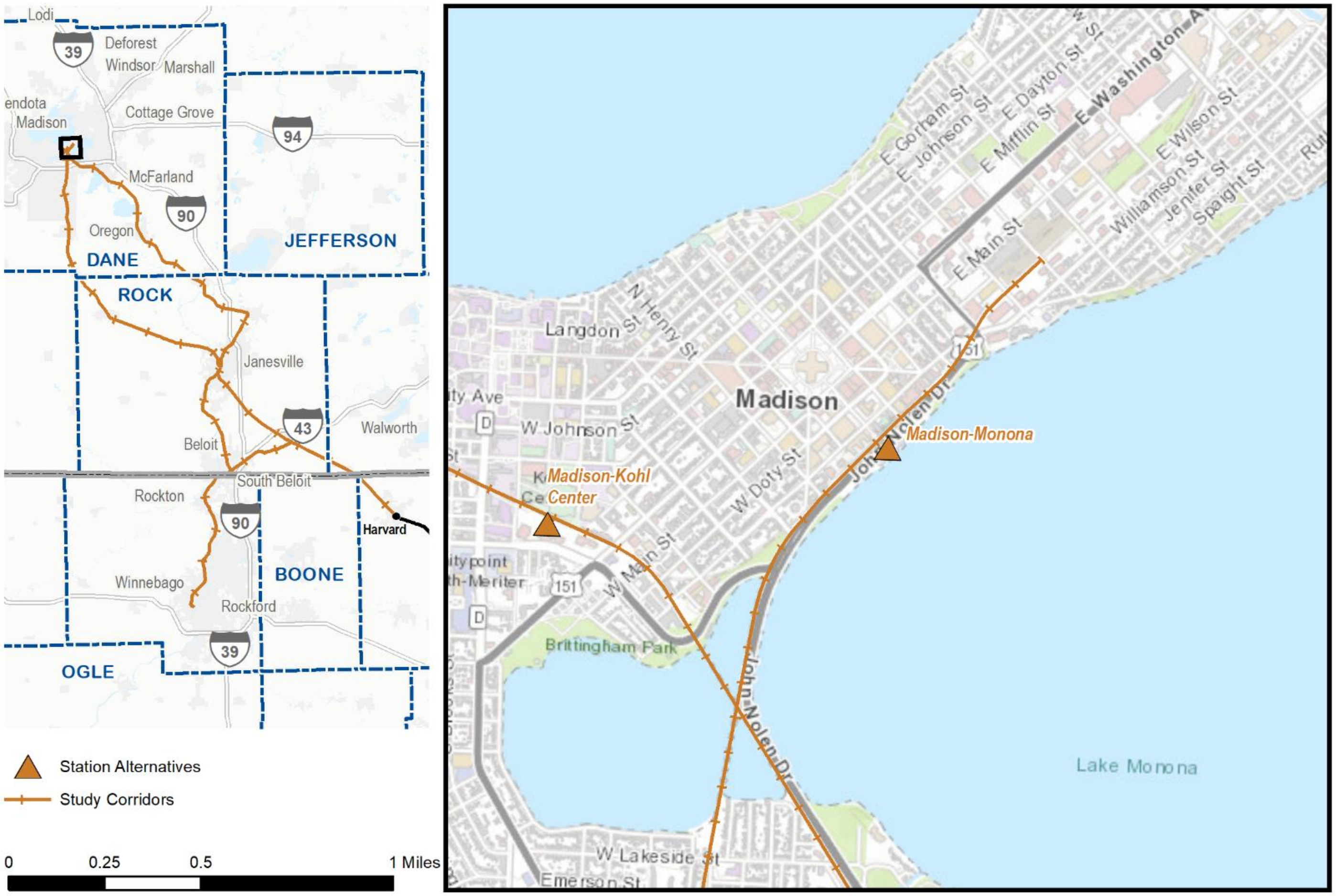
JEFFERSON
ROCK
Janesville
Beloit
Walworth
South Beloit
Rockton
Harvard
Winnebago
Rockford
BOONE
OGLE
39
94
90
43
Station Alternatives
Study Corridors
0
0.25
0.5
1 Miles
W Clayton
Pkwy
Swan Creek
Fitchburg
Lacy Rd
Haight Farm Rd
900 ft
Quarry Hill Park
McGaw Park
14
Irish Ln

Madison-Beltline/Badger

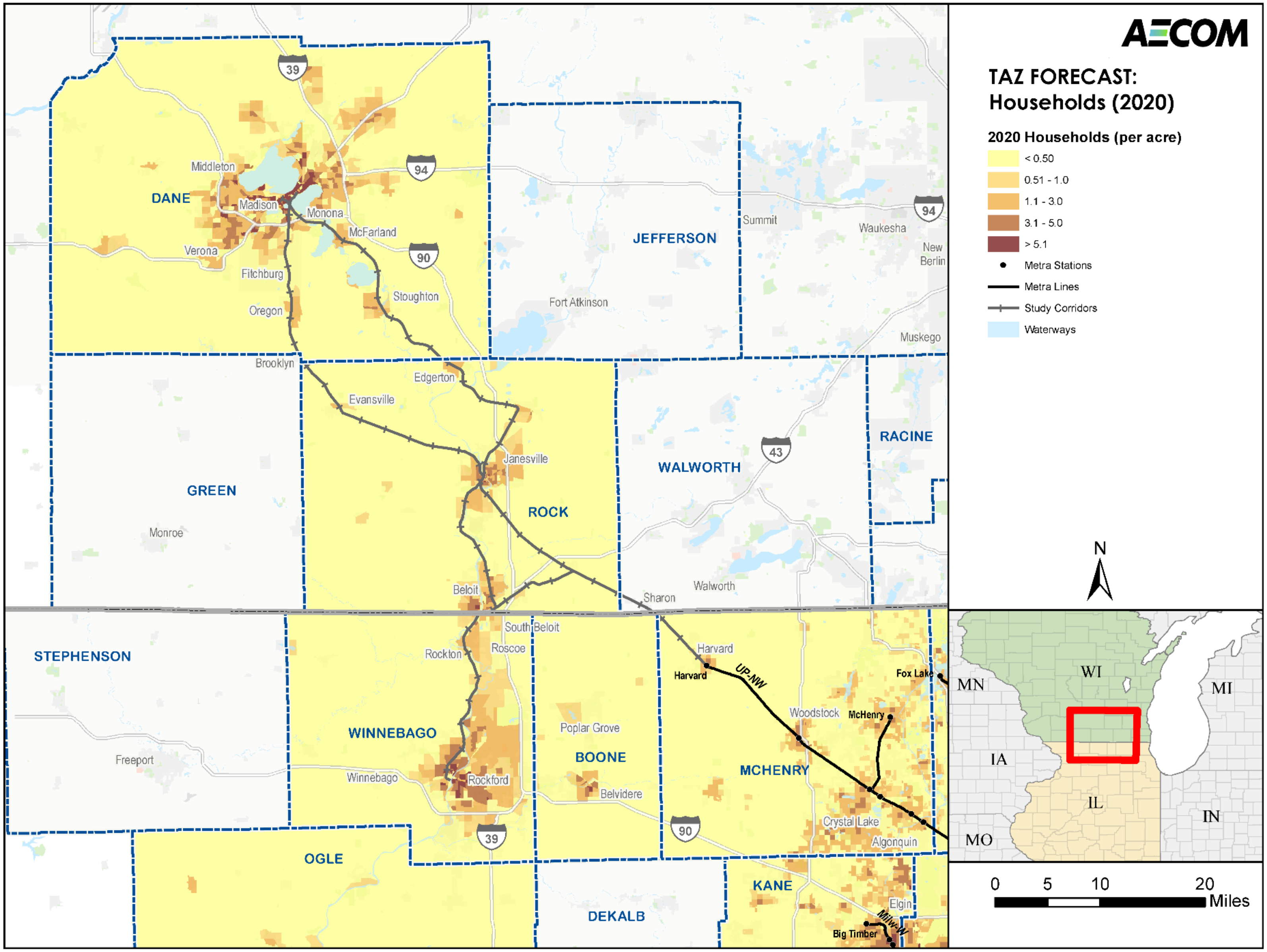


Madison-Monona



Appendix B | Socioeconomic Projections

This appendix provides map illustrations of the regional socioeconomic growth projections. These maps complement the metropolitan planning area-specific maps provided in Section 4.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Households (2020)
2020 Households (per acre)
< 0.50
0.51 - 1.0
1.1 - 3.0
3.1 - 5.0
> 5.1
Metra Stations
Metra Lines
Study Corridors
Waterways
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JEFFERSON
GREEN
ROCK
WALWORTH
RACINE
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
OGLE
DEKALB
KANE
Middleton
Madison
Monona
McFarland
Verona
Fitchburg
Oregon
Stoughton
Brooklyn
Evansville
Edgerton
Janesville
Beloit
South Beloit
Rockton
Roscoe
Rockford
Winnebago
Freeport
Monroe
Poplar Grove
Belvidere
Fort Atkinson
Summit
Waukesha
New Berlin
Muskego
Sharon
Walworth
Harvard
UP-NW
Woodstock
McHenry
Fox Lake
Crystal Lake
Algonquin
Elgin
Big Timber
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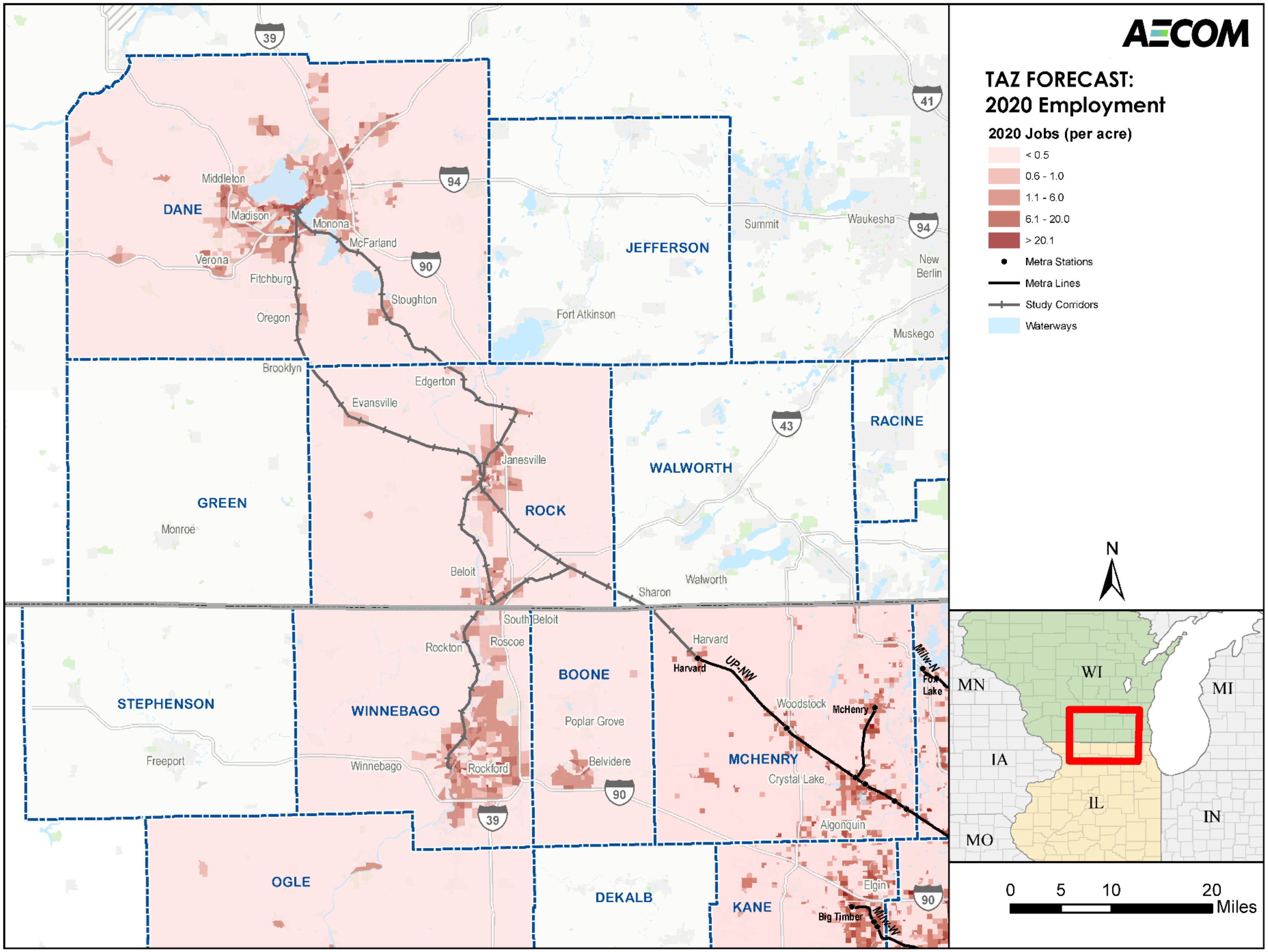
AECOM
TAZ FORECAST:
2020 Employment
2020 Jobs (per acre)
< 0.5
0.6 - 1.0
1.1 - 6.0
6.1 - 20.0
> 20.1
Metra Stations
Metra Lines
Study Corridors
Waterways
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0 5 10 20 Miles
DANE
JEFFERSON
ROCK
WALWORTH
RACINE
GREEN
STEPHENSON
WINNEBAGO
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New Berlin
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UP-NW
Woodstock
McHenry
Fox Lake
Milw-N
Poplar Grove
Belvidere
Freeport
Winnebago
Rockford
Crystal Lake
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Big Timber
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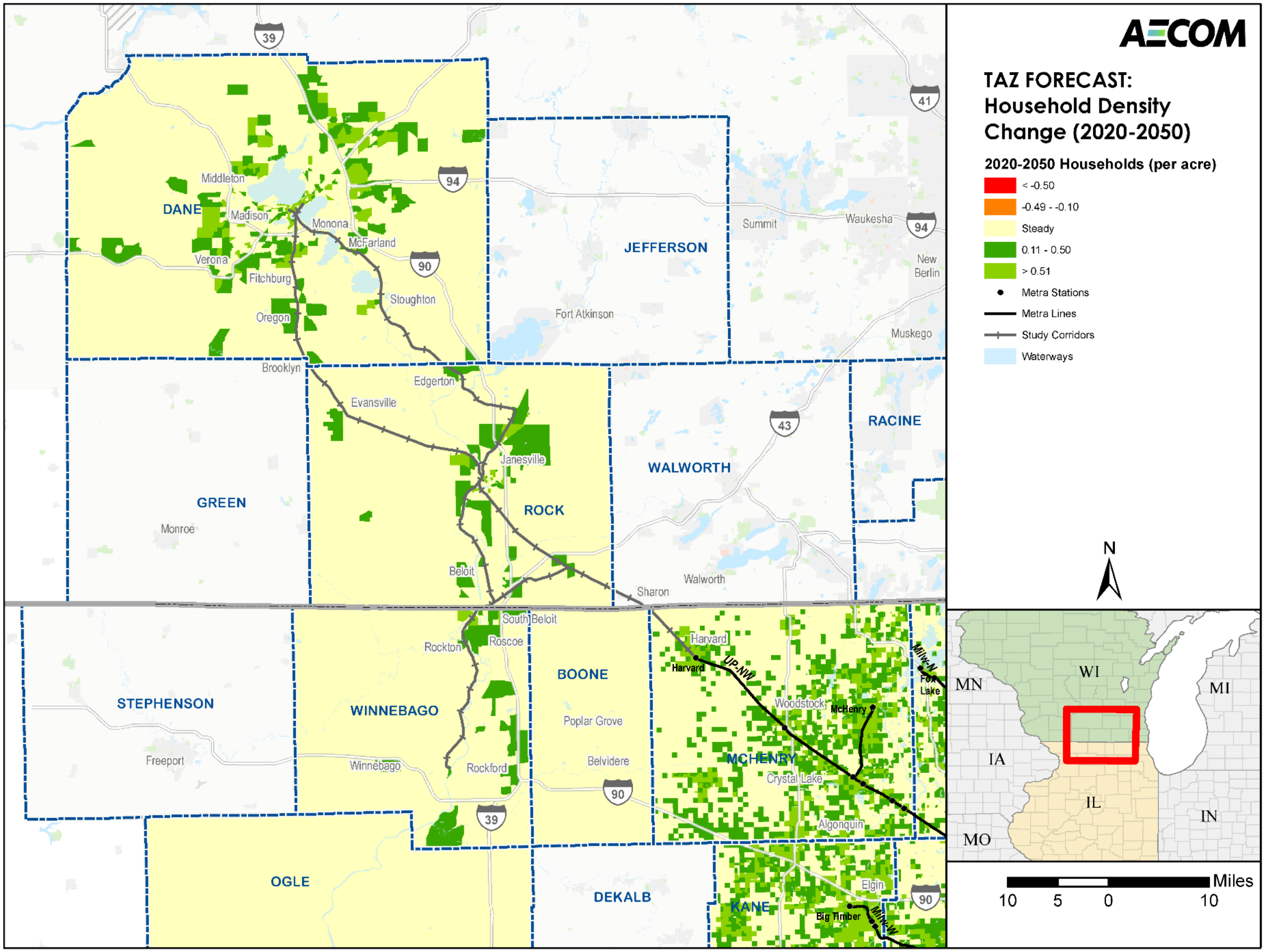
AECOM
TAZ FORECAST:
Household Density
Change (2020-2050)
2020-2050 Households (per acre)
< -0.50
-0.49 - -0.10
Steady
0.11 - 0.50
> 0.51
Metra Stations
Metra Lines
Study Corridors
Waterways
N
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DANE
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GREEN
ROCK
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WINNEBAGO
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Waukesha
New Berlin
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Walworth
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Harvard
UP-NW
Woodstock
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Fox Lake
Crystal Lake
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Freeport
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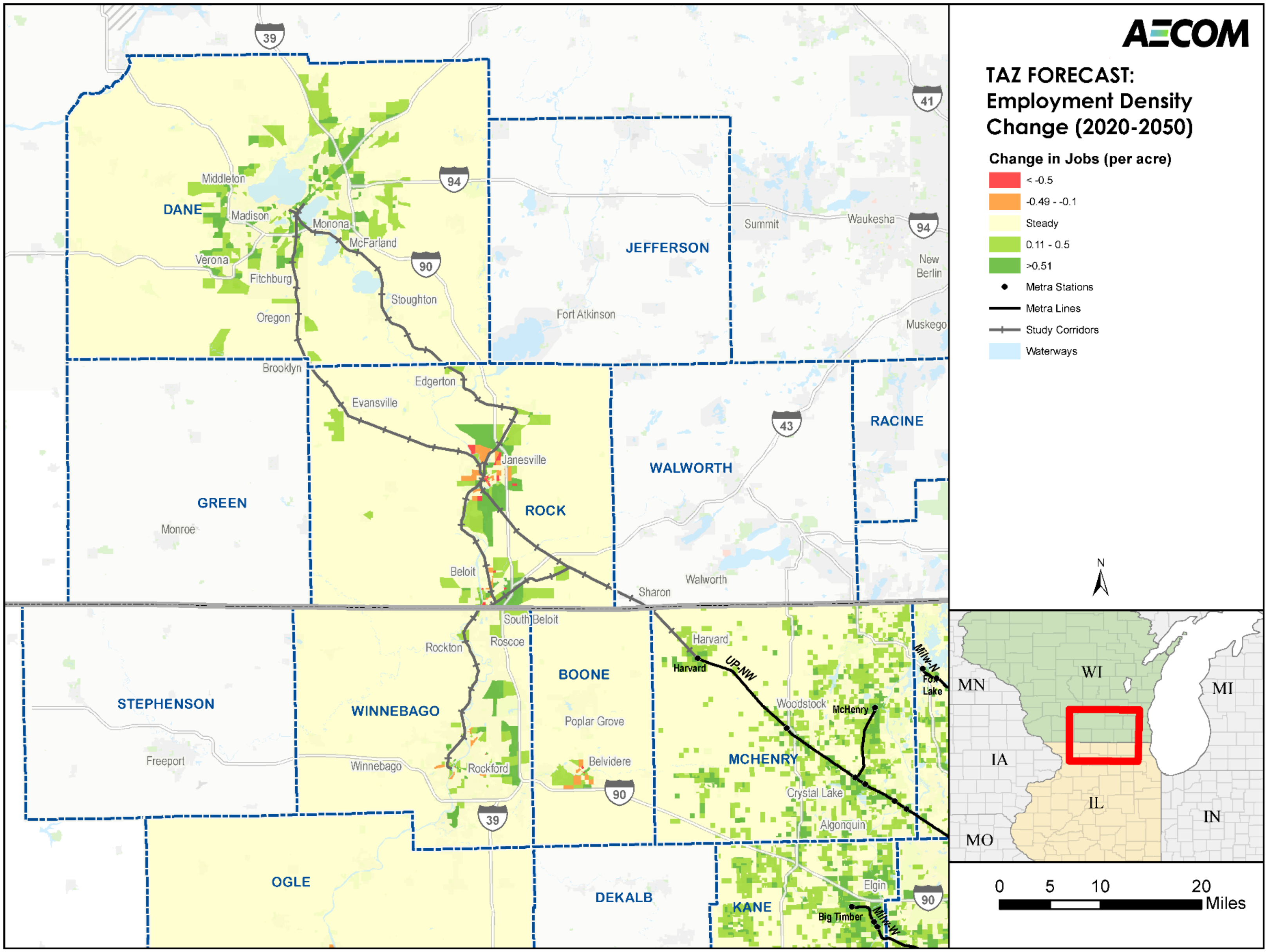
TAZ FORECAST:
Employment Density
Change (2020-2050)
Change in Jobs (per acre)
< -0.5
-0.49 - -0.1
Steady
0.11 - 0.5
>0.51
Metra Stations
Metra Lines
Study Corridors
Waterways
DANE
JEFFERSON
GREEN
ROCK
WALWORTH
RACINE
STEPHENSON
WINNEBAGO
BOONE
MCHENRY
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Belvidere
Summit
Waukesha
New Berlin
Muskego
Fort Atkinson
Sharon
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Harvard
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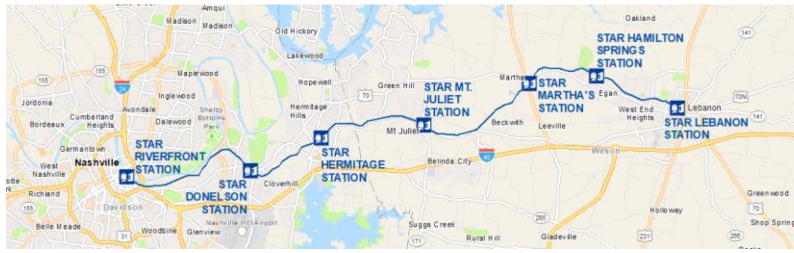
Appendix C | Peer Agency Profiles

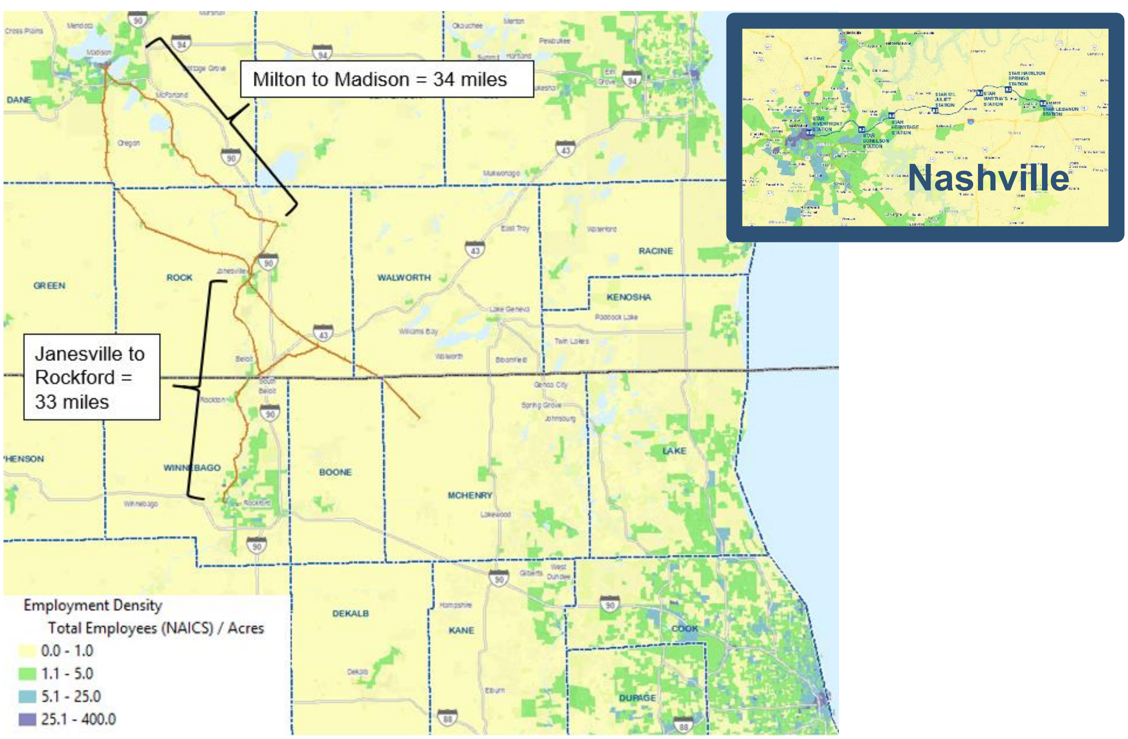
High-level information about the commuting patterns and relevant characteristics of two peer commuter rail services (Nashville RTA Music City Star and Albuquerque-Santa Fe Rio Metro RTD Rail Runner) and two hybrid rail services (Denton A-Train and Portland Westside Express) discussed in Section 7 are provided in this appendix, to provide further context for the ridership benchmarking effort. Data in this appendix are sourced from CTPP (2012-2016) for commuter flows and Esri Business Analyst (2018) for employment densities.

Nashville: RTA Music City Star

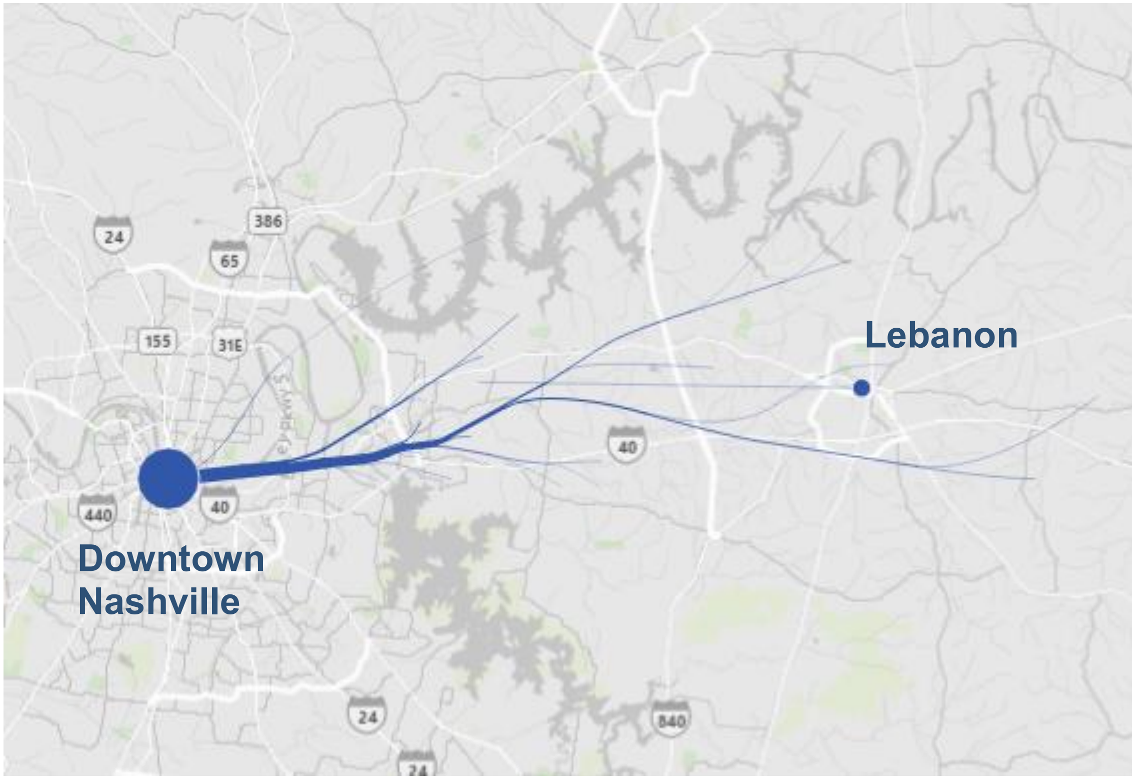


The Nashville line is 32 miles, and stations are generally located four to seven miles apart. The downtown (Riverfront) station has just under 100,000 employees in block groups within a one-mile radius, translating to about 15 employees per acre on average. The half-mile density is about 40 jobs per acre. Four stations have about 1.5 to 3.0 employees per acre, and the remaining two have less than one job per acre. In comparison, the Madison stations are generally twice as dense as the downtown Nashville station, though this is impacted somewhat by the environmental constraints of the large water bodies in downtown Madison. Three other locations have over three jobs per acre: Janesville, Rockford, and Beloit.

To compare the distances covered by the alignments, the full length of the Nashville service is comparable to roughly half the proposed Rockford-Madison (E) or Harvard-Madison (E) alignments. For example, Milton to Madison is roughly 34 miles, and Janesville to Rockford is 33 miles, as displayed in the graphic below



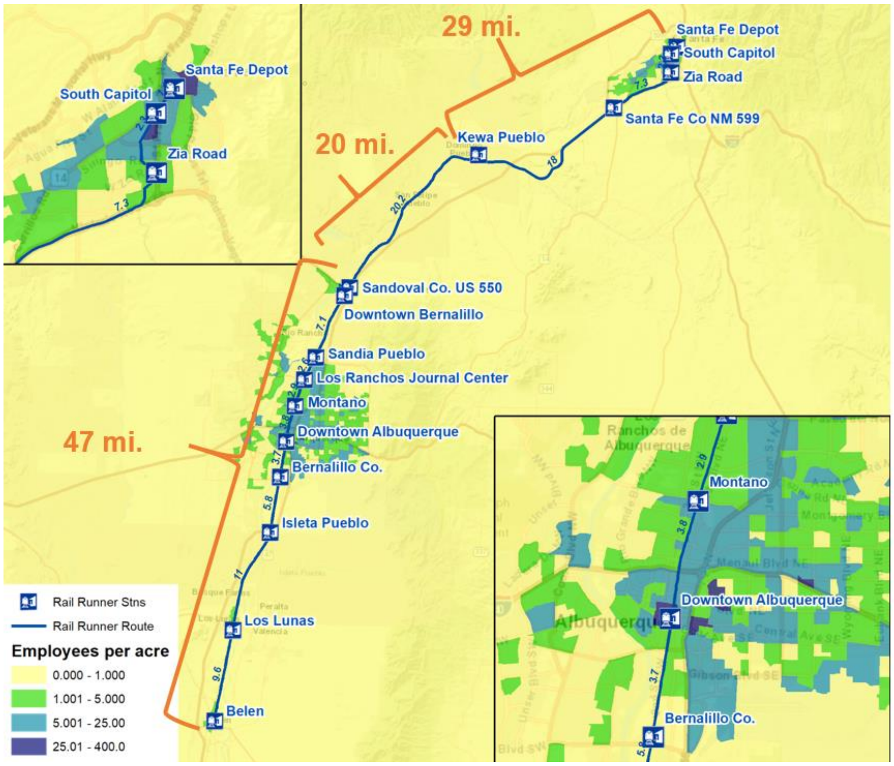
A rough estimation of potential origin and destination market sheds for the Music City Star Line was carried out and analysis of the CTPP data shows that about 400 railroad commuters live and work within these geographies. About 96% work downtown, and the remaining 4% work near Lebanon station, the suburban terminus. The average air-line distance traveled is 17 miles. A representation of the travel flows from the origin TAZ to the destination station (symbolized by a circle) is provided below.

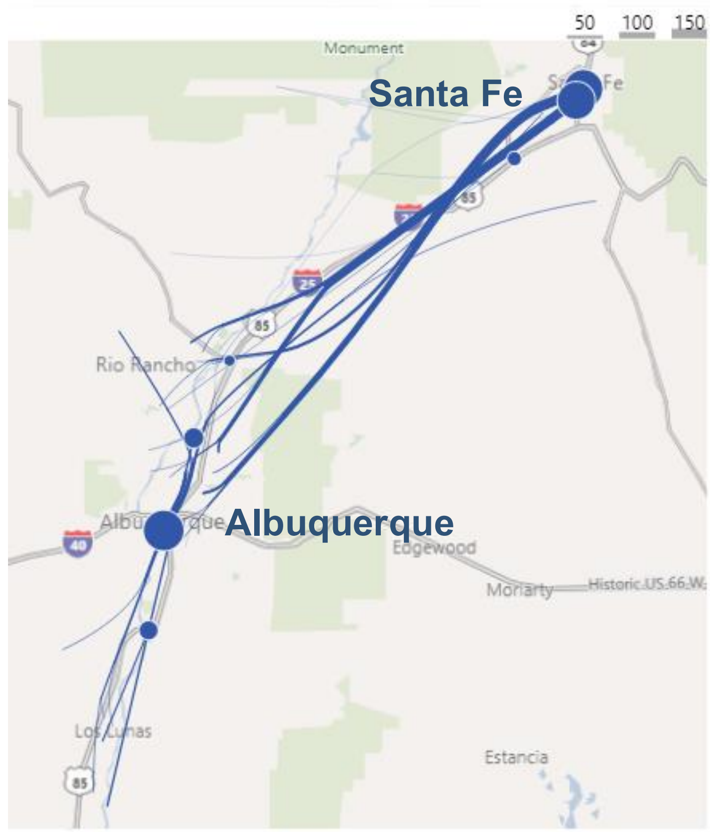


Albuquerque-Santa Fe: Rio Metro RTD Rail Runner

This commuter rail line runs about 95 miles between Santa Fe in the north, Albuquerque in the center, and Belen at the southern terminus. There are fifteen stations in total, ten of which may be described as falling within the greater Albuquerque area (Belen to Sandoval, 47-mile segment), and five in the greater Santa Fe area (Kewa Pueblo to Santa Fe Depot, 29-mile segment). It is about 57 miles air-line distance between Santa Fe and Albuquerque and 66 milepost distance; 30 milepost distance between Albuquerque and the southern terminus at Belen. For comparison, it is 57 milepost distance between Beloit and downtown Madison, and 75 milepost distance between Rockford and Madison, assuming the East alignment.

The development patterns in these sunbelt locations are less dense than older communities in the U.S., and employment densities are correspondingly lower. Downtown Albuquerque is estimated to have just under 50 jobs per acre (within a half-mile), and downtown Santa Fe is less than half that, at an average 20 jobs per acre (16 near South Capitol and 24 near the Santa Fe Depot stations). The only other location with over five jobs per acre is Montano (5.3 jobs/acre). Downtown Bernalillo, Los Lunas, Los Ranchos Journal Center, and Zia Road have between one and four jobs per acre), and the remaining seven stations have less than one job per acre.





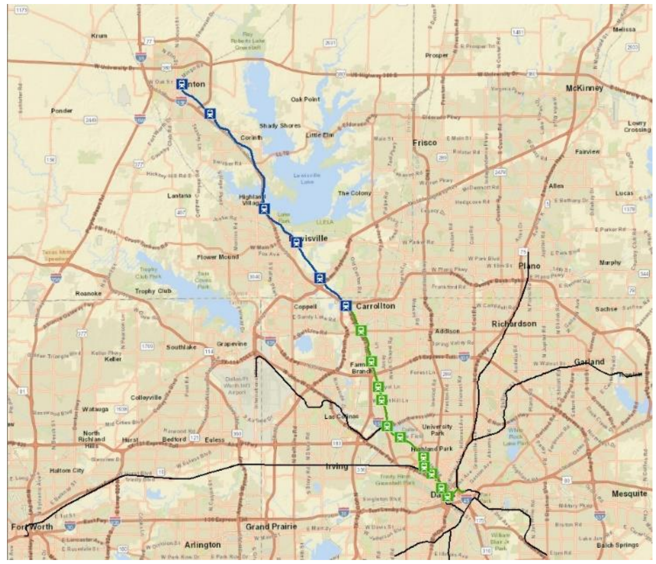
According to CTPP there are about 550 railroad commuters in the Rail Runner market area, traveling an average distance of 36 air-line miles. Over half (about 300) of these commuters are traveling to downtown Santa Fe, mostly from the northern Albuquerque area (Montano, Bernalillo, Sandia Pueblo, etc.). The average air-line distance traveled for these Santa Fe-destined commuters is about 45 to 50 miles.

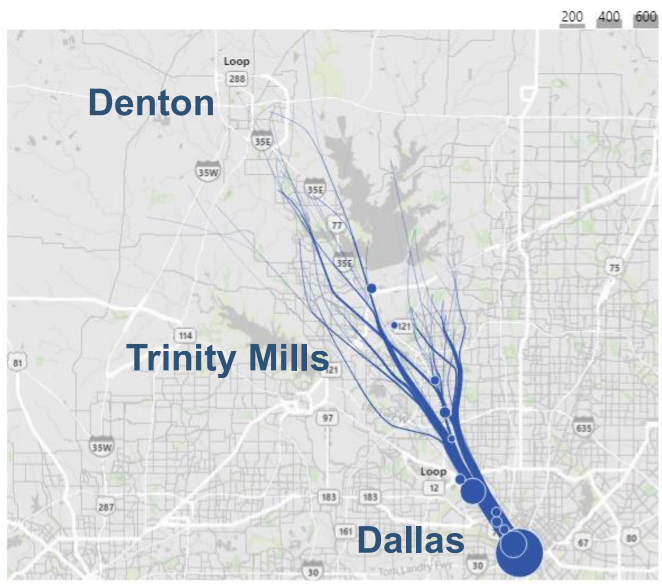
Downtown Albuquerque attracts about one third of all the rail commuters, mostly from nearby suburbs to the north and south; only about 20% are from the Santa Fe area (Zia Road). The average air-line distance traveled is 22 miles.

About 12% of the commuters travel to stations outside of downtown Albuquerque and Santa Fe (mostly Sandia Pueblo, Isleta Pueblo).

In this peer agency, it is possible that intercity trips may account for an unusually high level of rail ridership vis-à-vis commuter totals, given Santa Fe’s popularity as a tourist destination. It is likewise interesting that Santa Fe draws far more rail commuters than Albuquerque, despite having a tenth of the population.

Dallas Metro: Denton County A-Train





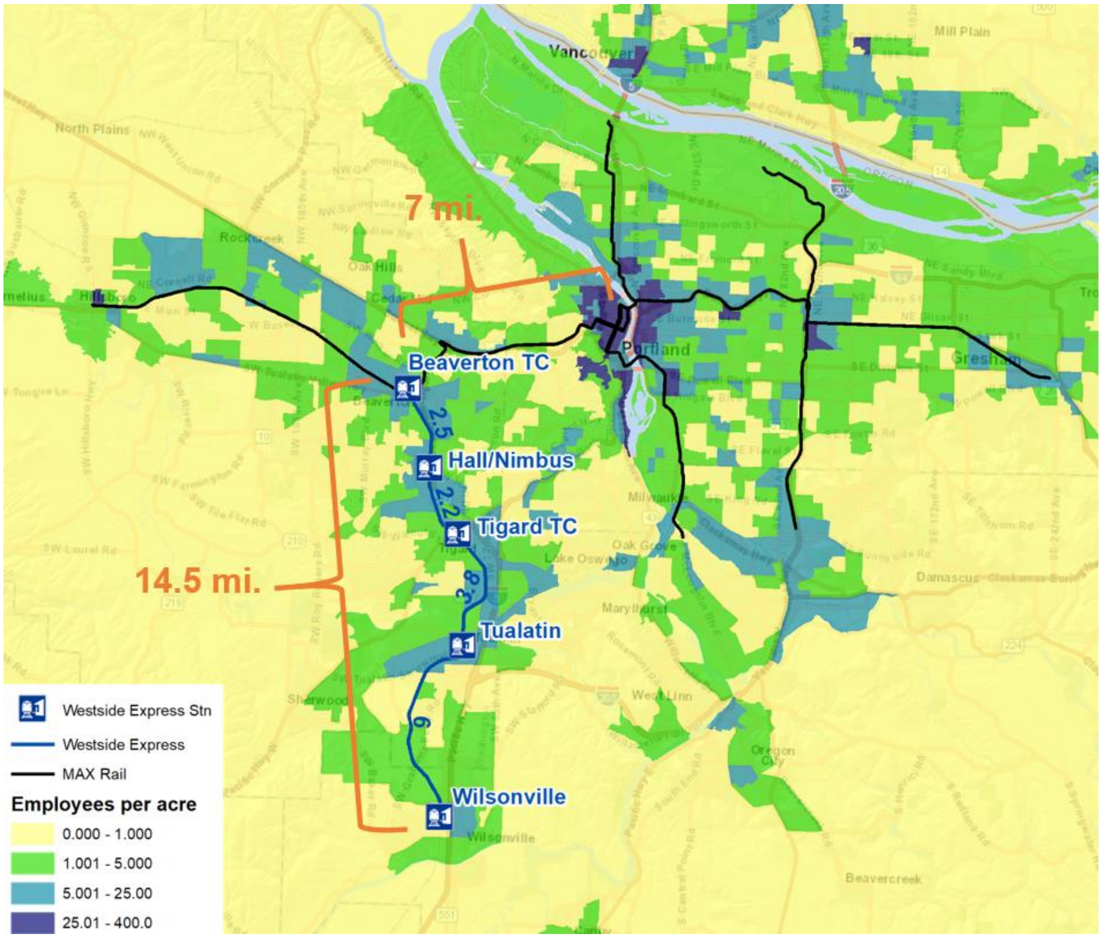
The A-Train is a hybrid rail service connecting to the DART Green Line at Trinity Mills, with continuing service to downtown Dallas, among other destinations in the Dallas-Fort Worth Region. The service opened in 2011, and for this reason the 2012-2016 CTPP commuter flows may underestimate current travel patterns, as it usually takes a number of years before people change their travel habits and new transit services reach their potential.

The route length is 21.3 miles, with most stations about 3 miles apart (the only longer spacing is between MedPark and Highland Village stations, 8.6 miles apart. It is another 16 miles between the Trinity Mill Station and downtown Dallas, with stations about one to two miles apart.

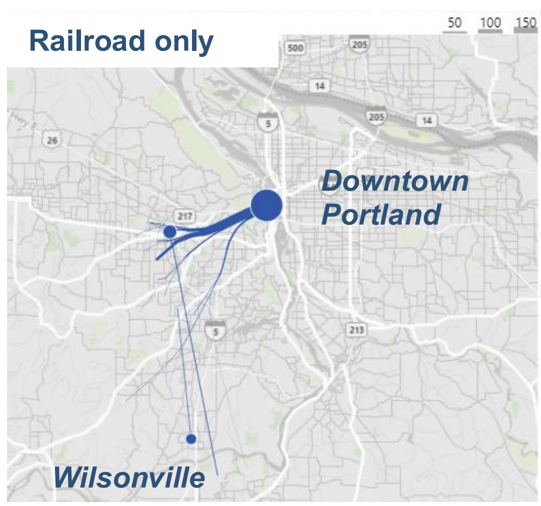
Analysis of the CTPP data shows that about 900 railroad and/or urban rail commuters live within the estimated origin market shed of the A-Train stations and work within one mile of the A-Train or DART Green Line Stations (between Trinity Mills and downtown Dallas). About 75% work downtown, and 14% work near Burbank station, which is adjacent to Love Field Airport. Other stations on the Green Line and A-Train have typically fewer than 20 rail commuters working nearby. The average air-line distance traveled is 23 miles, ranging from an average 18 miles near Hebron Station up to 33 miles at Downtown Denton Transit Center, the suburban terminus. A representation of the travel flows from the origin TAZ to the destination station (symbolized by a circle) is provided below.

Portland, OR: TriMet Westside Express (WES)

The Westside Express is a hybrid rail service connecting southwestern suburbs of Portland, Oregon, with destinations throughout the urbanized area via connections to the MAX rail network at Beaverton Transit Center. As shown in the map below, there are five station locations served by the WES (Beaverton, Hall/Nimbus, Tigard, Tualatin, and Wilsonville), with station spacing ranging from 2.2 miles to 6 miles. At Beaverton, riders can transfer to the MAX Blue or Red Lines to continue to downtown Portland. The MAX rail connection includes three intermediate stations spaced at about two to three miles apart before reaching downtown, where there is a much higher density of stations. In total, the milepost distance from Wilsonville to Beaverton is 14.5 miles, and continuing service along MAX rail to downtown is just over seven miles. The air-line distance between Wilsonville and downtown Portland is about 15 miles. For reference, the airline distance between Beloit and Rockford-Downtown is just over 15 miles, and the milepost distance is about 17 miles.



Due to the multimodal nature of trips conducted on both the hybrid rail WES and continuing service on the light rail MAX network, it is difficult to isolate WES riders from MAX riders in the CTPP data. The maps below illustrate the flows for the combined rail users on the left, and just those classified as "railroad"—presumably WES—on the right. There are an estimated 300 railroad users traveling from near one of the five WES stations. If one excludes origins near Beaverton station and adds other passenger rail commuters (e.g., light rail, streetcar) to account for commuters who transfer to MAX, there are a combined 400 all rail commuters. The average air-line distance traveled is eight miles.



Within the downtown Portland area, the average employment density is 85 jobs per acre—which is not dissimilar from the estimated 70 jobs per acre in downtown Madison, though the absolute numbers are higher due to the larger size. Within a half-mile of the five WES stations, the densities are generally about seven to ten jobs per acre, with the exception of Wilsonville, which is much lower at two jobs per acre. Despite relatively high levels of employment density for non-core locations (similar to Janesville and Rockford downtowns as analyzed in this study), the WES stations attract only about 50 rail commuters from along the alignment that includes the WES line and MAX Blue/Red line to downtown, according to the CTPP estimates.

Appendix D | UP-NW Extension Feasibility Study (2002)

As noted in Section 1.5, Relevant Prior Planning Studies, the Metra – UP Northwest Line Commuter Rail Extension Feasibility Study of 2002 evaluated the physical and operational feasibility of extending the Metra UP-NW line from Harvard, IL to Clinton, WI. Since the study concluded that the service extension would be feasible, it was thought that a more detailed review of methodological approach and conclusions could be useful for the SLATS Rail Study. Differences in approach and results from this Beloit Rail Study are highlighted.

The 2002 study was prompted by the formation of a rail coalition of State and local officials from Rock and Walworth Counties in 1999. The study was contracted to a consultant by the Village of Clinton, although other agencies served as co-sponsors, including WisDOT, municipalities of Beloit, Sharon, and Turtle, and townships of Clinton, Sharon and Turtle.

Existing Conditions

The 15.9 miles of single track between Harvard and Clinton included 136-pound welded rail, automatic block signaling, one passing track in Clinton, five roadway grade crossings equipped with safety devices, and fifteen crossings with crossbucks or stop signs (18 public and two private crossings).

UP operated four freight trains daily to Janesville with the largest customer the GM Plant in Janesville. [This plant permanently ceased production in 2009.]

Recommended Operations

It was proposed that existing Metra UP-NW Line trains be extended from Harvard, providing through service to new stations in Sharon and Clinton. Four round trips per weekday to Clinton would be provided, including three AM peak inbound trains, three PM peak outbound trains, and one midday round trip. Two round trips would operate on Saturdays and one round trip on Sundays. Train equipment would be stored at the UP yard in Harvard with deadhead moves from/to Harvard serving Clinton scheduled starts and ends.

Trains would be operated and maintained by UP staff under current agreements with Metra. Annual operating costs were estimated at $2.5 million in 2001 dollars.

Recommended Improvements

Capital improvements included:

- A two-mile passing side
- Upgrade of existing Clinton siding
- Highway grade crossing upgrades (some closures also recommended)
- Station platforms and facilities
- Four new coaches
- Track turnouts
- Upgrade of parking lots

Total capital costs were estimated at $18.8 million. Acquisition of new rail coaches was the single largest element at $8 million.

Potential Ridership

Gauging demand for the service was accomplished using a survey, which was distributed throughout Rock County and towns in northwest Illinois. While this technique is valid, it requires careful distribution to ensure that sampling is representative of the potential market. Unfortunately, the report provides no detail on respondents, including travel origin/destinations, purpose for trip-making, and current travel mode. Rather, the report states that 75 riders would use the service in Sharon and 225 in Clinton in 2001 based on the survey. This would translate to 600 weekday trips in 2001, which would grow to 1,000 trips in 2020 based on population forecasts.

The SLATS Rail study's approach to developing projections of demand used work commuter travel reported through the Census Transportation Planning Products (CTPP). Starting with the overall market of traveler demand, various assumptions were made on the likelihood that travelers would choose to use commuter rail (e.g., length of trip, and proximity of origins and destinations to stations). While the analysis is based on a set of assumptions and statistical analysis, the principal advantage is the greater certainty on the upper limit of potential users (i.e., all corridor commuters).

The result of the SLATS study demand analysis shown below indicates that adding Rockford to the Harvard-Beloit corridor increases the number of commuters using all modes more than five-fold. The study steps to estimate likely passenger trips was applied to the longer route Harvard-Rockford, yielding fewer than 100 passenger trips per day by 2050. The shorter route to Beloit was dropped before this step in anticipation of very low ridership.

		Harvard-Beloit-Rockford	Harvard-Beloit
Commuters-All Modes	2016	3,700	500
	2050	4,500	770
Likely Commute Trips	2016	70	n/a
	2050	90	n/a

The difference in estimated demand between the two studies is significant. The 2002 study estimated 1,000 passenger trips per weekday by 2020 for a route extension of 16 miles, while the SLATS study estimate totaled 90 passenger trips for a route nearly three times longer (i.e., 16 versus 44 miles).

The Clinton Extension study concluded that the project would be feasible based on an estimated revenue/operating cost ratio of 48%. It is believed that this level of performance is mostly the result of the estimated fare revenue, which was a function of the estimated ridership and assumed fare rates. It is believed that this the level of demand is overstated, which led to the comparatively high farebox recovery ratio.