Midwest High Speed Rail Association

The Economic Impacts of High Speed Rail: Transforming the Midwest

A summary from the research project prepared by AECOM and the Economic Development Research Group, Inc., and sponsored by Siemens

MidwestHSR.org

The Midwest High Speed Rail Association

The Midwest High Speed Rail Association is a Chicago-based, member-supported, non-profit organization advocating for fast, frequent and dependable trains linking the entire Midwest. Its diverse membership base includes nearly 2,000 individuals, local governments and corporations.

The Midwest High Speed Rail Association's goal is to persuade local, state and federal governments to implement an aggressive railroad expansion and provide ongoing operational support for fast trains throughout the Midwest.

This report presents highlights from a larger study prepared for the Midwest High Speed Rail Association and sponsored by Siemens, based on a high-level engineering study conducted by AECOM and an economic impact assessment of the Chicago Metropolitan region conducted by the Economic Development Research Group, Inc. (EDRG). We would like to thank all those who participated in this study for their valuable insights and time, including Solomon Cordwell Buenz, who provided a conceptual design for the incorporation of high speed rail at Union Station. The full version of the study can be viewed at MidwestHSR.org.

Special thanks to our sponsor

The Vision

The Midwest High Speed Rail Association is undertaking a series of studies to clearly define a plan and identify achievable steps that fulfill a vision to provide true a High Speed Rail (HSR) system (220-mph) for the Midwest. The HSR system will connect all major metropolitan regions within 450 miles of Chicago with travel times of between 2 and 3 hours. It will also provide HSR service to key cities and smaller metropolitan areas, giving most of them access in less than two hours to Chicago's O'Hare airport, other Chicago metropolitan area stations, and cities and metropolitan areas throughout the region. This will create important economic opportunities for the Midwest – improving the global competitiveness of a "mega-region" with a $2.6 trillion economy – among the largest economies in the world.

The time is right for taking the next steps in the process of planning, designing, financing and developing a workable, phased and financially feasible HSR system that will place the Midwest in the forefront of a globally competitive and economically thriving new economic future.

Our analysis to-date shows the following:

HSR Impacts on Chicagoland

- $13.8 billion per year increase in business sales for the Chicago Metro area alone
- 104,000 new jobs and an additional $5.5 billion in wages each year in the Chicago Metro area resulting from increased economic activity
- $314 million in new annual visitor spending in downtown Chicago alone

New jobs in the Chicago metropolitan area represent $118 billion in wages for the first 30 years that the HSR is in full operation, and the new business sales generated by economic activity associated with the HSR system are estimated to be $296 billion over 30 years.

HSR Operations, Costs and Revenues

- 43 million passengers on four HSR corridors
- Over $2.2 billion dollars annually in user-generated revenues
- 25 daily departures on each of the four corridors
- Capacity for up to 10 trains in peak hours on each corridor

Realistic costs and phasing for developing each of these HSR services is possible and well within the range of feasibility to warrant a serious examination of financing that involves both public and private investment. Phasing development of the HSR system will allow it to gain ridership and revenues, while it creates enough market share and economic benefits for the entire region.

HSR and the Economy of the Midwest

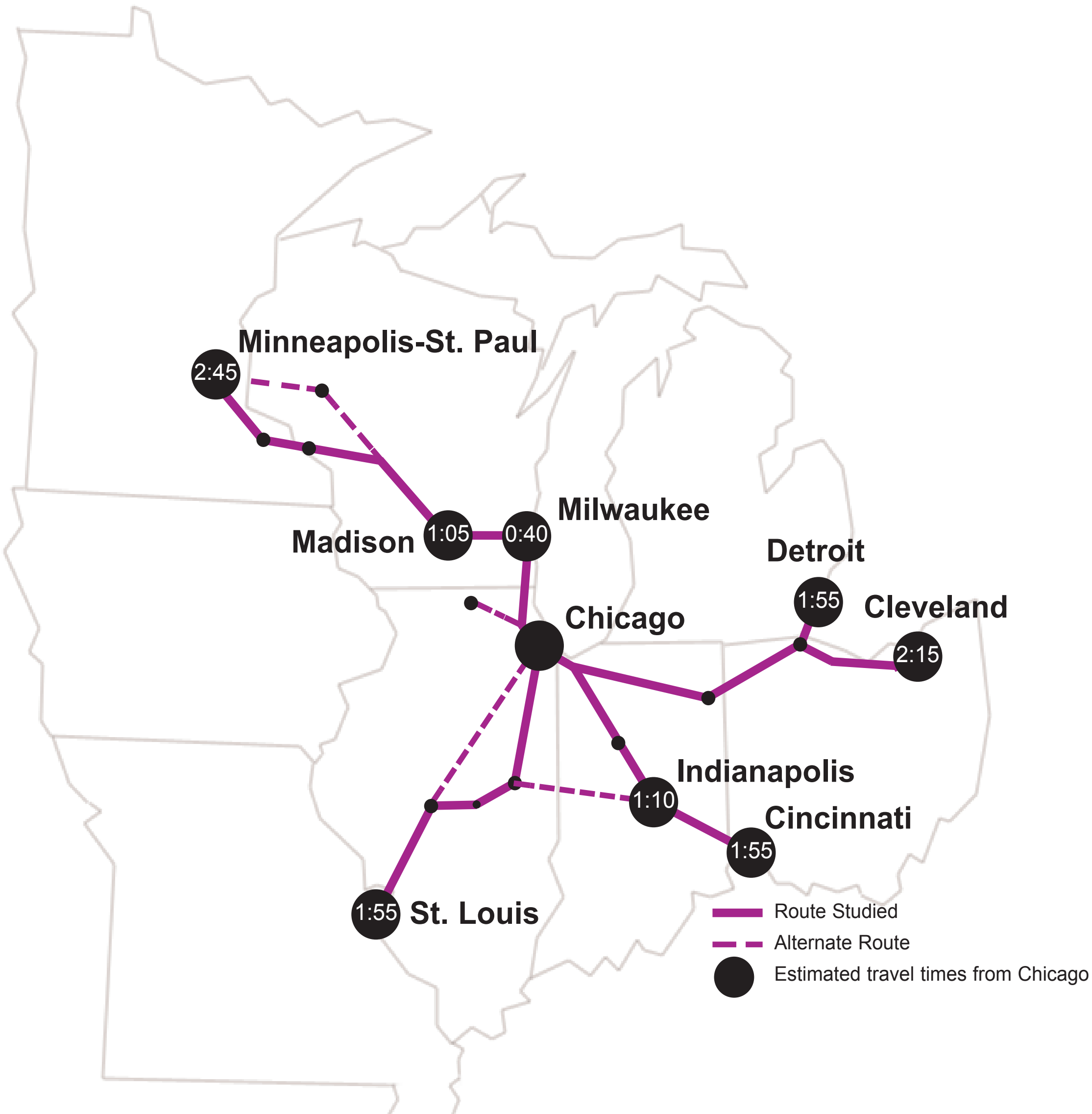
The economic benefits to the Chicago metropolitan region are significant. The Chicago study is just a preview of the potential economic impacts of HSR. The cumulative effects of HSR on the entire Midwest will be transformative and will serve as the catalyst so urgently needed to propel the Midwest into the forefront of a globally competitive world. Economic impacts for the other major metropolitan areas and smaller cities have yet to be determined. This study sets out a roadmap of ways that each of the cities and metropolitan areas linked to Chicago by the HSR system can plan their own supporting infrastructure connections to the HSR system.

Concept Plan for High-Speed Rail Routing and Connectivity – Midwest Region

Source: AECOM 2011; routings are subject to full environmental review and market analysis.

Table of Contents

1.0 Introduction....1
2.0 Midwest Candidate Corridor Descriptions....2
2.1 Chicago to Minneapolis / St. Paul....5
2.2 Chicago to St. Louis....5
2.3 Chicago to Cincinnati....6
2.4 Chicago to Detroit / Cleveland....7
3.0 Intermodal Integration with Metro Bus and Rail Services....7
4.0 Chicago Union Station (CUS) and the Central Area Action Plan....11
4.1 Chicago Union Station (CUS)....11
4.2 Central Area Action Plan....13
4.3 West Loop Transportation Center....13
5.0 System Facilities....14
5.1 Heavy Maintenance Facility....14
5.2 Overnight Storage and Light Maintenance....14
6.0 Travel Times....14
7.0 Ridership and Related Revenues....17
8.0 Economic Impacts and Other Benefits....19
8.1 Economic Impacts....20
8.2 Other Economic Impacts and Reasons for Building HSR....21
9.0 Capital Cost....22
10.0 Phasing....23
11.0 HSR Development Checklist....23
11.1 Which Outlying Major Metropolitan Areas will be the Endpoints of HSR Corridors?....24
11.2 Where Will the Downtown HSR Station be Located?....24
11.3 How Should Chicago's Existing Rail Terminal be Upgraded to Accommodate HSR?....24
11.4 How Would the Potential for Through Trains be Accommodated in Chicago?....24
11.5 What Access Improvements Should be Provided at the HSR Hub Station?....24
11.6 What Connectivity Should be Provided for HSR Service in the Metropolitan Area?....25
11.7 How Can We Make Short-Term Changes to Accommodate Emerging HSR?....25
11.8 How Will HSR Access to the Downtown Terminal be Accommodated?....25
12.0 Guidance for Other Cities, States, and Metropolitan Regions....27
12.1 System Planning....27
12.2 Suitability of Existing/Abandoned Railroad Corridors....28
12.3 Regional Connectivity....28
12.4 Stations and Land Use....28
12.5 Maintenance and Storage Facilities....29
12.6 Incremental Upgrade Strategy for HSR Corridors....29
13.0 Summary and Conclusions....32



HSR Station-to-Station Travel Times to Major Midwest Destinations on a 220-MPH System

1.0 Introduction

The Midwest High Speed Rail Association (MHSRA) is continuously striving to improve rail transportation in the Midwest and in particular implement a High Speed Rail (HSR) vision for the Midwest. The association teamed up with Siemens, who sponsored the study, and the Economic Development Research Group, Inc. (EDRG) of Boston, MA and AECOM, who prepared it. This study assesses the economic impacts of HSR on the Chicago metropolitan area. These economic changes will be created by investments in the current Chicago area rail system and other transportation facilities required to support a true "high-speed" intercity passenger train system. The study is structured to provide an independent look – beyond existing regional passenger rail plans – to a time in the future when high-speed intercity train service, currently enjoyed by other developed and developing post-industrial economies, becomes a reality in the United States.

The goal of the study is to provide a candid and impartial assessment of a wide range of investments that will need to be made in railroads, commuter rail and transit to support a HSR hub in downtown Chicago and to help envision the types of land use and development potential that a well-designed, integrated high-speed system could produce for Chicago and its surrounding communities. The study provides a basis for understanding the range of infrastructure investments, HSR-oriented development potential and supportive transportation services required to achieve multimodal integrated HSR transportation systems in core metropolitan centers in the United States.

The study also provides an assessment of the ways that HSR will help to integrate the economies of major metropolitan areas throughout the Midwest. The focus is on the Chicago metropolitan area because of its central role in the economy of the region, and because each of the HSR lines assessed in this study is linked directly with interconnecting commuter rail, transit and suburban stations serving Chicagoland. The economic impacts are significant and show how HSR will play a vital role in advancing Chicago's position as a global metropolitan center of business and finance creating nearly 104,000 permanent, high-paying new jobs and $7.8 billion annually in new business sales. Even more important, and as yet unexplored, are the economic consequences of introducing HSR service to each of the seven major metropolitan areas with populations between 3 million and 1 million, and the seven cities with populations between 200,000 and 750,000. As shown in a recent study for the U.S. Conference of Mayors, the economic effects of HSR on small and medium sized metropolitan areas can be transformative when combined with effective land use and transportation services.

The overall study area is defined by the location of major metropolitan areas within 300 to 450 miles of Chicago, which corresponds to a two- to three-hour, one-way HSR trip. This is the same area covered by the Midwest Regional Rail Initiative (MWRRI) plan to develop a system of 110-miles per hour (mph) "emerging" HSR corridors radiating from Chicago. This plan was most recently documented in the MWRRI Executive Report published in September 2004. Though the participating states – Illinois, Indiana, Iowa, Ohio, Wisconsin, Michigan, Minnesota, Missouri and Nebraska – have conducted studies of a number of individual corridors since its publication, the 2004 Executive Report remains the basis for the cooperative vision of 110-mph service in the study area, including the participating states' recent applications for federal HSR funding[1].

The MWRRI plan would provide trains approximately every two hours between major destinations at average operating speeds of 70 to 80 mph. This is a significant near-term upgrade that offers intercity travelers a choice of rail travel times that are reasonable alternatives to auto travel and lays the groundwork for a robust regional network for the future. However, true HSR service operating at top speeds of 150- to 220-mph or more, is a different product than the upgraded conventional passenger rail service envisioned in the MWRRI plan.

The key attribute of true HSR as it is envisioned in this study is that it cuts travel time between major city pairs to under three hours, making day trips by rail possible and rail door-to-door travel time complementary to air travel for cities within 450 miles of Chicago. Frequent trains, high-capacity and clockface schedules remove worries about running late and missing the train because another train will be leaving within an hour. Where HSR has been introduced in Europe and Asia, the quantum leap in frequency, speed and capacity inherent in true HSR service, along with commensurate feeder services, has produced a "sea change" in travel behavior. With true HSR service, the train becomes the preferred mode of travel for business and pleasure between destinations along the route, and the three-hour travel time allows rail to capture overall market shares of 30 percent or more.

In the context of a future Midwest passenger HSR system, which includes some corridors that operate at speeds up to 220-mph, the MWRRI plan is a cost-effective initial investment. The high construction and operating cost of true high-speed service can only be commercially justified in a few high-volume travel markets. Medium and small markets will continue to be served by conventional passenger rail routes that serve as feeders to the true high-speed

[1] With the exception of Nebraska, which has not applied for federal HSR funding

lines. Therefore, the prototypical HSR corridors evaluated in this study have been fully integrated into the MWRRI plan, as shown in Figure 1. This study also describes how HSR (with 150 to 200+ mph top speeds) can be introduced incrementally through infrastructure upgrades over a number of years, while the MWRRI-proposed system of 79 to 110-mph service continues to provide improved rail service to the Midwest.

2.0 Midwest Candidate Corridor Descriptions

Four corridors centered on Chicago appear appropriate for eventual upgrade to true high-speed service (220+ -mph), like those now operating in Europe and Asia. This network would serve the six largest metropolitan areas of the Midwest – Chicago, Detroit, Minneapolis/St. Paul, St. Louis, Cincinnati and Cleveland, providing end-to-end service of less than three hours in each corridor. The four corridors and potential stations are shown in Figure 2. These include the following:

- Chicago to Minneapolis/St. Paul
- Chicago to St. Louis
- Chicago to Cincinnati
- Chicago to Detroit/Cleveland

This study focuses on the Chicago hub, illustrating the considerations involved with implementing HSR in a dense, urban environment and in heavily-trafficked rail corridors. Within this area, and especially at greater distances from Chicago, routing and station locations are provided as examples and do not necessarily reflect specific recommendations. Full environmental review and market analysis will be vital in identifying a range of alternatives for routing and station locations in each corridor. The following sections describe possible alignments and improvements that would be required to realize true 220-mph HSR service. The term 220-mph is used to describe top speeds; because trains would make a number of intermediate stops and top speeds will not be reached on all sections of a corridor. For purposes of estimating actual travel times and ridership, end-to-end speeds approaching 150-mph are used. Key considerations regarding route selection are exemplified in the "High Speed Rail Development Checklist" provided in Section 11.

Figure 1: Concept Plan for High Speed Rail Routing and Connectivity – Midwest Region

Source: AECOM 2011; routings are subject to full environmental review and market analysis.

Figure 2a: High Speed Rail Corridors Evaluated

Source: AECOM 2011; routings are subject to full environmental review and market analysis.

Figure 2b: High Speed Rail Corridors Evaluated

Source: AECOM 2011; routings are subject to full environmental review and market analysis.

2.1 Chicago to Minneapolis/St. Paul

Of the four corridors identified for eventual true high-speed service shown in Figure 1, this corridor is the longest at just under 450 miles. Figure 1 shows two viable HSR routings via Eau Claire, Rochester and the existing Amtrak river route. Rochester was evaluated in this study because the existing Amtrak route is not suitable for speeds greater than 90 mph and the routing to St. Paul via Eau Claire would require new bridges over the protected St. Croix River and Bruce Vento Park. It would be critical to fully integrate the schedules of the proposed MWRRI service on the river route and new service on the Eau Claire route with those for the 220 mph route. The route studied is shown in Figure 2a and described below:

- From an underground West Loop Transportation Center station or reconfigured Chicago Union Station (CUS) in Downtown Chicago, HSR would be routed north in a tunnel and/or aerial structure to follow an alignment along the Milwaukee District North Metra line as shown in Figure 3
- HSR would continue north along a direct route or via O'Hare International Airport
    - On the direct route, HSR would continue along the Milwaukee District North line to reach a north side intermodal station in Deerfield at Lake Cook Metra Station
    - On the O'Hare route, HSR would be routed along the Milwaukee District West Metra line to serve a station below a new O'Hare West Terminal and rejoin the direct route south of Lake Cook Metra Station via the Union Pacific (former Chicago & North Western) corridor.
- Between Rondout (where Metra turns west toward Libertyville) and Milwaukee, HSR would generally follow the Canadian Pacific (former Milwaukee Road) corridor.
- In Milwaukee, HSR would stop at Mitchell Field and the downtown intermodal station.
- HSR would generally follow the I-90 corridor west of downtown Milwaukee to Rochester via La Crosse, continuing north in the US 52 corridor to St. Paul.
- A Madison station, where the Wisconsin and Southern (former Milwaukee Road) crosses under I-39/90/94, would minimize route deviation but require downtown shuttle service; other various station locations have been suggested and are subject to further study.
- HSR would approach the Twin Cities from the south-southwest, allowing access to the existing historic St. Paul Union Depot, then continuing on via an "S"-curve onto Burlington Northern Santa Fe (BNSF) right-of-way; local transit provides frequent, limited-stop bus service between downtown St. Paul and Minneapolis-St. Paul International Airport.
- An aerial alignment in the BNSF corridor would connect HSR between St. Paul and Target Field station in Minneapolis with direct connections to light rail and commuter rail

2.2 Chicago to St. Louis

Two potential routes are conceivable in this corridor via Champaign/Urbana or Bloomington/Normal. The Champaign route studied in this report would serve larger markets, therefore generating greater ridership than the Bloomington route, while still allowing for an end-to-end travel time of approximately two hours. To achieve an average travel speed approaching 150-mph, 220-mph alignments would be implemented between Chicago and Champaign and between Springfield and St. Louis.

- From an underground West Loop Transportation Center station or reconfigured CUS, HSR would be routed south in a tunnel and/or aerial structure via the St. Charles Air Line to follow an alignment in the Metra Electric District / Canadian National (former Illinois Central) corridor, as shown in Figure 3
- HSR stations would be located at McCormick Place (events only), Hyde Park and a Southwest Intermodal Station located in Harvey or Homewood, subject to further study
- The alignment would continue to follow the Canadian National with a stop at the existing Illinois Terminal in Champaign

- South of Champaign, HSR would curve west into an alignment in the new right-of-way to reach the I-72 corridor near the Sangamon River crossing
- HSR would follow I-72, the Decatur Junction Railway and Canadian National to reach a new station on the east side of downtown Decatur
- From Decatur, HSR would curve west from the Canadian National corridor to an alignment in the new right-of-way to re-enter the I-72 corridor
- Approaching Springfield, HSR would transition from the I-72 corridor, following the Norfolk Southern (former Wabash) either to a tunnel connecting to the Union Pacific (former Chicago & Alton) corridor to a stop at the Chicago & Alton Station or to a stop along the Norfolk Southern in the 10th Street corridor, which the city has identified for railroad consolidation
- From Springfield, HSR transitions from the Union Pacific (former Chicago & Alton) to generally follow I-55
- In the vicinity of Worden, HSR would transition to the Union Pacific (former Cleveland Cincinnati Chicago & St. Louis Railway) to reach the Gateway Terminal area in eastern St. Louis
- HSR would follow Terminal Railroad Association (former City of St. Louis) right-of-way across a new Mississippi River bridge to reach the Gateway Multimodal Transportation Center in St. Louis

2.3 Chicago to Cincinnati

At less than 300 miles, this is the shortest of the four identified high-speed corridors. To achieve an end-to-end travel speed approaching 150-mph and a travel time of less than two hours, 220-mph alignments would be implemented between Chicago and Gary, then through Ft. Wayne and Indianapolis to the vicinity of Greensburg. Because of the hilly topography of southeastern Indiana and the Cincinnati area, alignments supporting more modest speeds would be implemented on the approach to Cincinnati.

As shown in Figure 2b, the Chicago to Cincinnati route studied in this report has the following alignment:

- HSR would be routed from the West Loop/Chicago Union Station complex as described above for the St. Louis corridor
- South of Hyde Park Station, HSR would curve east to follow the Norfolk Southern (former Pennsylvania Railroad)/New York Central (former Lake Shore & Michigan Southern) corridor to a stop at the existing Gary Metro Center Station on the South Shore Line
- HSR would follow the I-65 corridor from Gary to Indianapolis, diverting along the CSX Transportation, Norfolk Southern and Conrail (former Cleveland Cincinnati Chicago & St. Louis Railway) corridors to stop at the existing Amtrak station in Lafayette
- From I-65, HSR would approach Indianapolis Union Station via CSX Transportation (former Pennsylvania Railroad), I-74 and Conrail (former Peoria & Eastern)
- From Indianapolis, HSR would follow CSX Transportation (former Cleveland Cincinnati Chicago & St. Louis Railway) to the vicinity of Greensburg and transition to the I-74 corridor
- Approaching Cincinnati, HSR would follow I-74, crossing Mill Creek, threading through Queensgate Yard to reach Cincinnati Union Terminal

Although not examined in this report, an alternative route via Champaign warrants further study. Combining this portion of the Chicago - Cincinnati route with the Chicago - St. Louis route may reduce the initial costs of construction. It would directly tie Chicago to Indianapolis and Cincinnati via one of the Midwest's major university and research complexes. More importantly, this routing would create the ability to provide direct service between St. Louis and Cincinnati in less than three hours without building a separate line. Under this scenario, it would be critical to fully integrate the schedules of the proposed 110-mph Chicago service via Lafayette and Gary with those for the 220 mph route. As demand for services warrants (including densities along the St. Louis to Chicago route), 220-mph service to Gary and Lafayette (as shown in Figure 2b) could be introduced.

2.4 Chicago to Detroit/Cleveland

This corridor passes through Gary and Fort Wayne to Toledo, where the route would branch to Detroit and Cleveland. To support an overall average travel speed of 150-mph in this corridor, 220-mph alignments would be implemented between Gary and Toledo. Given the relatively short distance between Toledo and Detroit, and challenging topography between Toledo and Cleveland, 150-mph alignments would be implemented between these cities, which would still maintain the expected end-to-end travel times of 1 hour 55 minutes, and 2 hour, 15 minutes, respectively.

- HSR would be routed from the West Loop/Chicago Union Station complex as described above for the Cincinnati corridor
- From Gary, HSR would follow the Chicago Fort Wayne & Eastern (former Pennsylvania Railroad) to Fort Wayne, with a stop at Baker Street Station; a route via South Bend and Elkhart would serve a considerable existing rail passenger market, warranting further study, but would possibly require a new “greenfields” alignment to the east of Elkhart
- HSR would follow the Norfolk Southern (former New York Chicago & St. Louis Railroad) east from Fort Wayne, curving north in the vicinity of Leipsic to follow the CSX Transportation (former Cincinnati Hamilton & Dayton Railway) to Perrysburg
- In the vicinity of Perrysburg, HSR would transition to I-75, approaching Toledo Union Station via CSX Transportation (former Cincinnati Hamilton & Dayton and Toledo & Ohio Central Railways) and a new Maumee River bridge
- Trains would split at Toledo, with one half continuing to Detroit and the other half going to Cleveland
- Detroit trains would head west and north along the Norfolk Southern (former Baltimore & Ohio Railroad) and Conrail corridor to reach the existing Amtrak station in Detroit’s New Center district
- Cleveland trains would turn east over the new Maumee River bridge and follow CSX (former Toledo & Ohio Central) and Penn Central (former Pennsylvania Railroad) to reach I-80/90
- HSR would follow I-80/90 (Ohio Turnpike) east to transition to the Norfolk Southern (former Lake Shore & Michigan Southern) in the vicinity of Amherst and Elyria
- HSR would continue east along the Norfolk Southern (former Lake Shore & Michigan Southern), with a stop at Hopkins International Airport, to reach Lakefront Station in Cleveland

From the Lakefront Station in Cleveland, passengers from Chicago could connect to the Northeast Corridor with HSR service via Pittsburgh.

3.0 Intermodal Integration with Metro Bus and Rail Services

To take full advantage of the opportunity for HSR service, to reduce automobile reliance and complement long-haul air travel by providing feeder service, planning should consider ways to maximize use of transit and other rail services for access. The discussion below specifically considers the Chicago area. Considerations for other cities are provided in the guiding principles presented in Section 12. Key service providers include:

- Chicago Transit Authority (CTA), which owns and operates the rail rapid transit and bus services serving the City of Chicago, as well as 40 surrounding suburbs
- Metra, which manages 11 commuter rail lines serving more than 100 communities, all primarily within a 35-mile radius of downtown Chicago
- Pace, a sister bus company to Metra, serving six metro counties with suburban transit service reaching some 210 communities, an auxiliary provider to the Metra and CTA rail and bus networks

The service concept for integration with commuter rail and local transit is based upon differentiation of service between HSR, which will primarily serve intercity travel, versus regional and local providers, which will primarily provide regional and local access to the HSR system. In addition to downtown Chicago, connectivity points where

HSR travelers could interchange with the regional network have been identified at O'Hare International Airport, Lake Cook Metra Station, Hyde Park (55th, 59th or 63rd Street Metra Station) a Southwest Intermodal (at Harvey Metra Station or Homewood), and Gary Metro Center Station on the South Shore Line, as shown in Figure 3.

- Lake Cook Metra Intermodal (Figure 4) – Provision of an intermodal station with Metra on the north side would offer HSR patrons a final point to transfer between O'Hare and downtown Chicago direct trains, as well as Metra trains. The station serves the heart of the highest suburban employment concentration between the Tri State Tollway (I-94) and the Edens Expressway and is located in a commercial district served by several Pace bus routes
- Hyde Park Metra Intermodal (Figure 5) – A HSR station at the 55th, 59th or 63rd Street Metra station would provide connectivity within the inner Metra / CTA rail district. This station would be located near principal activity centers, including the University of Chicago and the Museum of Science and Industry, and would be served by a number of CTA bus routes. The station also presents the opportunity for a Bus Rapid Transit (BRT) link to Midway Airport
- Southwest Intermodal (Figure 6) – A second south side intermodal would provide a connection to the regional network for HSR as it enters the metro area from the south. One option is at the existing Harvey Metra station, located in a commercial district served by an extensive Pace bus service. A station at Homewood is an alternative.
- Gary Metro Center (Figure 7) – Gary, Indiana, is located near the edge of the metro region commute shed and is served by the South Shore Line. An intermodal at the existing Gary Metro Center station would provide a connection to Hammond, Michigan City, South Bend and intermediate points. The station functions as the hub of the local bus network and lies within walking distance of the civic center, convention center and stadium
- O'Hare West Terminal Intermodal (Figure 8) – A direct link to the airport would be provided by a HSR station below a new West Terminal, currently under consideration (indicated in red). The West Terminal would be linked to the existing terminal complex via an underground Airport Transit System connection and potentially an extension of the CTA Blue Line (shown in blue). HSR service directly to O'Hare would provide important supportive and complementary, efficient ground access by providing feeder service for long-haul and international air travelers from throughout the Midwest.

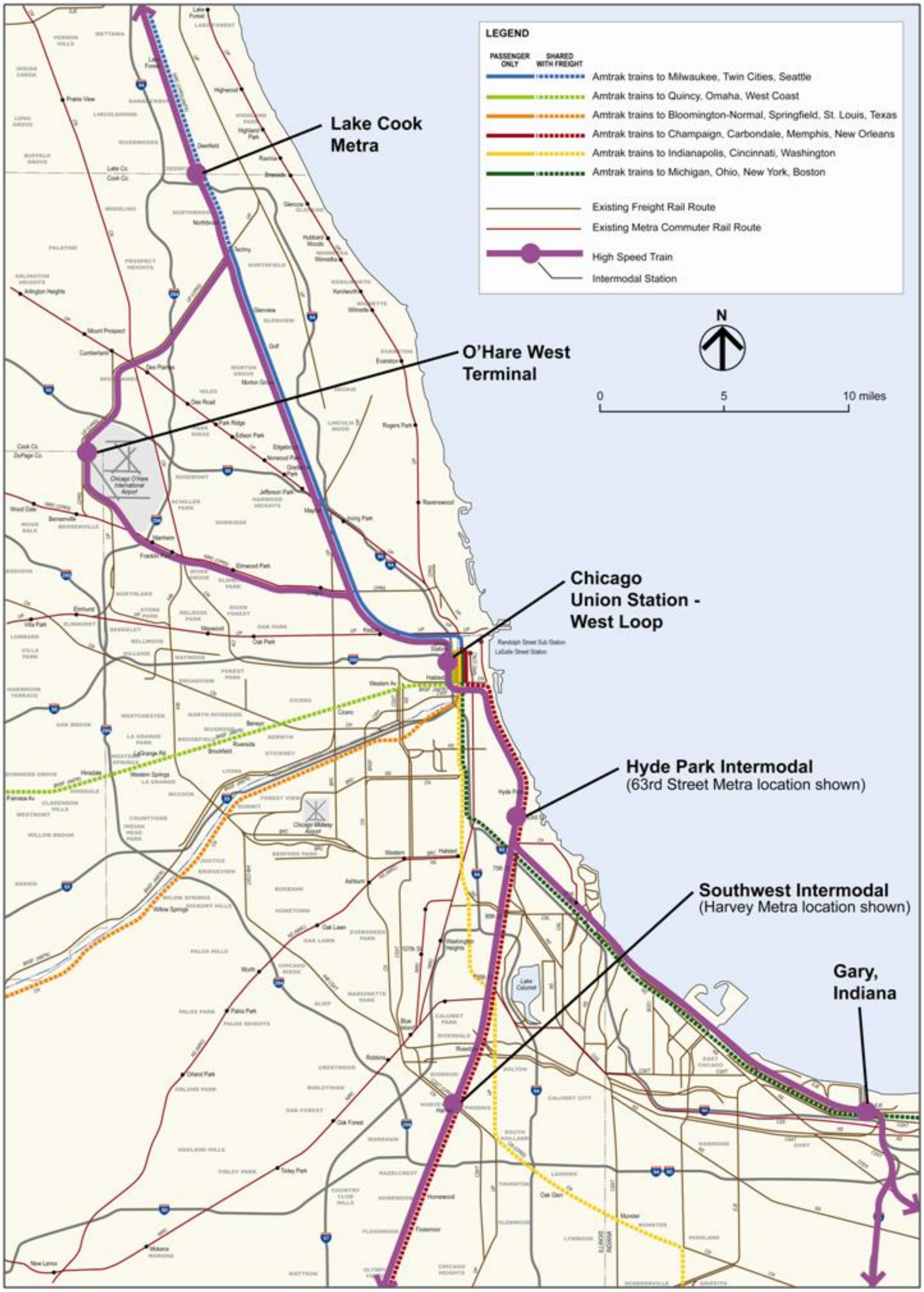


Figure 3: High Speed Rail Routing and Connectivity – Metro Area

Source: AECOM (Base map IDOT Illinois Railroad Map, 2006).

Figure 4: Lake Cook Metra

Figure 5: Hyde Park (63rd Street Metra shown)

Figure 6: Southwest Intermodal (Harvey Metra shown)

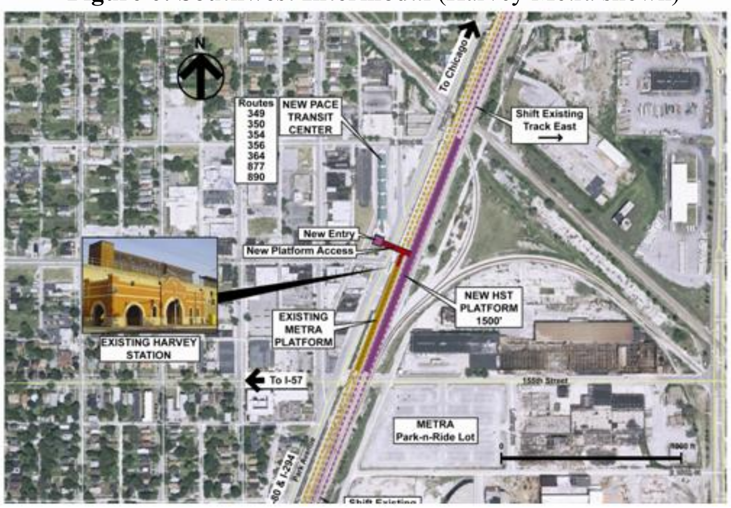
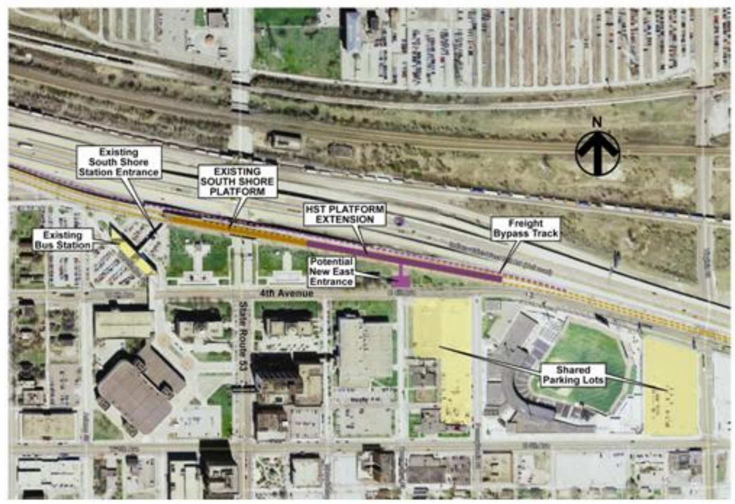


Figure 7: Gary Metro Center



Source: AECOM (Base provided by Google)

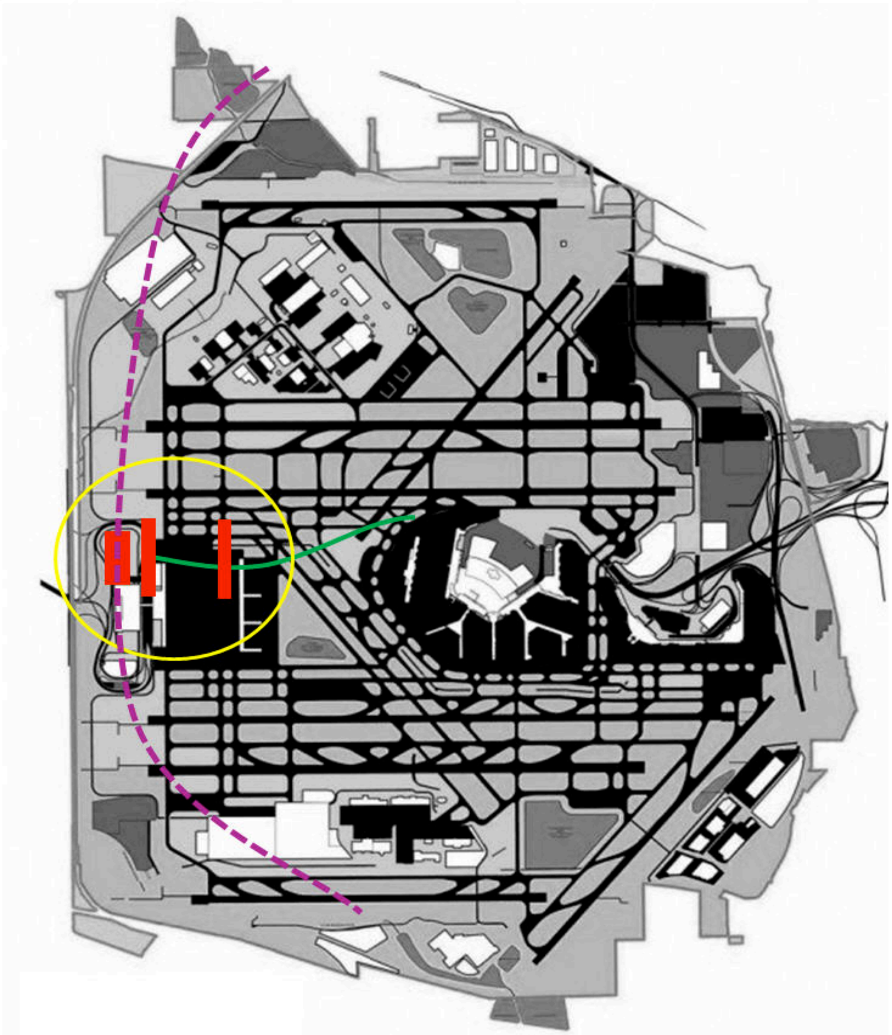


Figure 8: O'Hare West Intermodal Concept Plan
Source: AECOM, 2011

4.0 Chicago Union Station (CUS) and the Central Area Action Plan

As envisioned by the City of Chicago, CUS will continue as the most heavily-utilized commuter rail station and is also designated as the hub for the MWRRI 110-mph (emerging HSR) service. This study assumes that HSR service would be brought to a candidate location at the proposed West Loop Transportation Center adjacent to CUS or in the existing CUS reconfigured to accommodate HSR.

4.1 Chicago Union Station (CUS)

CUS is currently served by six Metra lines, as well as 17 Amtrak intercity services. The number of intercity trains is expected to climb significantly based upon the development of the 110-mph emerging high-speed corridors delineated by the MWRRI. The combined impact of the MWRRI service expansion, along with potential Metra service increases, is expected to exceed the capacity of the existing facility, even without inclusion of HSR service. The capacity of the existing terminal is constrained by surrounding development and its back-to-back stub-end design, with only a single through track.

A long-term solution for accommodating true HSR and addresses CUS's capacity constraints would be to implement the West Loop Transportation Center, under Clinton Street, adjacent to CUS, or reconfigure the existing CUS track, platform and concourse layout to significantly increase capacity. The West Loop Transportation Center/CUS Capacity Expansion is a key project identified in the *Central Area Action Plan* adopted by the Chicago Plan Commission on August 20, 2009. This project would also include a new north-south CTA subway alignment under Clinton Street to strengthen intermodal connections and relieve the existing, heavily-used north-south Red Line subway.

Figure 9 shows a potential HSR station located immediately west of Chicago Union Station and south of Ogilvie Station (where three Metra UP lines terminate). Possible access to this station, from the north, could be via new tracks paralleling the Milwaukee District Lines (MD-NH and MD-W), transitioning to the subway east of Ogden Avenue, then swinging south, then east, to follow Clinton Street through the subway. South of the station, the HSR alignment could emerge south of Roosevelt Road within the Clinton Street right-of-way (displacing the existing roadway lanes) and transition to aerial configuration across the existing rail yards and South Branch of the Chicago River on a new high-level bridge. Construction of the West Loop terminal could potentially be deferred, should the City of Chicago, Metra and Amtrak identify a means of addressing the current operational and capacity issues, and provided enhancements could be implemented without serious impact to ongoing operations. A reconfigured CUS would accommodate similar increased capacity track connections.

Figure 9: HSR Routing & Connectivity – Central Area Source: AECOM 2011 (base provided by Google)

Figure 10: Central Area Action Plan – Proposed Transit Improvements. Source: City of Chicago

As illustrated in Figures 9 and 10, a new HSR hub adjacent to CUS, or a reconfigured CUS would provide direct access to the CTA's rapid transit network via the new north-south subway under Clinton Street.

4.2 Central Area Action Plan

The City of Chicago's *Central Area Action Plan* calls for intensification of West Loop land use, and a number of major transportation improvements that would address many of Chicago Union Station's access needs. Figure 10 shows the principal elements of the plan, including a new north-south subway line with a new station adjacent to CUS, an east-west transitway connecting across the Loop to Michigan Avenue and the new high-density area north of Millennium Park and streetscape improvements to enhance the pedestrian environment crossing the Chicago River to the Central Loop subdistrict.

4.3 West Loop Transportation Center

Locating the long-term hub for HSR at a new station adjacent to CUS, or reconfiguring CUS itself, will address the capacity issues present at the existing terminal while taking advantage of all of the West Loop planned improvements. A cross-sectional view shows the facility as a multi-level station below Clinton Street in Figure 11, though its ultimate configuration requires additional study.

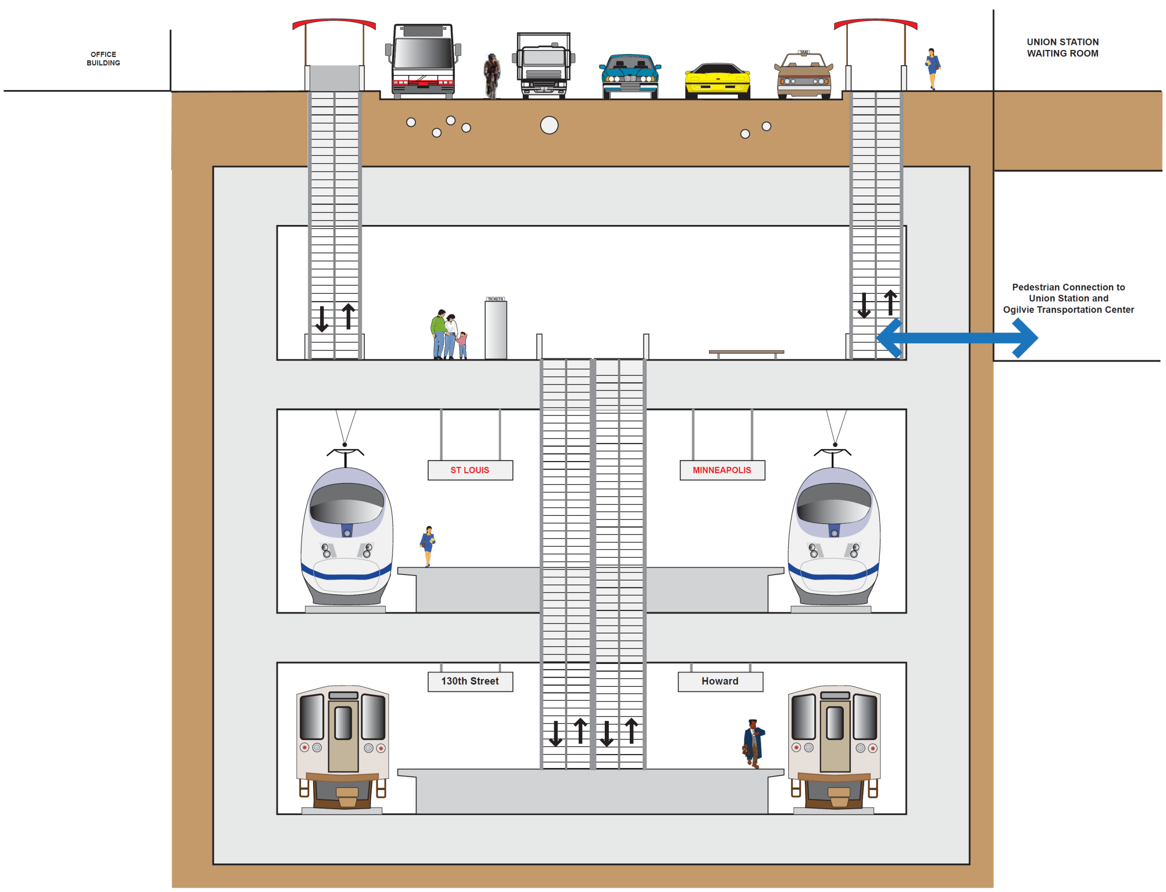


Figure 11: West Loop Transportation Center
Source: AECOM, 2011.

5.0 System Facilities

The HSR network would require a central control center to monitor and manage operations, typically developed near the heart of the system. Maintenance and storage functions would most likely be divided between a central heavy maintenance facility, which would be capable of performing the most demanding, time consuming and costly repairs and refurbishment, and light maintenance and overnight vehicle storage areas near terminal stations located elsewhere on the Midwest HSR network.

5.1 Heavy Maintenance Facility

The Heavy Maintenance Facility (HMF) would include a vehicle storage area to accommodate train-sets coming in for maintenance as well as parking serviced units. The principal elements of the facility would support train washing and cleaning, wheel truing/re-profiling and wheel, bogie, traction power and electric components inspection. Specialty shops would handle specific activities, such as vehicle assembly, body painting and cleaning, pneumatic / brake maintenance and testing, and interior maintenance and cleaning. A warehouse would facilitate the organization, storage and distribution of parts, modules and components of train-sets, and maintenance equipment. The HMF would need to be centrally located to the overall system, have convenient access to major utilities and roadways, and require the presence of a suitable labor market. A HMF to support a fleet of several hundred cars would require approximately 150 acres.

5.2 Overnight Storage and Light Maintenance

The configuration, capacity and length of the tracks in the overnight storage and light maintenance facility would be primarily based on the number of train-sets identified in the operating plan for the start-up of daily service at each terminal. The minimum length of tracks are assumed to conform with a standard train-set (400 meters), plus 7-8 percent to allow for a safety buffer on either end of a parked train and to accommodate access between the trains for maintenance personnel. The overnight storage and light maintenance facilities would each require sites about half the size of the HMF, approximately 75 acres.

6.0 Travel Times

The implementation of HSR would represent a dramatic improvement over travel on existing rail service, and under various scenarios rail travel would become an increasingly reasonable alternative to driving and highly complementary to long-haul and international air service by providing a feeder service for the O'Hare airport. Figure 12 shows the station-to-station travel times between downtown Chicago and several of the key cities and terminal metropolitan areas served by the proposed 220-mph system. Table 1 presents principal cities in each of the four corridors, along with the distance and station-to-station travel times from Chicago under four speed regimes:

- Current scheduled Amtrak service, which typically has delays built into the schedule
- Improvements proposed by the MWRRI, enabling 110-mph top speeds
- 150-mph maximum speed – comparable to the fastest U.S. rail service currently in operation
- 220-mph maximum speed – true HSR, as implemented in Europe and Asia

While Table 1 presents station-to-station travel times, the door-to-door travel times in Table 2 are more appropriate for comparing rail travel times to other modes. Reviewing door-to-door times facilitates comparisons with the auto mode, which typically does not have a time component for accessing the rail station or airport, or for processing time at the rail station or airport.

Figure 12: HSR Station-to-Station Travel Times to Major Midwest Destinations on a 220-MPH System

The door-to-door travel times shown in Table 2 were estimated based on a typical trip from a location within the Central Business District (CBD) of the originating city to a location within the CBD of the destination city. Since airports are outside the CBD, the time to travel between trip origin and the airport was assumed to be 30 minutes. One hour was assumed to be the typical time spent in the airport prior to departure, allowing for security screening and boarding the airplane. Time in the airport on arrival was assumed to be 30 minutes, which included time to disembark from the airplane, walk through the terminal and obtain ground transportation. Travel time from the airport to the final destination was assumed to be 30 minutes. In all, for the air mode, the travel time while not on-board the airplane totals 2 hours and 30 minutes.

For the rail mode, the time to travel between the origin and the train stations was assumed to be 15 minutes, since train stations are typically located in the CBD. The time in the rail station prior to departure was assumed to be 10 minutes, which allowed for reaching the platform and boarding the train. Time in the station on arrival was assumed to be 5 minutes for disembarking the train and walking through the station. Travel time from the train station to the final destination was assumed to be 15 minutes. In all, for the rail mode, the travel time while not on-board the train totals 45 minutes.

Table 1: Rail Travel Times Under Four Speed Regimes

Corridor[1]	Miles from Chicago[2]	Travel time from Chicago[3] (hours:minutes)			
		Amtrak Schedule	110-mph[4]	150-mph	220-mph
CHICAGO – MINNEAPOLIS / ST. PAUL					
Milwaukee	85	1:29	1:08	0:50	0:40
Madison	156	3:20	2:28	1:20	1:05
La Crosse	291	4:59	4:18	2:25	1:45
Rochester	358	—	—	2:55	2:05
St. Paul	430	8:05	6:29	3:30	2:30
Minneapolis	442	8:05	—	3:45	2:45
CHICAGO – ST. LOUIS					
Champaign	128	2:10	1:58	1:05	0:45
Decatur	176	—	—	1:30	1:00
Springfield	214	3:24	2:44	1:55	1:20
St. Louis	311	5:20	4:10	2:40	1:55
CHICAGO – CINCINNATI					
Lafayette	115	3:13	1:46	1:00	0:45
Indianapolis	178	4:10	2:55	1:30	1:10
Cincinnati	284	8:10	4:27	2:30	1:55
CHICAGO – DETROIT / CLEVELAND					
Fort Wayne	149	—	1:53	1:05	0:55
Toledo	253	3:59	3:18	1:55	1:25
Detroit	312	5:36	4:24	2:25	1:55
Cleveland	361	6:24	4:48	2:50	2:15

Notes: [1] Secondary HSR stations within each metropolitan area are not listed (e.g. O'Hare West)
[2] Mileage based on 150-mph / 220-mph corridor routing
[3] Reflecting typical rail operations, under which top speeds are reached along only portions of the route
[4] Based on non-express service and greatest level of improvement documented in *Midwest Regional Rail Initiative Project Notebook*, June 2004

Sources: Amtrak schedule effective May 10, 2010; AECOM 2011.

Table 2: Total Door-to-Door Trip Travel Times by Mode (hours:minutes)

Corridor	Air	Auto	Rail			
			Current Service	110-mph	150-mph	220-mph
CHICAGO – MINNEAPOLIS/ST. PAUL						
St. Paul	3:55	7:27	8:50	7:14	4:15	3:15
Minneapolis	3:55	7:39	8:50	—	4:30	3:30
CHICAGO – ST. LOUIS	3:40	5:09	6:05	4:55	3:25	2:40
CHICAGO – CINCINNATI	3:44	5:10	8:55	5:12	3:15	2:40
CHICAGO – DETROIT/CLEVELAND						
Detroit	3:46	4:50	6:21	5:09	3:10	2:40
Cleveland	3:47	6:03	7:09	5:33	3:35	3:00

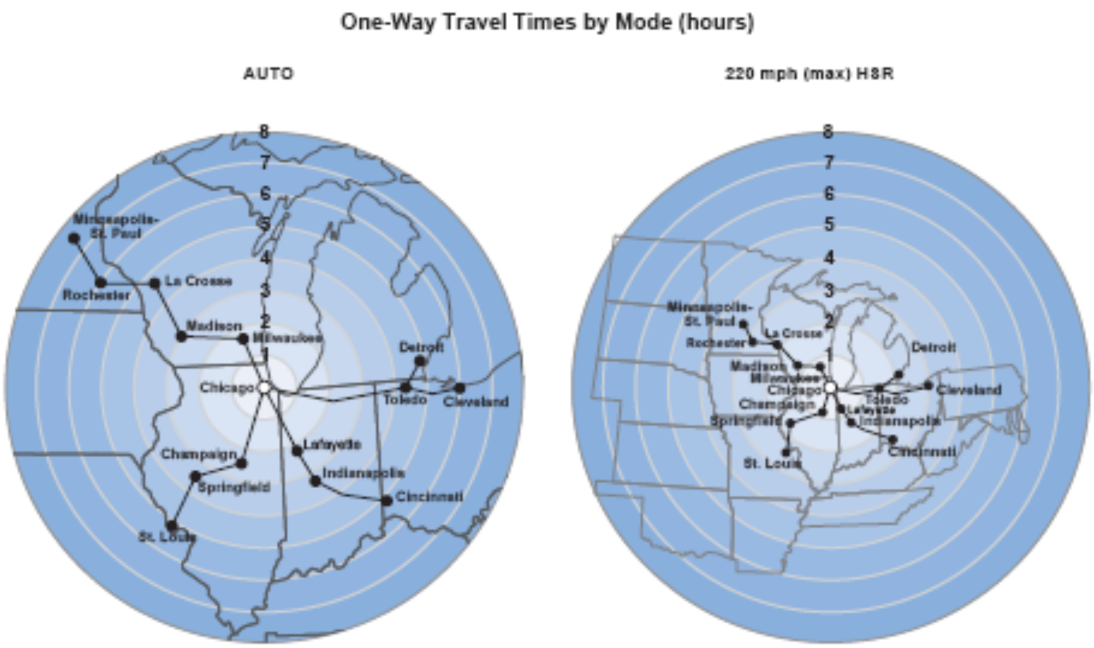
Sources: US Airways website accessed 8/11/10, Google Maps accessed 8/11/10, Amtrak schedule effective May 10, 2010; AECOM 2011.

Note: For rail mode, total additional time not on-board train is assumed to be 45 minutes

The door-to-door travel time comparison produces fairly consistent results for all city pairs. Usually, the auto mode is faster than the current Amtrak schedule, however, it becomes equivalent when upgrading rail service to top speeds of 110 mph. Rail operating at top speeds of 150-mph achieves parity to air, and is sometimes a little faster. Rail with top speeds of 220-mph is consistently faster than the air mode, typically by 30 to 60 minutes.

HSR service must match the frequency of hourly air shuttles and approach the on-demand convenience of auto travel to provide an effective alternative to both short-haul Midwest regional air flight and auto travel. Hourly service throughout the day with half-hourly service during peak periods is recommended, for a total of 25 daily departures on each major route. This service frequency is necessary to meet the needs of business and connecting air travel; for example, if a meeting goes longer than expected, the average wait time for a return train during peak periods would be only fifteen minutes.

The potential for HSR to reduce travel times and "shrink" the distances between cities is illustrated in Figure 13.



The travel time by automobile (based on Google Maps) is shown in the left diagram and by HSR (with a top speed of 220-mph) in the right diagram, holding the travel time scale constant. The resulting comparison shows that the Midwest's largest metropolitan areas – now separated by a drive of several hours – would all lie within a few hours of Chicago via HSR.

Figure 13: Midwest Region Major Destinations – Auto / HSR Travel Times in Hours from Chicago

Automobile Travel Time (Google Maps) — HSR Travel Time (220-mph top speed)

7.0 Ridership and Related Revenues

A 220-mph HSR network in the Midwest has the potential to attract over 43 million annual riders, generating more than $2.2 billion in revenue. By comparison, the 110-mph, the MWRRI network was estimated to attract nearly 12 million passengers in the four study corridors and generate just under $0.5 billion in revenue. A 150-mph network would attract 35 million riders and generate over $1.7 million in revenues.

Table 3 summarizes the 2025 ridership forecasted by the MWRRI for each of the four candidate corridors, as well as new estimates for 150-mph and 220-mph services in 2030. The expected annual revenue for each corridor, and under each scenario, is also presented. With implementation of 220-mph service, the Chicago to Minneapolis/St. Paul corridor would be expected to have the greatest ridership at nearly 16 million followed by the Detroit/Cleveland corridor with over 12 million and the St. Louis and Cincinnati corridors would each attract between 7 and 8 million riders annually. The same order would be expected given 150-mph service. The MWRRI forecasts proportionately higher ridership in the Detroit/Cleveland and St. Louis corridors, but this reflects an expanded level of service to these cities.

Revenue estimates for the 150- and 220-mph service assume fares 75-100 percent higher than existing Amtrak fares, consistent with prior HSR studies conducted in the Midwest. Travel only between major metro areas is assumed; because the proposed network includes multiple stations in the Chicago, Milwaukee, Minneapolis/St. Paul and Cleveland metropolitan areas, additional intra-metro area ridership would be expected, mainly for downtown to airport access. Currently, about 7 million annual air travelers connect through Chicago en route to their ultimate destinations.

Though not represented in the analysis, a significant percentage of these connecting air passengers could be diverted from short-haul flights to HSR. Increasing ridership on the HSR network provides airlines with additional capacity for more efficient and profitable long-haul flights. HSR service between each of the cities served by the four Chicago-based lines also provides the potential for a more efficient, frequent and less carbon-intense form of public transport than short-haul air service. HSR is ideally suited for providing an alternative to auto travel for medium distance intercity trips of about 3 hours or less, and would also provide a very effective form of ground access connecting medium size cities presently not served well by airports for longer distance, transcontinental and international air flights. When properly designed and operated, as described above, HSR can provide a service that complements long-haul and international air service by providing feeder service – thereby reducing the environmental effects of short-haul, regional air services and providing comparable airport access time and more reliable year-round connecting service. This has proven to be an effective strategy in both the United States (the Northeast Corridor) and in Europe.

Table 3: Ridership Forecast Summary

	Annual Riders	Annual Revenue	Travel Time	Daily Roundtrips
CHICAGO – MINNEAPOLIS / ST. PAUL				
110 mph (MWRRI)	4,362,404	$158,030,000	6:29	6
150 mph	12,537,000	$634,220,000	3:30	25
220 mph	15,884,000	$842,150,000	2:30	25
CHICAGO – ST. LOUIS				
110 mph (MWRRI)	1,757,123	$65,760,000	4:27	8
150 mph	5,999,000	$249,090,000	2:40	25
220 mph	7,904,000	$336,750,000	1:55	25
CHICAGO – CINCINNATI				
110 mph (MWRRI)	894,669	$55,420,000	4:08	5
150 mph	5,877,000	$285,660,000	2:30	25
220 mph	7,226,000	$374,280,000	1:55	25
CHICAGO – DETROIT / CLEVELAND				
110 mph (MWRRI)	4,795,048	$179,360,000	4:24 / 4:48	9
150 mph	10,661,000	$561,770,000	2:25 / 2:50	25
220 mph	12,650,000	$685,190,000	1:55 / 2:15	25
TOTALS				
110 mph (MWRRI)	11,809,244	$458,570,000	–	28
150 mph	35,074,000	$1,730,740,000	–	100
220 mph	43,664,000	$2,238,370,000	–	100

Notes: Current project forecast year: 2030; revenue in 2010 dollars
MWRRI forecast year: 2025; revenue in 2002 dollars
MWRRI reported Michigan and Cleveland corridors separately; results combined above
MWRRI Minneapolis / St. Paul corridor also includes Green Bay
MWRRI total only represents ridership forecast in the four corridors

Sources: *Midwest Regional Rail Initiative Project Notebook*, June 2004; AECOM 2011.

8.0 Economic Impacts and Other Benefits

The economy of the Chicago metropolitan area (defined as the fourteen-country metro area that reaches into Wisconsin and Indiana) includes a consolidated metropolitan area that is home to 9.6 million people. HSR service linking Chicago to seven of the largest metropolitan areas in the Midwest, as well as several important intermediate major cities, will provide significant positive economic impacts in jobs, business sales, wages and Gross Regional Product (GRP) for the Chicago metropolitan area where connections to commuter, transit and bus are provided.[1] These economic impacts were estimated for 2030 using ridership and station-area development potential provided in this report and is based on highly integrated "clock-face" service levels used in this analysis.

These economic impacts are "conservative" in that they understate the full effects of introducing HSR systems in the Midwest. Two important points should be emphasized. First, the economic impacts have been estimated only for the Chicago metropolitan area. Each of the other cities served by the HSR system will very likely see new jobs, greater growth in business revenues and a more diverse economic base as a result of increased connectivity with the rest of the Midwest region. These economic impacts can only be assessed by examining the structure of the economies of each metropolitan area and evaluating the access provided by transit and commuter rail connections, proposed land use plans and economic development initiatives that will be adopted to support HSR systems in each region. Second, these impacts represent just the long-term economic development for Chicago metropolitan area. They do not include the short-term rail construction and long-term operation and maintenance jobs. Nor do they account for jobs created in other parts of the Midwest by supplying materials and equipment during the building of the lines. Studies needed to provide these detailed assessments require more advanced engineering and design of the routes, plans for the phasing of construction and time frames for putting each segment of the HSR system into operation.

HSR will affect the regional economy in which these people work, live and recreate in several important and measurable ways. The economic effects attributable to HSR systems are determined by more than just travel time savings. Increased travel opportunities for households and businesses, higher levels of business productivity, and better access to jobs (for both employees and employers), other businesses and emerging technology, educational, health care and finance industries all produce higher returns to businesses and households for each dollar spent on transportation-related travel. This is true even for those who don't use HSR, because people diverted to trains, commuter lines and transit free up capacity on the region's highways and at the region's airports.

- **HSR service can broaden regional labor markets.** Expanding the distances that people can travel in a two- to three-hour trip provides businesses with access to more workers with specialized skills, while skilled workers can access employers with more specialized needs. These expanded markets offer important new opportunities, especially in an era of flexible work schedules where daily commutes are not required.

- **High speed rail service can support the growth of technology clusters.** High speed rail service also provides unique opportunities to support the development of technology clusters by enhanced day-trip links between research and development centers, university research centers and sites where advanced products are produced. In Chicago, high speed trains will enhance linkages between local research centers (focusing on energy, physics and biotechnology) and other technology R&D centers in Madison, Champaign/Urbana and Peoria. Most important, HSR service will link Chicago's global business and financial services to each of the metropolitan areas connected by HSR service.

- **HSR service can help drive higher-density, mixed-use development at train stations.** In Chicago, the Central Area Action Plan calls for development of new office development enabled by a coordinated strategy of local transit, HSR and airport express connectors.

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[1] GRP is equal to the value added by all business and industries in a region. It is the difference between final business sales (production) in a region and value of all intermediate goods and services (inputs) consumed by businesses in creating these final sales.

- **HSR service also expands visitor markets and generates additional visitor spending**. A portion of these visitors are local residents traveling to outside locations. Another portion are outsiders who already come to Chicago via other modes (car or airplane) but will shift to use of new high speed trains. A remaining portion represents new tourism, conference and business trips to the Chicago metropolitan area. These travelers will generate new spending at local hotels, restaurants and retail stores.

These effects are typically concentrated near stations located in downtown or other urban business districts. However, for large metropolitan areas, like Chicago, these impacts also tend to be distributed over the entire metropolitan region through the access provided by supporting transportation infrastructure such as commuter rail, transit and even the automobile. HSR service to O'Hare airport will also support greater interconnections between the Midwest's largest international airport and each of the metropolitan areas served by the HSR system and its feeder services. This is especially important for those smaller and mid-sized cities that currently have infrequent or no direct air passenger service to O'Hare.

There are a number of "mechanisms" through which HSR service produces positive economic impacts. HSR service can increase business productivity through travel-efficiency gains. Travel efficiency can come from four sources: (1) time and cost savings in travel time for those who can now use HSR service, (2) time and cost savings for car and truck travelers who benefit from reduced road congestion, (3) time and cost savings for airport users who benefit from reduced air delays due to congestion at airports and their access routes, and (4) additional benefits for travelers without car access who are now able to travel to places that were previously unavailable options for them. All four are considered benefits to society. However, they will affect income generated in the economy only if they translate into productivity gains through cost-savings or output increases for businesses.

This report also highlights other non-economic benefits that are difficult to quantify, but that will contribute to the overall sustainability, desirability and quality of life in the Chicago metropolitan region.

8.1 Economic Impacts

In this study, we have examined only those economic impacts for Chicago that are attributable to Chicago-based trips (travel to or from the metropolitan area) and the effects that the creation of new jobs and new spending have on the region's economy. Therefore, the ridership estimates, presented in section 7, and the factors affecting these estimates have an important influence on the overall impacts of HSR on the metropolitan area's economy.

The overall economic impact of planned high speed rail service is defined as the impact on economic growth at the metropolitan level. These impacts are calculated to reflect the net total impact of changes in productivity, visitors, labor markets and other business, and research and technology connections enabled by high speed service. These economic impacts represent additional economic activity occurring locally that would not have occurred without high speed rail service. High speed trains will have both temporary impacts during the construction period and permanent impacts after service commences. The analysis shown here examined only permanent impacts, which will gradually build as population, travel demand and service performance levels all increase over time.

Table 4 demonstrates the total economic impacts for the Chicago metropolitan area, which include the indirect and induced (economic multiplier) effects. For the 220-mph scenario, approximately 21.2 million out of the 43.6 million total estimated (one-way) riders are involved in a trip to or from Chicago. For the 150-mph service scenario, 16.7 million of the nearly 35.1 million annual riders are Chicago-based.

Table 4. Estimated Annual Total Economic Impacts of Chicago-based HSR Service in 2030

Measure	**Unit**	**150-mph Service**	**220-mph Service**
2030 Employment	Jobs	58,049	103,610
2030 Output (business sales)	$billion per year	$7.6	$13.8
2030 Value-Added (GRP)	$billion per year	$4.3	$7.8
2030 Wages	$billion per year	$3.0	$5.5

Source: EDR Group, Inc. TREDIS model analysis.

The majority (approximately 62.9 percent) of the new jobs associated with 220-mph HSR service are attributable to the improved market access that HSR provides to existing firms in the metropolitan area, as well as new firms that would be attracted as a result of the HSR option. Travel time and cost savings for the Chicago-based ridership on a 220-mph system accounts for approximately 27.1 percent of the total new jobs.

In Cook County, commercial development related to the three proposed station areas is expected to support 18,500 professional and service jobs for the 220-mph service and 8,900 jobs for the 150-mph service. These estimates are based on improved market access effects and their effects on development potential associated with the properties surrounding each of the station areas (including the Chicago Union Station Central Area Plan).

The economic impacts attributable to new visitors result in between $107.3 million and $157.8 million in spending from the riders on 150-mph and 220-mph services, respectively. These are visitors who would not otherwise have traveled to the metropolitan area.[2] An estimated $122.5 million to $156.3 million will be spent by visitors who would have traveled to other locations in the metropolitan area, but now pass through or are employed near the proposed HSR stations. Combined visitor spending of $229.8 million to $314.1 million for both business and leisure travel supports approximately 4,410 to 6,000 jobs in downtown Chicago and the three metropolitan area HSR station areas, inclusive of multiplier effects.

8.2 Other Economic Impacts and Reasons for Building HSR

Aside from speed, HSR service has a number of other attributes that make it attractive to customers and make it a strong contributor to the overall transportation system. HSR systems are exceptionally dependable. Trains run when scheduled, and there are generally no delays. Unlike air and auto modes that can be subject to weather delays, high-speed trains operate reliably in all weather conditions. Congestion is not a problem, since the trains run on their own tracks. This means that travel times are more predictable via rail, where auto or air travel is frequently subject to unexpected delays. As a result, rail travelers can plan their trips by the schedule, confident that they do not need to include extra time.

As noted above, the short-term economic impacts of construction, and the region-wide economic consequences of supplying materials, equipment and labor to operate, maintain and supply equipment (rail cars, signalization and long-term maintenance of the tracks and right-of-way) have not been included in this analysis. Phasing of construction, the amount of materials, labor and equipment to be supplied over time, and the specific operating requirements of each HSR corridor need to be better determined before these kinds of assessments can be completed. However, each of these effects and the benefits that they will bring to households (through increased employment opportunities) and businesses (through increased sales) will add significantly to the overall economic benefits provided by constructing the proposed HSR systems.

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[2] Estimates are derived from induced ridership representing 7.1% (150 mph) to 8.7% (220 mph) of the total ridership estimate. New spending accounts for the differences between business and leisure travelers and is based on the recent spending patterns for these two groups.

Once the rail system is installed, capacity can be increased by adding cars to specific trains or by adding more frequent train departures. Though this study has assumed half-hourly peak-hour headways, high-speed trains can operate at closer intervals to provide additional capacity or to accommodate long-term ridership growth. To maintain higher capacities over a longer period, vehicles will need to be added to the fleet, but expansion would not necessarily require any change to the tracks or stations.

Passengers are able to walk around and have room to work while on board the train. This is a significant benefit for business travelers, and changes their perception of travel time as well as their productivity while traveling. Instead of being wasted time, travel can be a productive part of the business traveler's day.

HSR benefits non-travelers as well. Since it is powered electrically, it has the potential to be carbon neutral, depending on the ultimate electricity source. Compared to freeways and airports, HSR fits in a relatively small footprint, and can be integrated into dense urban areas without disrupting walkability. HSR stations encourage compact, high-density development, which make more efficient use of infrastructure and energy.

9.0 Capital Cost

For a true HSR network in the four corridors described in this study, an order-of-magnitude estimate of capital costs at a preliminary planning level have been assembled. A summary of the capital investment by corridor is provided in Table 5. On a limited basis in constrained urban areas, existing tracks may be upgraded for HSR use, but the overwhelming majority of the HSR network would require new trackway and structures to accommodate greater frequency and speed of service. For a network supporting 220-mph speeds and greater, $84 billion (2010 dollars) in capital costs are estimated, with unit costs based on recent U.S. HSR and electrified rail planning studies.

Constructing a 150-mph system would cost nearly as much as a 220-mph system. New trackway and structures along nearly the entire network would be required to support either 220- or 150-mph speeds, but less stringent alignment criteria, lower traction power demand and reduced track design requirements would allow some cost reductions to be realized for the 150-mph system. With these discounts considered, $75 billion (2010 dollars) in capital costs are estimated for a 150-mph network. The marginally higher costs for a 220-mph network (11.9%) would be offset by significantly higher ridership (24.5%) and even greater annual revenues (29.3%).

Table 5: Infrastructure Capital Cost Summary

Corridor	HSR – 150 / 220-mph		
	Miles	Project Cost $-Billions (2010)	
		150-mph	220-mph
CHICAGO – MINNEAPOLIS / ST. PAUL	442	25.7	28.6
CHICAGO – ST. LOUIS[1]	311	14.1	15.9
CHICAGO – CINCINNATI[2]	284	12.6	14.2
CHICAGO – DETROIT CHICAGO – CLEVELAND	420	23.8	26.5
CHICAGO TERMINAL STATION	–	0.450	0.475
SYSTEM TOTALS[3]	1,430	74.7	83.6

Notes:
[1] Figures include route overlap from West Loop to Grand Crossing
[2] Figures include route overlap from West Loop to Gary
[3] Totals exclude route overlap
Source: AECOM 2011.

It is important to consider that very large investments in airports and freeways would be needed to accommodate all of this travel by air or auto. In essence, the reason to build the higher speed rail network is to avoid the need for very large expenditures in modes that already have demonstrated that they are at or near the physical limits needed to expand their capacity. Unlike HSR, there are no comparable costs available for either of these modes that provide an equivalent level of service or provide the kind of accessibility to a range of cities and metropolitan areas that are comparable to HSR. Moreover, we already know that both air and auto modes – being highly dependent on fossil fuels, use the increasingly costly energy resources inefficiently, and generate enormous quantities of greenhouse gasses. Coupling the energy efficiencies with land use benefits, HSR options provide the foundations for a major sustainability strategy that can be funded by shifting the government investments in transportation none of which have a direct pay back to the government, and all of which help support the private sector economy.

It should be reiterated that development of a HSR network will produce significant new revenues and jobs, which will permanently contribute to the tax base of these communities. The proposed 220-mph HSR system will produce $13.8 billion in new business sales <u>every year</u> and 104,000 permanent new jobs when it is in full operation. Over the 30-year operating life of the initial system investments, the total value of business sales and wages derived from the new jobs will be the equivalent of $295.9 billion in sales and $117.9 billion in wages. These new jobs and business opportunities will support and enhance the Chicago metropolitan area's global competitiveness and help Chicagoland maintain its preeminence as a global center of business, finance, technology and education.

10.0 Phasing

The following would be the key steps to incrementally develop a Midwest HSR system:

<u>Near Term</u>

- Implement improvements to resolve rail/rail bottlenecks within the Chicago metropolitan area
- Implement 79/90/110-mph services identified in the MWRRI
- Resolve track capacity issues affecting access to Chicago Union Station (CUS) and address capacity needs at CUS to accommodate MWRRI traffic levels with anticipated growth in Metra traffic

<u>Intermediate Term</u>

- Determine and plan for additional dedicated HSR trackage capable of up to 125-mph service along identified access routes paralleling Metra lines in the Chicago metropolitan area
- Expand and improve CUS; confirm site location and alignment needed to serve the West Loop Transportation Center along with supportive transportation improvements in the Central Area Plan
- Confirm site location and alignments needed to provide overnight storage and train turnback for Chicago terminating services (such as an O'Hare West station and new storage yard near downtown)
- Identify candidate sites for a central HMF within the Chicago metropolitan area
- Develop dedicated HSR corridors to support 150 to 220-mph service connecting metropolitan areas; prioritize factors such as cost, potential ridership and travel time savings/modal substitution
- Introduce 220-mph equipment along a demonstration corridor

<u>Long Term</u>

- Build out the system by implementing other HSR segments not included in the Intermediate Term Plan
- Upgrade service with the introduction of 220-mph service along other corridors where attainable given alignment constraints and warranted by travel time benefits and modal substitution.

11.0 HSR Development Checklist

This section is a "checklist" of key considerations to address at the beginning of the HSR planning and project development process. The checklist is a series of key questions, which have been addressed in the study, and can be applied by other metropolitan areas contemplating introduction of true HSR service.

11.1 Which Outlying Major Metropolitan Areas will be the Endpoints of HSR Corridors?

Four corridors surrounding Chicago are appropriate for eventual upgrade to true HSR service operating at speeds comparable to existing and proposed services in Europe and Asia:

- Minneapolis / St. Paul
- St. Louis
- Cincinnati
- Detroit/Cleveland

This network would be complemented by other lines operating at 79/90/110-mph, which would add service to other major destinations including Omaha, Kansas City and other points in Wisconsin, Illinois and Michigan.

11.2 Where Will the Downtown HSR Station be Located?

The City of Chicago has identified Chicago Union Station (CUS) as the transportation hub where both regional and long-distance trains would serve the Central Area. Union Station is the major hub for existing commuter services, and the city is planning major new development in the vicinity of the station along with significant improvements to connectivity and access. As noted, a new West Loop HSR station adjacent to CUS may be required, or substantial improvements, yet to be identified, would need to be provided to CUS. This study focuses on the Chicago hub, illustrating the considerations involved with a downtown HSR station. Locations of HSR stations in other cities have been identified, but require further study and analysis.

11.3 How Should Chicago's Existing Rail Terminal be Upgraded to Accommodate HSR?

CUS is a back-to-back stub end terminal with a single through track, and currently serves six Metra lines and 56 daily Amtrak long-haul trains. The combined impact of the MWRRI service expansion, along with potential Metra service increases, are expected to exceed the capacity of the existing facility; therefore improvements would be needed even without inclusion of true HSR. A promising long-term solution for true HSR would be to implement the West Loop Transportation Center or significantly reconfigure the existing CUS complex to expand track and passenger capacity.

11.4 How Would the Potential for Through Trains be Accommodated in Chicago?

Chicago has been the rail crossroads of the United States for more than a century; with Chicago positioned strategically near the southern end of Lake Michigan, many of the lines from the east funnel through the metro area and lines to the north, west and south converge here as well. As Chicago is also the largest metropolitan area in the Midwest region, it is unlikely that through trains would bypass the central area of the city. A four-spoke HSR network, with three lines branching to the south and east and one line heading north to O'Hare International Airport, would allow interlining of trains from the south and east with service to the north stopping at O'Hare and/or Milwaukee and/or St. Paul/Minneapolis.

11.5 What Access Improvements Should be Provided at the HSR Hub Station?

A number of pedestrian, rail transit and fixed guideway improvements have been identified to connect the West Loop Transportation Center/Chicago Union Station with other destinations in downtown Chicago:

- A new north-south CTA subway line under Clinton Street adjacent to Union Station
- A direct connection to the proposed east-west transitway which would connect to Michigan Avenue and a proposed downtown circulator transit system
- An underground pedestrian concourse along Clinton Street that would provide a sheltered walk to existing CTA rail stations at Congress Parkway and at Lake Street for HSR passengers.

11.6 What Connectivity Should be Provided for HSR Service in the Metropolitan Area?

Well-coordinated intercity feeder service is an essential component of a HSR system to expand its range. The MWRRI identified services in six corridors, operating at speeds up to 110-mph, which could provide connections to the HSR network at the Chicago hub:

- Chicago – Omaha (79/90-mph)
- Chicago – Quincy (90-mph)
- Chicago – Bloomington/Normal – Springfield (110-mph)
- Chicago – Kalamazoo – Detroit – Pontiac (110-mph)
- Chicago – Port Huron (79/110-mph)
- Chicago – Grand Rapids – Holland (79/110-mph)

The Chicago metropolitan area has a robust commuter rail network that would provide feeder service to the HSR system. The following HSR stations were identified in the metropolitan area:

- West Loop Transportation Center / Chicago Union Station
- Lake Cook Metra Station
- O'Hare International Airport
- Hyde Park (55th, 59th or 63rd Street Metra Station)
- Southwest Intermodal (Harvey Metra or Homewood)
- Southeast Intermodal (Gary Metro Center South Shore Station)

11.7 How Can We Make Short-Term Changes to Accommodate Emerging HSR?

The City of Chicago, working in conjunction with U.S. DOT, the State of Illinois, Metra, Amtrak and the nation's freight railroads is pursuing the Chicago Region Environmental and Transportation Efficiency Program (CREATE). CREATE includes a number of strategically-located rail / rail grade separations intended to significantly reduce rail conflicts.

Development of the MWRRI for emerging HSR service is expected to increase long distance passenger traffic entering CUS, especially from the south. One possible solution, shown in Figure 14, would be to shift passenger traffic converging from the south and east over to the two lakefront tracks paralleling the Metra Electric division, with a new connection at the "Grand Crossing" location on the near south side. Passenger traffic could potentially be routed to CUS via the east-west "St. Charles Air Line" segment located between 15th Street and 16th Street, immediately north of McCormick Place. This shift would essentially result in a passenger-only railroad section between CUS and Grand Crossing, which could be upgraded to provide service at speeds of up to 125-mph.

Where the strategy of physical separation of passenger and freight services and consolidation of operations in separate corridors may not be possible, temporal separation of passenger and freight services may still remain an option. Under such schemes, daytime capacity would be reserved for passenger trains, leaving nighttime hours for exclusive freight use.

11.8 How Will HSR Access to the Downtown Terminal be Accommodated?

Current Amtrak intercity service to Chicago operates over lines shared with varying levels of freight, as do some of the Metra commuter services. As noted above, creating dedicated passenger trackage along the lakefront could help resolve conflicts with freight service. This strategy could be expanded to include a new, dedicated HSR approach (separate from Metra lines) connecting to a future, dedicated HSR terminal at the West Loop Transportation Center or expanded Chicago Union Station. A dedicated HSR track would also solve the need to bypass more than two dozen Metra stops along the Metra Electric corridor. With separate HSR trackage connecting to the West Loop Transportation Center/CUS the existing at-grade crossing of the "St. Charles Air Line" trackage and Metra Rock Island District tracks east of the Chicago River could be eliminated as well.

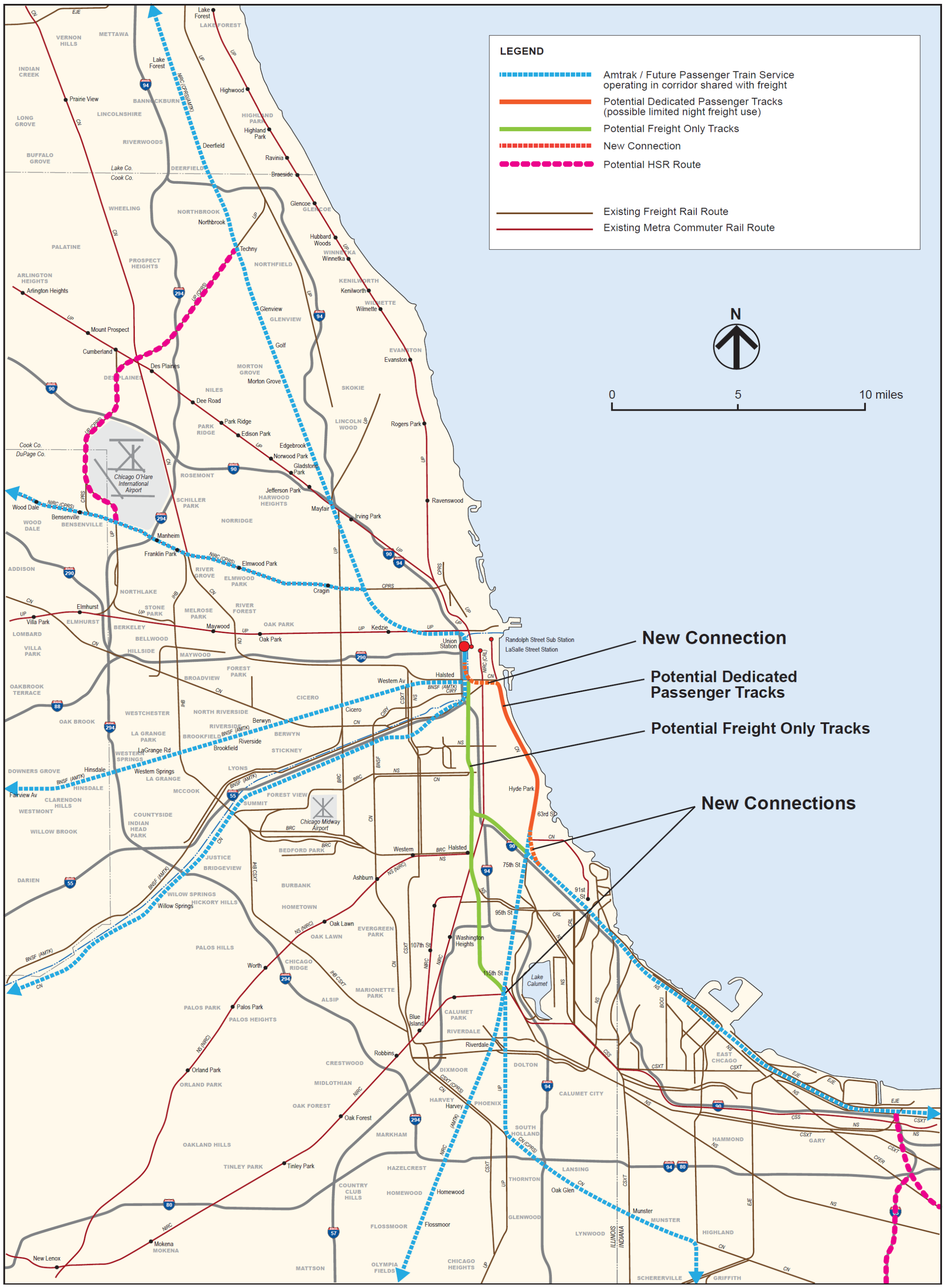

Figure 14: Integration of 220-mph with 110-mph Service for Chicago Union Station Passenger Traffic Access

Source: AECOM, 2011

12.0 Guidance for Other Cities, States and Metropolitan Regions

Based upon this Chicago and Midwest HSR study, the following guiding principles have been identified for jurisdictions wishing to develop a HSR system.

12.1 System Planning

One of the first choices to be made in establishing a HSR system is determining the desired routes for services. Issues which were identified and considered in the Chicago / Midwest study include:

- Identification of Terminals and Intermediate Stops – One consideration is linking the largest urban areas with service to the city centers where good connections to transit feeder services can be provided and where some principal destinations are within walking distance. Selecting intermediate stations requires balancing the choice to serve additional communities with the need to minimize the number of stops and to keep the stops adequately spaced so trains can operate at cruising speed for much of the trip. Keeping routes as straight as possible results in faster overall travel times, however in some circumstances, the speed of the service allows for route deviations to serve major intermediate points without unacceptable impact to travel times between terminal locations.
- Determining Speed of Service – The speed of service should be fast enough to provide reasonable alternative travel times with auto and/or short-haul Midwest intercity air depending upon the market objectives of the system. For example, on the approximate 90-mile reach between Chicago and Milwaukee, 220-mph service is not required to attain the threshold of travel time savings needed to attain high levels of ridership; the 110-mph service proposed in the MWRRI with a travel time of one hour and eight minutes easily exceeds typical auto travel times of one hour and forty-five minutes to two hours even without peak period highway congestion. On the other hand, between Chicago and Minneapolis/St. Paul, the 110-mph service proposed in the MWRRI provides a travel time of six hours and twenty-nine minutes; although this is approximately one hour faster than driving, it does not offer a reasonable opportunity to provide feeder service for air travel.
- Identification of Alignments – Three distinct alignment types were evaluated in this study:
  - 110-mph Emerging HSR: Where stations are closely spaced, 110-mph service using corridors shared with freight may provide a cost-effective solution especially if the cost of track and signal upgrades is moderate. However, unless freight traffic is very limited or can be reduced by shifting some freight trains to alternate routes, it will be difficult to accommodate robust passenger schedules. The presence of extensive commuter rail service using conventional equipment likewise limits the ability to operate 110-mph on existing commuter lines during peak periods.
  - 150-mph HSR: Operation at this speed requires elimination of all grade crossings, which in turn, may require a new rail alignment especially in dense areas where it may not be possible to wholesale grade separate and/or close all existing road crossings. Therefore, the alignment strategy may be to look for fitting dedicated HSR tracks within a shared rail corridor, using an abandoned railroad corridor, following a freeway or developing a new corridor. The approximate 10,000-foot radius required to maintain top speed may require that the HSR tracks follow a separate route at locations where an existing alignment is not straight.
  - 220+ -mph HSR: At speeds of 220-mph and higher, very long radius curves are required (e.g., more than 5 miles radius at 250-mph). With such radius requirements, it is impractical to closely follow most existing railroad or freeway corridors. As a result, following an existing transportation corridor involves following straight sections, where available, and providing sweeping bends to re-orient back to a tangent section.
- Frequency of Service / Clockface Scheduling – A minimum of hourly service all day long with 30-minute headways during peak periods is recommended in each corridor to provide door-to-door travel times that

are reasonable substitutes for air service (flights are available at this level of frequency between Chicago and the endpoint cities) and with auto (which is available on demand). A train each hour is necessary to meet the needs of the business traveler; for example, if a meeting goes longer than expected, the average wait time for a return train would be one half hour, given hourly service. Such a system will also support the possibility of combining HSR service with scheduled international/long-haul air service by providing feeder services, thereby simultaneously serving the short-haul air markets and freeing gate capacity at O'Hare. If train schedules are less frequent or irregular, passengers are tied to the schedule, limiting travel flexibility, precluding reliable air connections and introducing inordinate waiting times. Where feasible, schedules should incorporate "clockface" departures (e.g. on the hour, half hour, or 15 / 45 minutes after the hour) from key intermediate destinations to maximize passenger convenience.

12.2 Suitability of Existing/Abandoned Railroad Corridors

Existing and/or abandoned railroad corridors may or may not be suitable for HSR and land acquisition and/or easement costs would typically be involved. As described previously, shared track/110-mph corridors where freight traffic levels are low (e.g. less than a dozen trains per day) may support moderate levels of emerging HSR service with relatively low investment. As previously noted, ETCS or a similar system may be very beneficial in allowing HSR to be implemented on shared corridors with low traffic levels. For true HSR operating at 150-mph or 220+ -mph, full-grade separation is required, so the benefit of existing corridors is primarily use of the right-of-way. HSR on an elevated structure can fit within a typical 100-foot wide active rail right-of-way, provided the alignment is straight. Even if there are no active standard rail tracks (or if the right-of-way is surplus or abandoned), the requirement for full grade separation means that the HSR alignment will generally be on an embankment or aerial structure in urban areas.

A key issue regarding suitability of existing corridors is the adjacent land use in urban and suburban areas. In the event the existing rail right-of-way passes through cities within an industrial zone, HSR could potentially operate close to the maximum effective operating speed. The presence of adjacent residential uses or other uses sensitive to noise and vibration may result in operation at reduced speeds or providing an alternate route or bypass around such areas.

12.3 Regional Connectivity

Well-coordinated regional rail and bus feeder service is an essential component of an HSR system to expand its range. Feeder service allows passengers to access HSR and reach their final destination via public transportation. For cities and towns that are either too small to support rail service or difficult to serve via existing rail corridors, dedicated feeder bus service would be provided. Rail and bus feeders would be scheduled to meet HSR trains, providing a convenient transfer. Depending on market size, feeder routes could meet every HSR train, or perhaps every second, third or fourth train.

Where connections are convenient, HSR has the potential to substitute for other modes providing access to airports in its service area. This ability raises the question of whether the HSR service should include a station at the major airport in each metropolitan area it serves. The answer is usually yes, if the following conditions apply:

- The airport has flights that serve national and international destinations beyond the range of HSR
- It is possible to serve the airport without a major deviation in the HSR route alignment
- The existing airport-area land use is compatible with the HSR customer base

12.4 Stations and Land Use

Stations should be optimized as intermodal transportation hubs between HSR and urban transportation modes including subways, light rail, buses, taxis and auto. Urban design should cater to the "last mile" of the passenger's journey by managing the flow of pedestrian traffic and creating a continuum with the urban fabric. When considering station locations, it should be noted that HSR services require long platforms and long "throat" areas for switching trains between platforms, which are difficult to fit within the highest density areas of an urban core. As a result, the more feasible station location is often adjacent to, but not directly within, the center of the downtown area.

Areas adjacent to HSR stations have a strong potential for high-density development and high intensity employment. In the area within a 5-minute walk of the station, there is potential for 3.5 million square feet of development at a 1.0 floor area ratio (FAR). In dense urban areas a FAR of 4.0 or more is attainable.

12.5 Maintenance and Storage Facilities

The HSR network would require a Heavy Maintenance Facility (HMF) capable of performing the most demanding, time consuming, and costly repairs and refurbishment, as well as overnight vehicle storage areas where light maintenance could be performed. In general, it would be desirable to have the HMF situated near the heart of the system to minimize average access distance and time. Overnight storage and light maintenance would be desirably located at or within a few miles of terminal stations.

12.6 Potential Incremental Upgrade Strategy for HSR Corridors

The MWRRI plan proposes increasing the frequency and speed of existing Amtrak routes running on existing freight tracks. While the higher speed envisioned in the MWRRI plan could make intercity rail competitive with the automobile for trips between select Midwest city centers, it may be difficult to support more frequent passenger operations using trackage shared with freight trains. Passenger trains would operate at nearly twice the speed of fast freight trains, and they would be more frequent than current service. This would create a number of challenges, chief among them the larger "schedule windows" required for passenger service that would reduce the amount of "track time" available for freight service. The operation of freight and passenger trains at substantially different speeds on the same line results in trade-offs between capacity and schedule reliability. Dedicated passenger tracks may therefore be required to serve, for example, hourly passenger service – even at 110-mph.

Developments in signaling, train control and protection technology have the potential to facilitate shared operations in the future. In North America, Positive Train Control (PTC) is currently in the design phase and will incorporate automatic cab signaling and other systems to monitor and control train movements. A similar system, the European Train Control System (ETCS) has been implemented in mixed freight/passenger applications in Europe and is designed to support short headways. A system that could integrate both PTC and ETCS would be beneficial for the situation in the Midwest, with its high-rail traffic densities and mixed freight and passenger operations.

A 150-mph or 220+ -mph system could potentially be phased in over time with the building blocks consisting not only of specific segments from point-to-point, but also progressive upgrades to specific segments so that investments over many years could be used to develop a comprehensive network. It was beyond the scope of this study to suggest a specific phasing plan for the Midwest HSR system; however, given the need to build or improve most routes from end-to-end, there are two alternative approaches:

1) Similar to the European model, develop long intercity links in the early phases, or,
2) Develop shorter links providing access to the central city core areas first.

Rural segments can be built with more at-grade sections resulting in lower costs per mile. Rural segments also have fewer alignment constraints and can be operated at higher speeds thereby yielding large time savings. However, access to metropolitan areas and central business districts still needs to be provided to have a complete system. On the other hand, construction of new electrified passenger links within metro areas not only provides access to downtown locations but can also support "regional overlay" services; e.g., trains with lower top speeds stopping at additional stops between the principal HSR stations serving a combination of commuters and intercity travelers. Provision of overlay services presumes that the financial resources are available to develop these routes, which may have very high per-mile costs as well as costly terminals.

Because few U.S. cities have a well developed passenger network serving the core and there are few existing electrified lines, implementation of HSR in the United States will need to depart from the European model and include construction of new lines to penetrate metro areas and access urban cores, while at the same time still providing high speed intercity sections.

There are a number of strategies that can be used to phase HSR investments, depending on the configuration of the network:

- Prioritize short intercity "Minimum Operating Segments" – although short intercity segments will not yield time savings as high as long rural links, such segments can be put into service with a lower total investment, generating substantial ridership if market conditions are positive. For example, a short interstate link between Chicago and Milwaukee could be developed in anticipation of ultimate Twin Cities service.
- Prioritize routes providing core access for multiple lines – where the network is dense and multiple lines can operate over common trackage, early construction of shared routes will increase the cost-effectiveness of the investment. For example, a segment between Chicago and Champaign would support Cincinnati and Cleveland/Detroit service in the Chicago Metropolitan area, and could potentially branch east towards Indianapolis as well as west to St. Louis.
- Convert low-traffic freight lines to passenger service – provided the alignment is suitable for passenger service and where freight traffic is low enough to be shifted to other lines or operated at night, existing lines can be upgraded by providing grade separations and electrification to support HSR. For example, Chicago's lakefront has two freight tracks that could be converted to provide HSR access to downtown Chicago.
- Consider "stopping short" – where existing metro-area services can provide frequent and timely access to final destinations and construction of the full route may require a very large investment, or where the full route includes a "back leg" extending beyond a first metro-area HSR stop, phased construction can be used to reduce the cost of the first phase. For example, St. Paul could serve as an interim terminal for Twin Cities service.
- Consider interim or alternative CBD stations – rather than constructing an entirely new downtown terminal, it may be possible to add capacity to an existing station or provide a new platform and tracks adjacent to an existing depot, allowing existing facilities and intermodal connections to be shared. For instance, it may be possible to construct a lower-cost interim station near the old post office in Chicago before a new HSR terminal at the preferred location can be funded.

In addition to phasing various sections and stations as noted above, it also may be possible to phase successive improvements into a corridor over time such that an existing passenger service operating on a line shared with freight traffic can be upgraded first to higher-speed regional service and ultimately to HSR, as shown in Figure 15:

- Phase 1: Shared Track – This is the typical existing condition with standard passenger service sharing a freight track. Typical operating speeds are 60 mph for fast freight and 79 mph for passenger operations.
- Phase 2: Shared Corridor – An initial investment in a separate passenger track can allow operation of a higher number of passenger trains independent of the freight traffic level.
- Phase 3: Emerging HSR – Provision of two fully separate passenger tracks can allow operation at speeds of 110 mph through grade crossings; as the passenger traffic is separate from freight traffic, lightweight equipment can be used for faster acceleration and lower fuel consumption.
- Phase 4: HSR – All grade crossings can be eliminated to allow passenger trains to operate at speeds of 125 mph, even with diesel-electric propulsion.
- Phase 5: Electrified HSR – Converting to electric propulsion allows for operation at speeds of 150 to 250 mph, depending on track curvature.

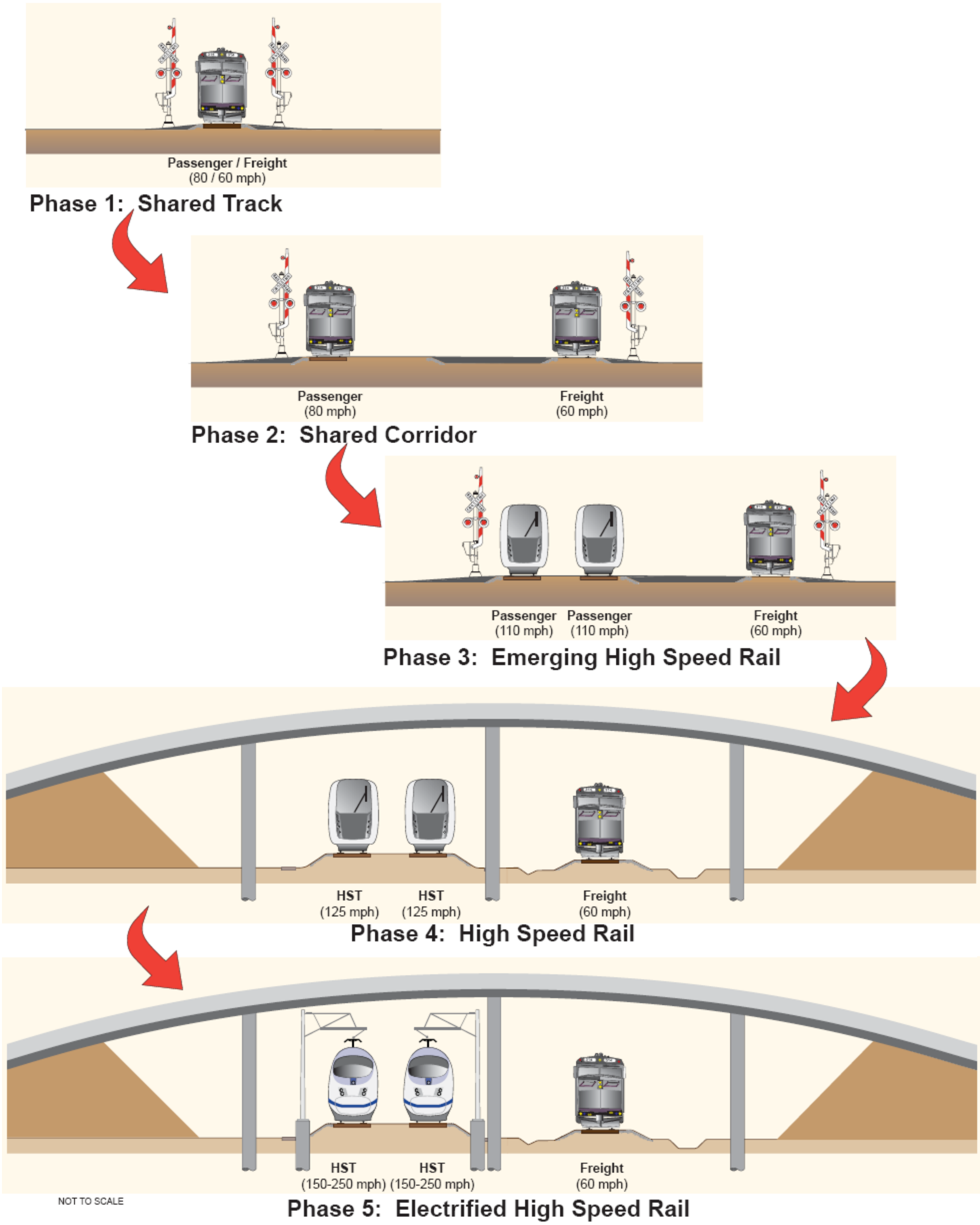

Figure 15: Potential Incremental Upgrade Strategy

Source: AECOM, 2011.

13.0 Summary and Conclusions

HSR has economic benefits that support and enhance the Chicago metropolitan area's global competitiveness and will help Chicagoland maintain its preeminence as a global center of business, finance, technology and education. By adding over 104,000 new jobs representing $117.9 billion in wages over 30 years, and stimulating $13.8 billion in annual business sales ($295.6 billion over 30 years) just for the Chicago metropolitan region, HSR will significantly contribute to long-term growth of Chicagoland. The economic benefits for other major metropolitan regions and cities served by the HSR system and regional HSR systems planned to support the HSR system have yet to be determined. Nevertheless, creating a true HSR system for the Midwest is a daunting endeavor because of alignment and station placement issues. But, it can and should be approached in phases, which allow the system to gain ridership and revenues, while it creates enough market share and economic benefit for the region to move from shared track to shared corridor and eventually to electrified HSR with speeds of 150- to 250-mph.

There are five important findings that summarize the work done in this study:

1. Preliminary design of HSR systems for the Midwest region shows that it is feasible to connect nine of the major metropolitan regions within 450 miles with HSR service that will provide travel times of between 2 and 3 hours to Chicago.

2. Ridership of up to 43 million passengers on these HSR corridors will generate over $2 billion dollars in annual revenues and support up to 25 trains per day on each line.

3. Riders will be able to access Chicago metropolitan area stations, O'Hare airport, and other cities and metropolitan areas throughout the Midwest region.

4. Realistic costs and phasing for developing each of these HSR services is possible, and well within the range of feasibility to warrant a serious examination of financing that involves both public and private investment.

5. The economic impacts of job creation and business sales ($295.6 billion) for the Chicago metropolitan region alone far exceed the costs of building the entire system ($83.6 billion). When these same effects are evaluated for each of the other cities that will be connected by the HSR system, the evidence of the transformative power of a true HSR system will be even more powerful.

Three key conclusions can be drawn from this study:

- **High-speed intercity rail service will create significant economic development opportunities for the Chicago metropolitan area.** Jobs, wages, business sales and value added will increase significantly with the introduction of HSR services. The size of these impacts will depend on the speeds, frequencies and city pairs served. However, the results point to an unambiguous increase in economic payback as travel times between city pairs approach two to three hours. For Chicago, HSR service will improve access to labor markets and will consolidate higher-end business, financial and cultural/tourism services. It will expand the labor pool to a larger, highly skilled and more diverse population, thereby helping Chicago to excel in a more globally competitive world.

- **High-speed train services facilitate and optimize development plans, especially the higher-density mixed-use development advanced by the Central Area Action Plan, which calls for development of new office development enabled by a coordinated strategy of local transit, HSR and airport express connectors.** The ultimate impacts on both local development and regional economic growth are highly dependent on the effectiveness of connections between HSR stations and the surrounding area, taking into account the specifics of local connections, schedule frequency, pricing and station design. In Chicago, where existing rail lines will be used, at least initially, service upgrades in the form of speed and schedule improvements are expected to occur in stages, with ultimate service levels still under discussion. These decisions will have important implications for the economic impacts of commuter, business and tourism trips, since the connectivity provided at these downtown stations will affect travel times and may thus mean the difference between city pairs being inside or outside of the threshold of acceptable schedules for day trips. These decisions will also enable local transportation and business-investment plans to be refined so that they can most effectively leverage opportunities for economic development associated with improving connections between cities, airports and tourism venues.

- **Potential economic development impacts need to be placed in perspective.** Economic development impacts should be viewed in a broader context that acknowledges how the economy is changing. The development of information and communication technologies, together with changes in both domestic and international trade as well as highly competitive technology-, finance- and service-based industries, are continuing to grow national and global markets and supply chains. That in turn, is dramatically increasing needs for interaction between people and firms across distances. As a result, while telecommuting and internet conferencing are growing, long-term trends (beyond the current economic slowdown) also show growth of long distance professional travel, tourism and convention business in major cities, and the explosion of airplanes and urban delivery vehicles servicing overnight parcels. The development of new technology clusters and their need for professional interaction is also creating new travel demand patterns. All of these trends are adding to traffic growth and affecting the potential impacts that high speed trains can have on local and regional economies.

The potential to change the face of the Chicago region is real and significant. Each of the cities connected to the Chicago metropolitan area are also likely to benefit significantly from these investments. In addressing specific plans and approaches that the Chicago metropolitan area might use to implement a HSR development plan, this study has laid out a roadmap of ways that each of the cities and metropolitan areas connected to Chicago by the HSR system can capture value from the HSR system. However, the economic impacts for the other major metropolitan areas and smaller cities have yet to be estimated. The cumulative effects of HSR on the entire Midwest, using the Chicago study as a preview, will be transformative and could serve as the catalyst so urgently needed to propel the Midwest into the forefront of a globally competitive world.

This study represents the first step in a process of planning for the future of HSR for the Midwest. The time is right for taking the next steps in the process of planning, designing, financing and developing a workable, phased and financially feasible HSR system that will place the region in the forefront of a globally competitive and economically thriving new economic future.

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