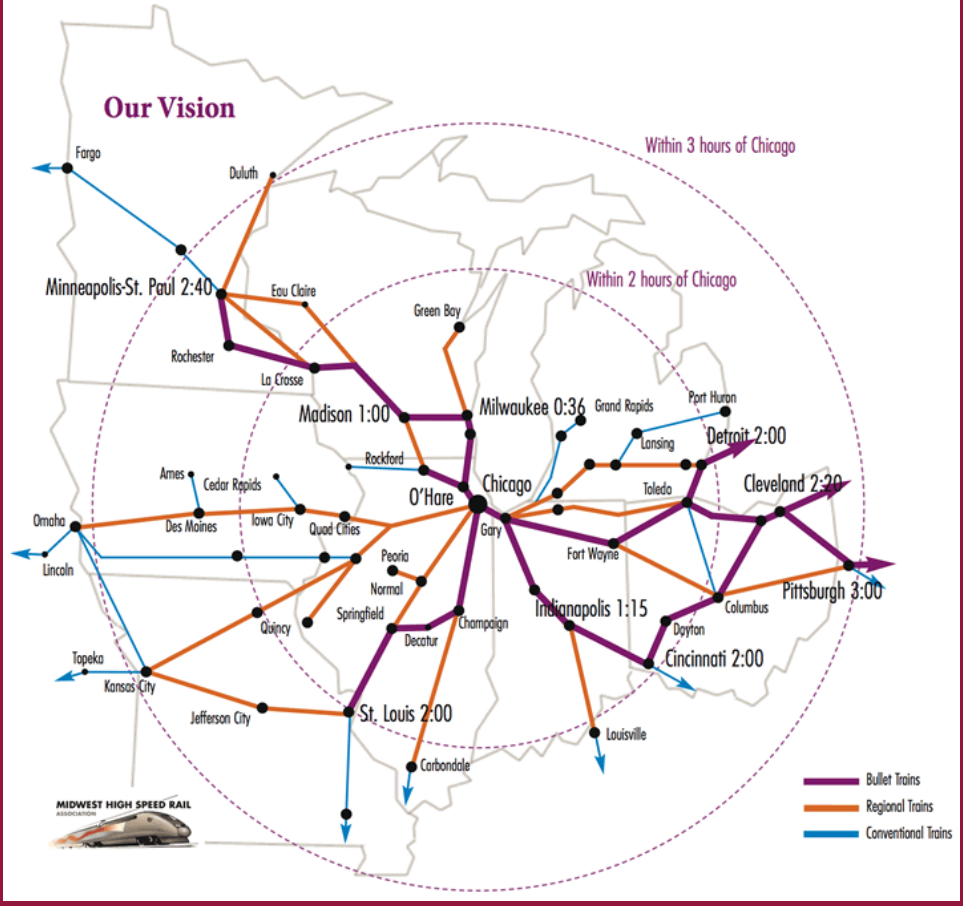
Midwest Network
220 mph High Speed Rail
Network Benefits Study



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Executive Summary

TranSystems was commissioned by the Midwest High Speed Rail Association to estimate the economic and environmental benefits of a four-spoke, 220-mph Core Express (HSR) system hubbed at Chicago with routes to Minneapolis, Detroit, Cleveland, Cincinnati, St. Louis, and intermediate cities.

This study builds upon the work of a study conducted by AECOM and the Economic Development Research Group (ERDG). The thrust of this study is to investigate the economic and environmental benefits of the system on each corridor, including the economic impact of HSR by community and its job creation benefits, user value-of-time benefits, consumer surplus benefits, user accident reduction benefits, and environmental benefits.

Building the HSR network will have a massive construction-industry job creation impact during the anticipated 11-year construction period. We estimate 609,852 job-years of work to construct the system – i.e. nearly 70,000 jobs per year for over a decade. The system would produce over 4,000 permanent jobs operations and maintenance jobs, and nearly 130,000 permanent jobs as a result of the economic growth induced by the availability of HSR service.

As the business and commerce capital of the Midwest and the common end-point shared by all of the proposed new Midwest HSR routes, Chicago will benefit from the most passenger traffic on the system. Indeed, 88% of the forecast nearly 44 million annual passenger trips will begin or end in Chicago. As a result, the city proper will gain over 53,000 jobs in the long term as a result of ongoing HSR economic activity. Indeed, the system will boost Chicago's economic activity by nearly 1% through the passenger traffic generated at Union Station and a station at O'Hare Airport.

While Chicago and the large endpoint cities will see larger passenger volumes and greater numbers of new jobs as a result of HSR, somewhat larger relative local economic benefits will accrue to the system's intermediate cities, such as LaCrosse, WI, Lafayette, IN, and Decatur, IL. There are two explanatory factors: the base economic activity levels are lower in the intermediate points, hence newly added value generates a larger percentage, and transportation/mobility options are improved more in the intermediate cities than the end-points.

La Crosse stands to experience the region's greatest average percentage increase in economic activity due to HSR. That city's regional base of 30,000 jobs will grow by nearly 1,000 as a result of induced job creation. Milwaukee, WI and Rochester, MN will both see gains of 2.17%, with Milwaukee adding 10,250 jobs, in large part due to serving over 4.5 million passengers with a 40-minute trip to downtown Chicago.

HSR service will dramatically impact cities like Lafayette, which stands to experience an increase of 2% in economic activity from its downtown station. HSR would allow the possibility of a 50-minute, long-distance commuting to or from Chicago. Lafayette's downtown would be impacted by hosting nearly 300,000 passengers per year. And Fort Wayne, IN, which last saw passenger trains in 1990, would be about an hour from Chicago, Detroit, and Cleveland via HSR. A new HSR station on the site of the former PRR Baker Street Station could see an astounding 900,000 passengers per year, helping boost that city's economy by nearly 2%.

A significant benefit of HSR over other travel modes is time and cost savings of faster and cheaper travel. The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new trips, known as "induced demand." 77% of the network's nearly 44 million annual passengers are expected to be diverted from cars, 9% diverted from airlines, 6% diverted from conventional rail service, and 8% of the system's riders will result from induced demand.

Our models indicate that on the four-corridor network, over 35 million annual former auto drivers and former conventional rail users will save $1.2 billion in value of time saved switching to HSR. A combined 37 million auto-diverted and air-diverted trips will save $1.9 billion. And 32 million annual auto trips diverted to HSR will reduce total annual vehicle miles traveled 6.4 billion annual miles. Statistically, this will result annually in 2,615 fewer non-fatal and 43 fewer fatal accidents each year! While it is hard to put a value on this reduced impact on people, the monetized value of this safety benefit is $905 million annually using standard formulas.

There would also be major savings that have not yet been calculated in the investments in infrastructure improvements that can be avoided (i.e. Interstate Highway widening and added runways) as a result of the modal shift from auto and air travel to rail that will be made possible by the availability of high quality, high capacity HSR service.

The combined monetized value of the savings in value of time, consumer surplus, and accident reduction would be about $2.05 billion every year after the four-spoke, 220-mph Core Express Midwest HSR system is completed. This would be combined with the increase of 132,000 permanent jobs resulting from the increase in economic activity spurred by the tremendous reductions in travel time enabled by HSR and the reductions investment in highway and airport capacity as a result of the availability of a Midwest HSR network.

HSR would also improve the region's air quality. By comparing the total emissions from the operation of the HSR network to the total emissions avoided as a result of its implementation, it is evident that HSR will be a more energy-efficient and less-polluting travel mode than the current modes of travel. CO2e emissions could be reduced by nearly 3.3 million metric tons in 2030 with adoption of HSR service. In addition, the region would also realize a net reduction in all criteria pollutants, with the exception of SO2. These reductions could assist metropolitan areas in the Midwest to reach (or stay in) attainment of the ozone and particulate matter requirements of the National Ambient Air Quality Standards set by the EPA.

The AECOM/ERDG study estimates the cost of the proposed 220 mph Midwest HSR network at $83.6 billion, including a significant contingency. The combination of the effects of very significant job creation, savings that would accrue that have been quantified and summarized in this Study, and the savings from avoided investment in infrastructure required to accommodate growth in auto and air traffic will most likely offset this construction cost by a wide margin. Based on the experience in virtually every other country, operation of the service will be fully self-supporting and, indeed, likely to be able to make a modest contribution to the cost of constructing/equipping the system. Thus, the case for starting construction is quite compelling.

1.0 Multi-Route Midwest High Speed Rail Network Benefits

The objective of this study is to identify basic economic and environmental benefit statistics needed to better understand and justify the proposed Mid-West Multi-Route High Speed Rail (HSR) Project on both a corridor-specific and network-wide basis.

This report is specifically designed to be viewed in conjunction with the MHSR Association-published Siemens/AECOM/EDRG Mid-West Multi-Route HSR Benefits Study which developed a conceptual design for a network of four 220 mph high speed rail routes radiating from a hub at Chicago Union Station to:

- Minneapolis/St. Paul, via O'Hare Airport, Milwaukee, Madison, and Rochester
- Detroit/Cleveland, via Fort Wayne and Toledo
- Cincinnati, via Gary, Lafayette and Indianapolis
- St. Louis, via Champaign, Decatur, and Springfield

Figure 1: Concept Plan for 220 mph HSR Network *AECOM*

That study included an analysis of economic benefits, focused on the greater Chicago Metropolitan Area. This report provides analysis and results of economic and transportation/mobility impacts for the key intermediate and outer-end-point cities in the proposed 4-route network.

This report presents societal (i.e. "indirect") economic benefits developed in the study that should accrue during the substantial construction period and then after the start of operation of HSR in each corridor of the four route network. This section also describes the unique transportation/mobility improvements for each newly HSR-served intermediate-station community. The second section develops preliminary environmental benefits that would result from the 4-route HSR Network, primarily air quality, which can be used to compare and justify transportation investments.

It must be cautioned that limitations of sufficiently disaggregated input data in several cases led to the need for using averages or other simplifying assumptions to quantifiably model each of the benefit categories. It should also be observed that the overall benefit estimation methodology is based on a "bottom-up" approach, i.e. calculating individual categories of quantifiable societal benefits and then evaluating their aggregate impact rather than systemic or "top-down" in which a regional economic model calculates the collective impact of transportation improvements, as was done in the previously performed Chicago-area economic analysis.

Ridership Calculations

The previous study estimated overall ridership for each corridor but did not estimate ridership between station pairs and did not estimate diversions from other modes. This information was necessary to support a number of the parameters that this study was intended to identify so a more in-depth analysis was performed, using the ridership estimated in the previous study for 2030 as a base. A summary of the ridership for the corridors, and the mode they are anticipated to be diverted from is shown in Table 1 and a breakdown of estimated riders between major trip pairs in each corridor is shown in Table 2. These tables also highlight the estimated number of new trips "induced" to high speed rail that would not have been made (whether for business or personal reasons) prior to the availability of fast trains that make given trips much less time-consuming.

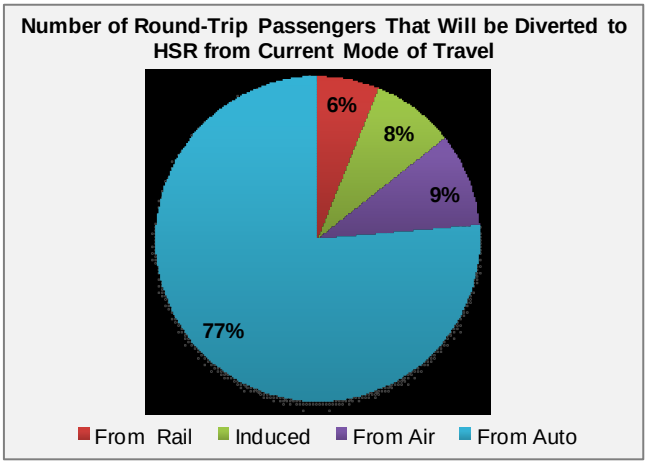


Table 1. Number of HSR Round-Trip Passengers and Diversions from Current Mode of Travel, by Corridor

Rail Corridor	From Rail	From Air	Induced	From Auto	Total
Chicago - Minneapolis	1,468,000	1,618,244	1,366,000	11,431,756	15,884,000
Chicago – Detroit/Cleveland	484,000	1,228,617	1,047,000	9,890,383	12,650,000
Chicago - Cincinnati	90,000	334,409	552,000	6,249,591	7,226,000
Chicago - St. Louis	635,000	873,961	624,000	5,771,039	7,904,000
All Lines	**2,677,000**	**4,055,232**	**3,589,000**	**33,342,768**	**43,664,000**

Table 2. Number of Round-Trip Passengers on HSR by City Pair

Chicago-Minneapolis Corridor Total	**15,884,000**	**Chicago-Detroit/Cleveland Corridor Total**	**12,650,000**
Minneapolis-Rochester	*453,968*	*Cleveland-Detroit*	*116,044*
Minneapolis-Madison	*701,616*	*Cleveland-Toledo*	*206,704*
Minneapolis-Milwaukee	*1,357,682*	*Cleveland-Fort Wayne*	*140,383*
Minneapolis-Chicago	*5,715,109*	*Cleveland-Chicago*	*3,483,700*
Rochester-Madison	*79,817*	*Detroit-Toledo*	*409,799*
Rochester-Milwaukee	*166,333*	*Detroit-Fort Wayne*	*229,847*
Rochester-Chicago	*866,879*	*Detroit-Chicago*	*6,663,784*
Madison-Milwaukee	*497,535*	*Toledo-Fort Wayne*	*10,704*
Madison-Chicago	*1,512,589*	*Toledo-Chicago*	*897,048*
Milwaukee-Chicago	*4,532,472*	*Fort Wayne-Chicago*	*491,987*
Chicago-Cincinnati Corridor Total	**7,226,000**	**Chicago-St. Louis Corridor Total**	**7,904,000**
Cincinnati-Indianapolis	*254,109*	*St. Louis-Springfield*	*207,588*
Cincinnati-Lafayette	*61,337*	*St. Louis-Decatur*	*65,343*
Cincinnati-Chicago	*3,191,818*	*St. Louis-Champaign*	*54,178*
Indianapolis-Lafayette	*30,641*	*St. Louis-Chicago*	*2,746,026*
Indianapolis-Chicago	*3,485,097*	*Springfield-Decatur*	*23,406*
Lafayette-Chicago	*202,999*	*Springfield-Champaign*	*38,785*
		Springfield-Chicago	*1,821,365*
		Decatur-Champaign	*13,569*
		Decatur-Chicago	*764,740*
		Champaign-Chicago	*2,169,002*
		All Corridors	**43,664,000**

Note: Flows between minor city pairs have not been calculated, although the corridor totals do include all trips. No attempt to calculate flows between corridors has been attempted.

Operating Plan

Certain key operating plan parameters established in the previous study have been carried over as assumptions in the work of this study:

- 25 trips per day will be operated on each route, generally translating into hourly service during the day with half-hourly service during peak periods and wider intervals during the evening.
- The new 220 mph service will replace conventional Amtrak regional (non-overnight) services on the following routes/route segments:
    - Chicago-Milwaukee

- Chicago-Champaign
- Springfield-St. Louis

- Convenient transfers will be available between HSR and conventional routes, particularly where thru service was previously provided (i.e. at Champaign for Chicago-Carbondale passengers). Schedules will need to be coordinated and stations should be large enough to permit across-the-platform transfers.
- Trains are assumed to be world standard 200 meters long, with approximately 500 seats, with a mixture of 2 -2 coach seats and 2-1 business class seats. The normal crew would consist of an engineer, conductor, assistant conductor, snack car attendant, and business class attendant.
- Double length trains (two 200 meter long trains coupled together, as is common in Europe) will be operated on all trips between Chicago and Toledo and split there eastbound (and combined westbound). Double length trains would have a double crew, except operated by a single engineer.
- The analysis in this study has identified a need for such double length trains on the Chicago-Twin Cities route, probably as far north as Madison, to accommodate anticipated ridership.

It is assumed that most passengers would obtain reservations and purchase tickets online, although ticket vending machines (capable of modifying reservations) would be provided at stations. Access to station platforms would be controlled by turnstiles reading some form of eticket confirmations. Customer service staff would be available at all stations during all periods of train operations, although the assumed ticketing arrangements would allow the size of the staff to be kept to a minimum. No checked baggage service is anticipated, consistent with current Amtrak practice on regional trains.

Network effects

There will be significant marketing advantages resulting from the hub and spoke operation focused on a major hub station such as Chicago, allowing convenient connection between the HSR routes (as well as with remaining conventional intercity rail, commuter rail, and local transportation. There will further advantages if services run thru Chicago allowing passengers traveling between stations on the Twin Cities route to continue through to points on at least one of the routes south/east of Chicago without having to change trains. It may also make sense for some or most trains to Chicago to/from the south and east to operate to/from O'Hare Airport (as well as serving Union Station) to be able to function as feeders for international and other long distance flights and access the important Northwest suburban Chicago market, A train servicing facility could be constructed near O'Hare, relieving pressure on downtown facilities.

Allocation of Costs and Benefits in the Chicago area

Because the four proposed routes generally approach the Union Station hub from different directions, making intermediate stops *enroute*, it has been deemed appropriate to allocate the construction costs to each route, with equal sharing of the costs from improvements to Union Station (including the potential construction of the "West Loop Transportation Center" tunnel, bypassing the existing congested station tracks).

It should be noted that a "Chicago Union Station Master Plan Study", which is investigating a variety of solutions to the requirements for additional capacity, focused particularly on adding thru tracks, is currently underway. This study is being led by the City of Chicago DOT, with a Technical Advisory Committee (TAC) consisting of representatives of Amtrak, Metra, the Illinois DOT, MPC (Metropolitan Planning Council), CMAP (Chicago Metropolitan Agency for Planning, and the Federal Railroad Administration. TranSystems is the lead consultant for the current phase. The MPC has also established a Civic Advisory Committee (CAC).

2.0 Job Creation Benefits

Creation of a large number of high quality jobs, both during the construction/implementation period and during ongoing revenue service is a major economic benefit of the proposed HSR routes. Three types of job creation effects were estimated: those during the construction phase, those associated with train operations and maintenance, and the number of jobs estimated to result from the increase in future economic activity resulting from the availability of HSR service in each community served.

Any major capital construction infrastructure project has a major positive impact on employment of skilled and unskilled labor, a public value well recognized in the highway industry. In order to estimate the construction period job creation, we developed a simple linear forecasting model to predict jobs based on construction cost (an output provided from AECOM based on their work in the previous study). The model inputs include: estimated construction cost by corridor sub-segment, average labor percentage of construction expenditure, average construction wages, and multiplier constant. A 2.1 multiplier was applied to construction jobs.

Similarly, the Operating and Maintenance (O&M) labor needs of the system will also create long-term skilled jobs for onboard crews (engineers, conductors, and food/beverage service attendants), station staffing, high speed train maintenance, and track/facility maintenance. In order to estimate the ongoing O&M jobs after service commences, we used a simple "bottom up" model calculating future job requirements to operate and maintain the HSR System by individual job-category and job location. As with construction jobs, a multiplier constant of 2.1 was applied to the direct number of O&M jobs created.

There should also be an (even more substantial) anticipated long-term job creation due to the increased local economic activity induced by the HSR. We developed a simple model examining local area impacts. Key factors were existing job levels in city proper and surrounding county and/or metropolitan areas. We then deployed a qualitative/quantitative extrapolation method for percentage impact, based on the major eleven-year construction job percentages, the recent historic unemployment levels, and the percentage change in relative travel mobility vs. the base case. Although by far the largest city-pair ridership and operations involve the endpoint cities, much larger relative local economic benefits are likely to accrue to the intermediate cities. There are two explanatory factors: the base economic activity levels are lower in the intermediate points, hence newly added value generates a larger percentage and transportation/mobility options are improved more in the intermediate cities than the end-points.

Note Concerning Chicago Results

Note that Chicago appears in the tabulation of jobs for each corridor. These Chicago-area jobs represent the share of the effects of the respective route on Chicago. They are not double-counted.

2.1 Chicago - Twin Cities Corridor Job Creation Benefits

Model Results

The model suggests that a remarkable 209,622 job-years of work will be created over the duration of the construction period. It was assumed that construction of this route, the longest in the network, would be performed incrementally, over an 11-year construction period. This averages to 19,057 annual jobs. When the secondary "multiplier" effect, is included, this results in 40,000 total annual jobs for each of the eleven construction years.

Because of the very high cost of the complex construction anticipated in the greater Chicago Metropolitan area, including a tunnel for access to a new station on the west side of O'Hare Airport, (the segment between Union Station and O'Hare is treated as part of the Chicago-Minneapolis route) this region's construction job impact is the largest in the corridor. The second largest regional construction jobs impact is for the greater Madison area, which is defined to include substantial components of new ROW extending towards Milwaukee to the south and La Crosse to the north.

Table 3. HSR Construction Job Creation

	Cost--Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (during 11-year constr. period)	Avg. Annual Jobs w/ Multiplier
Chicago Metro	$7,313	50,528	4,593	9,646
Milwaukee area	$3,591	27,298	2,482	5,211
Madison area	$5,966	41,218	3,747	7,869
La Crosse area	$5,004	34,572	3,143	6,600
Rochester area	$4,554	31,466	2,861	6,007
Twin Cities Metro	$3,552	24,541	2,231	4,685
TOTAL	**$30,340**	**209,622**	**19,057**	**40,019**

The ongoing HSR operations will create an estimated 632 permanent jobs in this corridor, primarily in the traditional train operations, station staffing, onboard services, train maintenance, and maintenance of way categories. The Chicago region, including the largest single station, a major maintenance facility and crew bases for onboard employees is estimated to employ 254. The second largest station, including secondary crew base at outer end-point Minneapolis is expected to employ 183. In addition to the base level of all jobs, it is anticipated that with the multiplier effect, the HSR will ultimately generate a total of 1,327 jobs.

Table 4. Long-Term Ongoing HSR O&M Job Creation

	O&M jobs	Annual Ongoing Jobs w/ Multiplier
Chicago Metro	254	532
Milwaukee area	45	96
Madison area	94	197
La Crosse area	15	31
Rochester area	25	53
Twin Cities Metro	199	418
TOTAL	**632**	**1,327**

Following is a table of anticipated relative economic changes and likely resultant positive job impacts in the corridor. Note the much larger relative local economic benefits that are likely to accrue to the intermediate cities.

Table 5. Long-Term Ongoing HSR Economic Activity-Induced Job Creation

	Estimated Base Regional Jobs (000)	Avg. % Econ Activity Growth from HSR	Estimated New Annual Regional Jobs
Chicago Metro	2,500	0.73%	16,000
Milwaukee Metro	700	2.17%	10,250
Madison region	365	2.50%	6,450
La Crosse	30	2.25%	900
Rochester region	240	2.17%	3,950
Twin Cities Metro	925	1.17%	7,250
TOTAL	**4,760**	**0.94%**	**44,800**

2.2 Chicago - Detroit/Cleveland Corridor Job Creation Benefits

Model Results

The model suggests that a very substantial 186,223 job-years of work will be created over the duration of the construction period in this corridor. This averages to 16,929 annual jobs over an assumed 11-year construction period. When the secondary "multiplier" effect, is included, this results in over 35,000 total annual jobs for each of the eleven construction years.

Because of the high cost of the greater Chicago Metropolitan area construction, this region's construction job impact is the largest single region amount. Only slightly behind in job impact value is the broadly-defined greater Toledo region, which is defined to include substantial new ROW components extending westward half-way to Ft. Wayne, northward towards Detroit and eastward towards Cleveland.

Table 6. HSR Construction Job Creation

	Cost-- Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (during 7-year constr. period)	Avg. Annual Jobs w/ Multiplier
Chicago Metro	$7,079	48,909	4,446	9,337
Ft. Wayne region	$5,216	36,037	3,726	6,880
Toledo region	$6,900	47,673	4,334	9,101
Detroit Metro	$2,554	17,645	1,604	3,369
Cleveland Metro	$5,205	35,960	3,269	6,685
TOTAL	**$26,953**	**186,223**	**16,929**	**35,552**

The ongoing HSR operations in this corridor will create an estimated 672 permanent jobs. The Chicago region, including the largest single station, a major maintenance facility and crew bases for onboard employees is estimated to employ 312. The two east end-point stations are roughly equal, with greater Detroit employing 138 and greater Cleveland 144. In addition to the base level of all jobs, it is anticipated that with the multiplier effect, the HSR will ultimately generate a total of 1,411 jobs.

Table 7. Long-Term Ongoing HSR O&M Job Creation

	O&M jobs	Annual Ongoing Jobs w/ Multiplier
Chicago Metro	312	655
Ft. Wayne region	27	56
Toledo region	51	108
Detroit Metro	138	289
Cleveland Metro	144	303
TOTAL	**672**	**1411**

Following is a table of anticipated relative economic changes and likely resultant positive job impacts. Although the largest city-pair ridership involves the three endpoint cities, the greater relative transportation improvement and extremely large "job surge" during construction will produce much larger percentage economic increases at Toledo and Ft. Wayne, the intermediate cities in the corridor.

Table 8. Long-Term Ongoing HSR Economic Activity-Induced Job Creation

	Estimated Base Regional Jobs (000)	Avg. % Econ Activity Growth from HSR	Estimated New Annual Regional Jobs
Chicago Metro	2,483	0.54%	13,367
Ft. Wayne region	167	1.63%	2,708
Toledo region	287	1.38%	3,967
Detroit Metro	1,633	0.61%	9,933
Cleveland Metro	948	0.71%	6,686
TOTAL	**5,518**	**0.66%**	**36,661**

2.3 Chicago - Cincinnati Corridor Job Creation Benefits

Model Results

The model suggests that a very substantial 101,202 job-years of work will be created over the duration of the construction period. This averages to 14,457 annual jobs over an assumed 7-year construction period. When the secondary "multiplier" effect, is included, this results in over 30,000 total annual jobs for each of the seven construction years.

Because of the high cost of the greater Chicago Metropolitan area construction, this region's construction job impact is somewhat larger than each of the other three regional aggregations. The second largest regional construction jobs impact is for the broadly-defined greater Lafayette area, which is defined to include substantial ROW components extending towards the Illinois/Indiana border to the north and half-way to Indianapolis, to the south.

Table 9. HSR Construction Job Creation

	Cost--Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (during 7-year constr. period)	Avg. Annual Jobs w/ Multiplier
Chicago Metro	$3,875	26,773	3,825	8,032
Lafayette region	$3,854	26,631	3,804	7,989
Indianapolis region	$3,681	25,433	3,633	7,630
Cincinnati Metro	$3,237	22,365	3,195	6,710
TOTAL	**$14,648**	**101,102**	**14,457**	**30,361**

The ongoing HSR operations will create an estimated 378 permanent jobs, primarily in the traditional train operations, station staffing, onboard services, train maintenance, and maintenance of way categories. The Chicago region, including the largest single station, a major maintenance facility and crew bases for onboard employees is estimated to employ 214. The second largest station, including secondary crew base at outer end-point Cincinnati is expected to employ 105. In addition to the base level of all jobs, it is anticipated that with the multiplier effect, the HSR will ultimately generate a total of 794 jobs.

Table 10. Long-Term Ongoing HSR Job Creation

	O&M jobs	Annual Ongoing Jobs w/ Multiplier
Chicago Metro	214	450
Lafayette region	33	69
Indianapolis region	25	53
Cincinnati Metro	105	221
TOTAL	**378**	**794**

Long-Term Job Creation Resulting from Increased Local Economic Activity Induced by the New Chicago-Indianapolis HSR

There should be a significant anticipated long-term job creation due to the increased local economic activity induced by the HSR. We developed a simple model examining local area impacts. Key factors were existing job levels in city proper and surrounding county and/or metropolitan areas. We then deployed a qualitative/quantitative extrapolation method for percentage impact, based on the major eleven-year construction job percentages, the recent historic unemployment levels, and the percentage change in relative travel mobility vs. the base case.

Following is a table of anticipated relative economic changes and likely resultant positive job impacts. Although the largest city-pair ridership involves the endpoint cities as well as Indianapolis and operations are based solely at the endpoint cities, larger relative local economic benefits are likely to accrue to Lafayette because the baseline economic activity level is lower, hence newly added value generates a larger percentage improvement.

Table 11. Long-Term Ongoing HSR Economic Activity-Induced Job Creation

	Estimated Base Regional Jobs (000)	Avg. % Econ Activity Growth from HSR	Estimated New Annual Regional Jobs
Chicago Metro	2,462	0.57%	13,933
Lafayette region	101	2.0%	2,017
Indianapolis region	654	0.79%	5,187
Cincinnati Metro	602	0.84%	5,078
TOTAL	**3,820**	**0.69%**	**26,215**

2.4 Chicago - St. Louis Corridor Job Creation Benefits

Model Results

The model suggests that 112,805 job-years of work will be required over the duration of the construction period. This averages to 16,115 annual jobs over an assumed 7-year period. When the secondary "multiplier" effect, is included, this results in 33,841 total annual jobs for each of the seven construction years.

Table 12. HSR Construction/ O&M Job Creation

	Cost--Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (during 7-year constr. period)	Avg. Annual Jobs w/ Multiplier
Chicago Metro	$4,513	31,178	4,454	9,353
Champaign area	$3,132	21,643	3,092	6,493
Decatur area	$3,069	21,201	3,029	6,360
Springfield area	$3,537	24,435	3,491	7,330
St. Louis Metro	$2,077	14,349	2,050	4,305
TOTAL	**$16,327**	**112,805**	**16,115**	**33,841**

The ongoing HSR operations will create an estimated 381 permanent jobs for this corridor. Chicago, the largest station, including a major crew base and heavy maintenance facility, is estimated to employ 172. The second largest station and secondary crew base at St. Louis will employ 125. In addition to the base level of all jobs, it is anticipated that the multiplier effect will ultimately generate a total of 800 jobs.

Table 13. Long-Term Ongoing HSR O&M Job Creation

	O&M jobs	Annual Ongoing Jobs w/ Multiplier
Chicago Metro	172.2	361.7
Champaign area	25.3	53.2
Decatur area	42.9	90.1
Springfield area	15.6	33.8
St. Louis Metro	124.8	262.1
TOTAL	**380.9**	**799.9**

Following is a table of anticipated relative economic changes and likely resultant positive job impacts. Although by far the largest city-pair ridership and operations involve the endpoint cities, the greater relative transportation improvement and extremely large "job surge" during construction will produce much larger percentage economic increases at Champaign-Urbana, Decatur and Springfield, the intermediate cities in the corridor.

Table 14. Long-Term Ongoing HSR Economic Activity-Induced Job Creation

	Estimated Base Regional Jobs (000)	Avg. % Econ Activity Growth from HSR	Estimated New Annual Regional Jobs
Chicago Metro	2,305	0.5%	11,515
Champaign area	97	1.67%	1,756
Decatur area	64	2.0%	1,594
Springfield area	81	1.33%	1,413
St. Louis Metro	578	0.88%	4,362
TOTAL	**3,125**	***0.66%***	**20,641**

2.5 Full HSR Network Job Creation Benefits

The construction-period jobs creation of the full four corridor $88 billion HSR network is estimated at 609,853 job-years, averaging 66,500 annual jobs during the 7 or 11 year respective corridor construction time lines. Including the secondary multiplier, this results in an annual 139,773 jobs created during construction.

Table 15. HSR Construction Period Job Creation

	Cost--Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (during 7/11-year constr.)	Avg. Annual Jobs w/ Multiplier
Chicago-Twin Cities	$30,340	209,622	19,057	40,019
Chicago-Detroit/Cleveland	$26,953	186,223	16,929	35,552
Chicago-Cincinnati	$14,648	101,202	14,457	30,361
Chicago-St. Louis	$16,327	112,805	16,115	33,841
TOTAL	**$88,268**	**609,853**	**66,558**	**139,773**

The ongoing HSR O&M will create 2,063 permanent direct annual jobs, and ultimately 4,333 jobs when the secondary multiplier effect is counted.

Table 16. Long-Term Ongoing HSR O&M Job Creation

	O&M jobs	Annual Ongoing Jobs w/ Multiplier
Chicago-Twin Cities	632	1,327
Chicago-Detroit/Cleveland	672	1,411
Chicago-Cincinnati	378	794
Chicago-St. Louis	381	800
TOTAL	**2,063**	**4,333**

Significant increased regional economic activity resulting from the new HSR Network will create 128,317 permanent jobs on all corridors, with the greatest job creation along the Twin Cities Corridor and the least along the St. Louis Corridor, in rough proportion to base jobs and degree of increased mobility and travel.

Table 17. Long-Term Ongoing HSR Economic Activity-Induced Job Creation

	Estimated Base Regional Jobs (000)	Avg. % Econ Activity Growth from HSR	Estimated New Annual Regional Jobs
Chicago-Twin Cities	4,760,000	0.94%	44,800
Chicago-Detroit/Cleveland	5,518,000	0.66%	36,661
Chicago-Cincinnati	3,820,000	0.69%	26,215
Chicago-St. Louis	3,125,000	0.66%	20,641
TOTAL	**17,223,000**		**128,317**

Adding the effect of economic activity-induced jobs and ongoing O&M jobs (with multiplier) yields a grand total of 132,649 new annual jobs along the four corridors.

Table 18. Combined Total Long-Term Job Creation

	Long-Term Jobs (Econ Growth)	Ongoing O&M Jobs w/mult.	TOTAL JOBS
Chicago-Twin Cities	44,800	1,327	46,127
Chicago-Detroit/Cleveland	36,661	1,411	38,072
Chicago-Cincinnati	26,215	794	27,009
Chicago-St. Louis	20,641	800	21,441
TOTAL	**128,317**	**4,333**	**132,649**

3.0 User Value-of-Time Benefits

One of the significant benefits to many users of the proposed HSR routes will be the total trip time savings compared to slower comparable time of driving or conventional rail service. In order to best quantify time savings impacts and benefits of the former auto and former conventional rail passengers, a simple forecasting model was developed based on current average driving times, current rail trip times, scheduled HSR travel times and average feeder/distribution time by public transit or taxi. The model inputs include: forecast ridership for diverted auto/rail riders by city pair, estimated access/distribution time for HSR Trips, unconstrained auto travel time at 55 mph, scheduled HSR trip time, Value-of-Time (VOT) constant, etc. VOT was assumed to be $22.00 per hour. The model outputs include: estimated total trip time by city pair for previous and new modes, difference in time, and monetized value.

3.1 Chicago-Twin Cities Corridor User Value-of-Time Benefits

Nearly 70% of forecast HSR riders are diverted from auto because of dramatically faster trip times. Approximately 10% of HSR riders in this corridor are former conventional rail riders attracted by the significant speed improvement and further encouraged by only modest price increases for the premium service.

The model suggests that 11.208 million former auto drivers in this corridor will save 19.820 million annual hours, with a monetized nominal value of $436 million. The 1.478 million former conventional rail travelers would save 1.798 million annual hours, monetized at $12.5 Million. The combined total annual diverted auto and conventional rail users would experience a value of time benefit is estimated at $448 million.

Table 19. Chicago-Twin Cities HSR User Value-of Time Benefit (Sample O/D's)

Sample O/D Orig. Mode	Annual Passengers	HSR trip time (w/feeder)	Orig. mode time (auto/Amtrak)	Net Trip time savings	Monetized Savings per Trip	Total savings (000)
Chicago/Twin Cities (auto)	3,819,187	4.3	7.6	3.3	$73.40	$280,326
Chicago/Milwaukee (auto)	2,770,598	1.9	2.0	0.1	$3.30	$9,143
Chicago/Madison (auto)	1,375,627	2.3	2.7	0.4	$10.5	414,433
Milwaukee/Twin Cities (auto)	997,596	3.2	6.0	2.8	$61.60	$61,452
Chicago/Rochester (auto)	757,248	3.6	6.5	2.9	$62.43	$47,277
Chicago/Milwaukee (Amtrak)	1,367,000	0.6	1.5	0.9	$19.80	$27,067
Chicago/Twin Cities (Amtrak)	101,000	2.8	8.0	5.2	$114.40	$11,544
TOTAL *	**12,686,004**	--	--	--	---	**$448,532**

* Includes all origins/destinations and both modes, not only the sample ones shown in table

3.2 Chicago - Detroit/Cleveland Corridor User Value-of-Time Benefits

Particularly because of the relatively limited conventional rail service between Chicago and Cleveland, and the lack of virtually any transportation to Fort Wayne other than auto, nearly 78% of forecast HSR riders are diverted from auto because of dramatically faster trip times. Because there is a relatively robust existing

Michigan-sponsored Amtrak service connecting the Detroit Metro Region and Chicago end-points (but via a substantially different intermediate routing), it is assumed that virtually all of this eligible end-point market will switch to the new HSR. Thus nearly 4% of the total corridor ridership is derived from this source. Conversely, considering the Cleveland branch of the service, the existing rail option is infrequent and at odd hours, so there is very little ridership for diversion at both Cleveland and Toledo.

The model suggests that 9.653 million former auto drivers will save 19.112 million annual hours, with a monetized nominal value of $420 million. The 484,000 million former conventional rail travelers would save 1.86 million annual hours, monetized at $40.9 Million. The combined total annual diverted auto and conventional rail users would experience a value of time benefit estimated at $461 million.

Table 20. HSR User Value-of Time Benefit (Sample O/D's)

Sample O/D Orig. Mode	Annual Passengers	HSR trip time (w/feeder)	Orig. mode time (auto/Amtrak)	Net Trip time savings	Monetized Savings per Trip	Total savings (000)
Chicago/Detroit (auto)	5,060,674	3.6	5.7	2.1	$46.04	$232,993
Chicago/Cleveland (auto)	2,606,312	3.9	6.6	2.7	$58.45	$152,347
Chicago/Toledo (auto)	770,127	2.9	4.6	1.7	$36.59	28,181
Chicago/Detroit (Amtrak)	425,000	2.1	6.0	3.9	$86.24	$36,652
TOTAL *	**10,137,483**	**--**	**--**	**--**	**---**	**$461,365**

* Includes all origins/destinations and both modes, not only the sample ones shown in table

3.3 Chicago-Cincinnati Corridor User Value-of-Time Benefits

Because of the extremely limited existing rail service in the corridor, nearly 86% of forecast HSR riders are diverted from auto because of dramatically faster trip times. Only roughly 1% of HSR riders are former conventional rail riders because the baseline only includes one relatively slow daily Indianapolis-Lafayette-Chicago round trip and an even less usable tri-weekly Cincinnati-Chicago service.

The model suggests that 6.221 million former auto drivers will save 6.634 million annual hours, with a monetized nominal value of $145 million. The 90,000 million former conventional rail travelers would save 285 thousand annual hours, monetized at $3.9 Million. The combined total annual diverted auto and conventional rail users would experience a value of time benefit is estimated at $150 million.

Table 21. HSR User Value-of Time Benefit (Sample O/D's)

Sample O/D Orig. Mode	Annual Passengers	HSR trip time (w/feeder)	Orig. mode time (auto/ Amtrak)	Net Trip time savings	Monetized Savings per Trip	Total savings (000)
Chicago/Indianapolis (auto)	3,027,922	2.7	3.2	0.5	$11.84	$35,850
Chicago/Cincinnati (auto)	2,757,672	3.4	5.2	1.8	$38.95	$107,402
Indianapolis/Cincinnati (auto)	234,483	1.7	1.9	0.2	$5.11	$1,197
Chicago/Indianapolis (Amtrak)	47,000	1.2	5.0	3.8	$84.04	$3,950
Chicago/Lafayette (Amtrak)	43,000	0.8	3.25	2.5	$54.05	$2,324
TOTAL *	**6,311,220**	**--**	**--**	**--**	**---**	**$149,904**

* Includes all origins/destinations and both modes, not only the sample ones shown in table

3.4 Chicago-St. Louis Corridor User Value-of-Time Benefits

A very large percentage of Chicago-St. Louis HSR patronage will be derived from former auto users, attracted by travel times that will be dramatically faster than driving times. Although the endpoint downtown to downtown net time is even faster than total time for former air passengers, we have not quantified this benefit because many Chicago-St. Louis trips actually do not begin or end in the downtown, and total anticipated net travel times are likely to be a wash by HSR vs. air. For perspective, it may be worthwhile to note that 5.8 million (virtually 3/4 of the total forecast 7.9 Million annual HSR riders) are diverted from the auto; 875,000 from air, and 635,000 from the conventional rail to be replaced.

The model suggests that 5.701 million annual former auto drivers will save 5.228 million annual hours, with a monetized nominal value of $115 million. Similarly, 635,000 annual former conventional rail travelers would save 1.437 million hours, monetized at $26.2 million. The combined total annual diverted auto and conventional rail users would experience a value of time benefit is estimated at $141.2 million.

Table 22. HSR User Value-of Time Benefit (Sample O/D's)

Sample O/D Orig. Mode	Annual Passengers	HSR trip time (w/feeder)	Orig. mode time (auto/Amtrak)	Net Trip time savings	Monetized Savings per Trip	Total savings (000)
Chicago/Champaign (auto)	1,694,164	2.4	2.5	0.1	$1.20	$2,033
Chicago/St. Louis (auto)	1,623,891	3.5	5.5	2.0	$44.01	$71,473
Chicago/Springfield (auto)	1,411,622	2.9	3.9	1.0	$21.97	$31,018
Chicago/St. Louis (Amtrak)	231,000	2.0	5.4	3.4	$74.21	$17,143
Chicago/Champaign (Amtrak)	175,000	0.9	2.3	1.4	$30.80	$5,390
Chicago/Springfield (Amtrak)	195,000	1.4	3.3	1.9	$40.77	$7,951
TOTAL *	**6,665,022**	--	--	--	---	**$141,240**

* Includes all origins/destinations and both modes, not only the sample ones shown in table

3.5 Full HSR Network Value of Time Benefits

On the four corridor network, a total of 32.8 million annual former auto drivers will save $1.1 billion in value of time saved switching to HSR. 2.7 million annual former conventional rail users will save $83 million in time savings. Combined, all HSR users will save over $1.2 billion annual in their value of time.

Table 23. HSR User Value-of Time Benefit

	Passengers (ex-auto)	Passengers (ex-Amtrak)	$-value (ex-auto) ($000)	$-value (ex-Amtrak) ($000)	Total ($mil)
Chicago-Twin Cities	11,208,104	1,477,900	$436,041	$12,491	$448.5
Chicago-Detroit/Cleveland	9,653,483	484,000	$420,457	$40,909	$461.4
Chicago-Cincinnati	6221,220	90,000	$145,954	$3,950	$149.9
Chicago-St. Louis	5,701,199	635,000	$115,009	$26,231	$141.2
TOTAL	**32,784,006**	**2,686,900**	**$1,117,461**	**$83,581**	**$1,201**

4.0 Consumer Surplus Benefits

One frequently analyzed socio-economic benefit of publicly invested rail transit projects is "Consumer Surplus," or net savings or value to the customers greater than their direct cost of purchase. This occurs primarily when the newly provided service is equal or better (likely in speed) than the previous mode, but costs less.

In order to quantify the consumer surplus benefit of the former auto and air passengers, we developed a simple linear forecasting model based on average auto cost, average air cost, HSR ridership and total HSR out-of-pocket trip costs. The model inputs include: forecast ridership by key city pair for diverted auto and air riders, derived passenger miles, statistical auto operating cost, actual average air costs, typical access/egress costs for HSR trips, adjusted by region and transportation options, and forecast HSR fares and yields.

4.1 Chicago-Twin Cities Corridor Consumer Surplus Benefits

The consumer surplus model forecasts a total monetized annual benefit of $563.9 million for the 11.2 million former auto users that switch to HSR and $86.3 million for air users that switch to HSR. The combined annual benefit for both diversion modes is $650 million. Positive individual auto-diversion city-pair savings range from $5 per trip for Chicago/Milwaukee to $98 per trip for Chicago-Minneapolis. Only two relatively short city pairs, Milwaukee/Madison and Rochester/Minneapolis are forecast to produce small negative values because of the short trips with relatively high feeder/distribution cost. By far the largest air-diversion market is Chicago/Twin Cities, where the individual average savings is $56 per trip, and the total savings is $73 million. When combined with other smaller air diversion markets, the total savings for all former air trips is $86 million.

Table 24. HSR User Consumer Surplus Benefit in Sample Markets

Sample O/Ds	Annual Passengers	HSR fare Avg.	Feed/distr. $(transit/ taxi)	Auto or air cost	Trip savings	Total savings (000)
Chicago/Twin Cities (auto)	3,819,175	$84	$20	$202	$98	$372,750
Chicago/Milwaukee (auto)	2,770,598	$18	$20	$43	$5	$14,407
Chicago/Madison (auto)	1,374,627	$30	$25	$72	$17	$23,369
Milwaukee/Twin Cities (auto)	997,596	$66	$20	$158	$72	$72,226
*Sub-total (all auto) **	*11,208,104*	--	--	--	--	*$563,945*
Chicago/Twin Cities (air)	1,303,461	$84	--	$140	$56	$72,994
*Sub-total (all air)**	*1,581,868*	--	--	--	--	*$86,284*
TOTAL	**12,789,972**					**$650,230**

* Includes all origins/destinations, not only the sample ones shown in table

4.2 Chicago-Detroit/Cleveland Corridor Consumer Surplus Benefits

The consumer surplus model forecasts a total monetized annual benefit of $597.0 million for the 9.6 million former auto users that switch to HSR and $96.4 million for 1.2 million air users that switch to HSR. The combined annual benefit for both diversion modes is $693 million. Positive individual auto-diversion city-pair savings range from $5 per trip for Toledo/Cleveland to $173 per trip for Chicago-Cleveland. Because both Detroit and Cleveland enjoy frequent, relatively low-cost air service to Chicago, their consumer surplus is comparable, with Detroit/Chicago enjoying $42.3 million and Cleveland/Chicago $52.3 million.

Table 25. HSR User Consumer Surplus Benefit in Sample Markets

Sample O/Ds	Annual Passengers	HSR fare Avg.	Feed/ distr. $ (transit/ taxi)	Auto or air cost	Trip savings	Total savings (000)
Chicago/Detroit (auto)	5,060,674	$62.40	$20	$150	$67	$340,887
Chicago/Cleveland (auto)	2,606,312	$72.20	$20	$173	$81	$211,320
*Sub-total (all auto) **	*9,653,483*	--	--	--	--	*$597,085*
Chicago/Detroit (air)	626,571	$62.40	--	$130	$67.6	$42,356
Chicago/Cleveland	564,054	$72.20	--	$165	$92.80	$52,344
*Sub-total (all air)**	*1,209,300*	--	--	--	--	*$96,370*
TOTAL	**10,862,783**					**$693,395**

* Includes all origins/destinations, not only the sample ones shown in table

4.3 Chicago-Cincinnati Corridor Consumer Surplus Benefits

The consumer surplus model forecasts a total monetized annual benefit of $257.2 million for the 6.2 million former auto users that switch to HSR and $63.9 million for 334,000 air users that switch to HSR. The combined annual benefit for both diversion modes is $321 million. Positive individual auto-diversion city-pair savings range from $5 per trip for Indianapolis/Cincinnati to $60 per trip for Chicago-Cincinnati. The largest air-diversion market, Cincinnati-Chicago produces an exceptionally large consumer surplus value, because, as the only major end-point market not served by low-cost Southwest airlines, the typical Cincinnati air fares are nearly triple those of other city pairs! The estimated total savings for all former air trips is $64 million, of which the Cincinnati market contributes $54 million.

Table 26. HSR User Consumer Surplus Benefit in Sample Markets

Sample O/Ds	Annual Passengers	HSR fare Avg.	Feed/ distr. $ (transit/ taxi)	Auto or air cost	Trip savings	Total savings (000)
Chicago/Indianapolis (auto)	3,027,922	$35.40	$20	$85	$30	$89,505
Chicago/Cincinnati(auto)	2,757,672	$56.80	$20	$136	$60	$164,137
*Sub-total (all auto) **	*6,221,220*	--	--	--	--	*$257,208*
Chicago/Cincinnati (air)	190,320	$56.80	--	$340	$283	$53,899
Chicago/Indianapolis	143,875	$35.40	--	$105	$70	$10,014
*Sub-total (all air)**	*334,195*	--	--	--	--	*$63,912*
TOTAL	**6,555,415**					**$321,120**

* Includes all origins/destinations, not only the sample ones shown in table

4.4 Chicago-St. Louis Corridor Consumer Surplus Benefits

The consumer surplus model forecasts a total monetized annual benefit of $205.9 million for auto users that switch to HSR and $74.8 million for air users that switch to HSR. The combined annual benefit for diversion from both modes is $280.7 million. Positive individual auto-diversion city-pair savings range from $10 per trip for Decatur/St. Louis trips to $65 per trip for Chicago-St. Louis. Only one city pair, Springfield-St. Louis is forecast to produce a negligible amount because of the relatively high feeder/distribution cost for this short trip. By far the largest air-diversion market is Chicago/St. Louis, where the individual average savings is $59.20 per trip, and the total savings is $39.9 million. When combined with the smaller local air diversion markets of Chicago/Champaign and Chicago/Springfield, the annual total is $74.8 million.

Table 27. HSR User Consumer Surplus Benefit in Sample Markets

Sample O/Ds	Annual Passengers	HSR fare Avg.	Feed/ distr. $ (transit/ taxi)	Auto or air cost	Trip savings	Total savings (000)
Chicago/Champaign(auto)	1,694,164	$27.00	$20	$65	$18	$30,156
Chicago/St. Louis (auto)	1,623,891	$60.80	$20	$146	$65	$105,748
Chicago/Springfield. (auto)	1,411,622	$43.40	$25	$104	$36	$50,480
Sub-total (all auto) *	5,701,199	--	--	--	--	$205,871
Chicago/St. Louis (air)	674,344	$60.80	0	$120	$59.20	$39,211
Sub-total (all air)*	873,856	--	--	--	--	$74,806
TOTAL	**6,575,055**					**$288,678**

* Includes all origins/destinations, not only the sample ones shown in table

4.5 Full HSR Network Consumer Surplus Benefits

32.8 million former annual auto trips diverted to HSR will enjoy a consumer surplus benefit of $1.6 billion in savings. 4 million annual former fliers will enjoy a consumer surplus of $321 million. Combined auto-diverted and air-diverted trips will save $1.9 billion.

Table 28. HSR Consumer Surplus Benefit

	Passengers (ex-auto)	Passengers (ex-air).	$-Value (ex-auto)($000)	$-Value (ex-air) ($000)	TOTAL Value ($mil)
Chicago-Twin Cities	11,208,104	1,581,868	$563,945	$86,285	$650.2
Chicago-Detroit/Cleveland	9,653,483	1,209,300	$597,025	$96,370	$693.4
Chicago-Cincinnati	6221,220	334,195	$257,208	$63,912	$321.1
Chicago-St. Louis	5,701,199	873,856	$205.871	$74,806	$280.7
TOTAL	**32,784,006**	**3,999,219**	**$1,624,050**	**$321,373**	**$1,945.4**

5.0 User Accident Reduction Benefits

One of the greatest benefits of a world class, fully grade-separated HSR system is its near perfect safety record. The French TGV, Spanish AVE and Japanese Shinkansen have been operating very high density services, some for over forty years without a single passenger fatality. Although the proposed HSR services would statistically be even safer than air and conventional rail, the differential is greatest compared with auto. To be conservative, and because the safety benefit is most unquestionable, we have limited our User Safety calculation to former auto users only.

In order to best quantify safety benefit of the former auto passengers, we developed a simple linear statistical forecasting model based on average auto VMT accident rates and assuming no accidents for HSR. The model inputs include: forecast ridership by key city pair for diverted auto riders, derived passenger miles, inferred VMT, based on 1.3 average occupants per car, differential accident and fatality rates for auto vs. HSR and average monetized value per type of incident.

5.1 Chicago-Twin Cities Corridor User Accident Reduction Benefits

The model suggests that 11,208,000 former auto drivers will incur an annual average of 908 fewer non-fatal accidents and statistically 15.1 fatal accidents as a result of riding a "fail safe" HSR train vs. driving. The estimated monetized value of this savings is $ 314.4 million annually.

Table 29. HSR User Accident Reduction Benefit

O/D (sample city pairs)	Annual Passengers	Total Passenger Miles (000)	Total VMT (000)	Non-fatal accident Reduction	Fatal Accident Reduction	Monetized Savings ($000)
Chicago/Twin Cities	3,819,157	1,604,046	1,233,881	505.9	8.4	$175,137
Chicago/Milwaukee	2,770,598	249,354	191,811	78.6	1.3	$27,226
Chicago/Madison	1,374,627	206,194	158,611	65.0	1.08	$22,513
Milwaukee/Twin Cities	997,596	329,207	253,236	103.8	1.7	$35,944
Chicago/Rochester	757,248	268,823	206,787	84.8	1.4	$29,351
TOTAL *	**11,208**	**2,879,325**	**2,214,865**	**908.1**	**15.1**	**$314,378**

* Includes all origins/destinations, not only the sample ones shown in table

5.2 Chicago-Detroit/Cleveland Corridor User Accident Reduction Benefits

The model suggests that 9,653,000 former auto drivers will incur an annual average of 901 fewer non-fatal accidents and statistically 14.9 fewer fatal accidents as a result of riding a "fail safe" HSR train vs. driving. The estimated monetized value of this savings is $ 312.0 million annually.

Table 30. HSR User Accident Reduction Benefit

O/D (sample city pairs)	Annual Passengers	Total Passenger Miles (000)	Total VMT (000)	Non-fatal accident Reduction	Fatal Accident Reduction	Monetized Savings ($000)
Chicago/Detroit	5,060,674	1,598,930	1,214,561	498.0	8.3	$172,395
Chicago/Cleveland	2,606,312	940,878	723,752	296.7	4.9	$102,729
Chicago/Toledo	770,127	194,842	149,878	61.4	1.0	$21,274
TOTAL *	**9,653,483**	**2,857,241**	**2,197,878**	**901.1**	**14.9**	**$311,967**

* Includes all origins/destinations, not only the sample ones shown in table

5.3 Chicago-Cincinnati Corridor User Accident Reduction Benefits

Model Results

The model suggests that 6,221,000 former auto drivers will incur an annual average of 432 fewer non-fatal accidents and statistically 7.2 fewer fatal accidents as a result of riding a "fail safe" HSR train vs. driving. The estimated monetized value of this savings is $ 149.7 million annually.

Table 31. HSR User Accident Reduction Benefit

O/D (sample city pairs)	Annual Passengers	Total Passenger Miles (000)	Total VMT (000)	Non-fatal accident Reduction	Fatal Accident Reduction	Monetized Savings ($000)
Chicago/Indianapolis	3,027,922	535,942	412,263	169.0	2.8	$58,516
Chicago/Cincinnati	2,757,672	783,179	602,445	247.0	4.1	$85,511
Indianapolis/Cincinnati	234,483	25,090	19,300	7.9	0.1	$2,739
TOTAL *	**6,221,220**	**1,370,753**	**1,054,425**	**432.1**	**7.2**	**$149,665**

* Includes all origins/destinations, not only the sample ones shown in table

5.4 Chicago-St. Louis Corridor User Accident Reduction Benefits

The model suggests that 5,701,199 former auto drivers will incur an annual average of 374 fewer non-fatal accidents and statistically 6.2 fatal accidents as a result of riding a "fail safe" HSR train vs. driving. The estimated monetized value of this savings is $129.4 million annually.

Table 32. HSR User Accident Reduction Benefit

O/D (key city pairs)	Annual Passengers	Total Passenger Miles (000)	VMT avoided (000)	Non-fatal accident Reduction	Fatal Accident Reduction	Monetized Savings ($000)
Chicago/Champaign	1,694,164	228,712	175,932	72.13	1.2	$24,972
Chicago/St. Louis	1,623,891	493,663	379,740	155.69	2.58	$53,900
Chicago/Springfield.	1,411,622	235,632	235,632	96.61	1.6	$33,446
TOTAL *	**5,701,199**	**1,185,040**	**911,969**	**373.74**	**6.2**	**$129,388**

* Includes all origins/destinations, not only the sample ones shown in table

5.5 Full HSR Network Accident Reduction Benefits

32 million annual auto trips diverted to HSR will reduce total annual VMT in the 4-route Corridor Network by 6.4 billion annual miles. Statistically, this will result annually in 2,615 fewer non-fatal and 43 fewer fatal accidents! The monetized value of this safety benefit is $905 million annually.

Table 33. Accident Reduction Benefit

	Annual Passengers	Total Passenger Miles (000)	VMT avoided (000)	Non-fatal accident Reduction	Fatal Accident Reduction	Monetized Savings ($mil)
Chicago-Twin Cities	11,208,104	2,879,325	2,214,865	908	15.06	$314.4
Chicago-Detroit/Cleveland	9,653,483	2,857,241	2,197,878	901	14.95	$312.0
Chicago-Cincinnati	6,221,220	1,370,753	1,054,425	432	7.17	$149.4
Chicago-St. Louis	5,701,199	1,185,040	911,569	374	6.20	$129.4
TOTAL	**32,784,006**	**8,292,385**	**6,378,737**	**2,615**	**43.38**	**$905.4**

6.0 Economic Impacts by Community

This and the following sections break out the impact of the implementation of the HSR by the individual cities proposed to be served. For each a summary of the existing intercity access available is provided followed by a discussion of economic benefits, focusing on job creation, in terms of jobs related to construction of the HSR, as well as ongoing operations, and, most importantly, the anticipated long term increase related to economic development spurred by the introduction of high speed rail service. Finally a brief discussion of the specific way the HSR is proposed to fit into each community and the anticipated benefits is provided.

6.1 Economic Impacts for the Principal Cities in the Chicago-Twin Cities Corridor

The Chicago Metro Region (including O'Hare Airport and suburban Lake Cook Road) will be the cornerstone of the proposed Chicago-Minneapolis HSR, with 79% of forecast passenger trips beginning or ending in Chicago Metro. Minneapolis Metro will be the second most heavily patronized region with 52% of forecast passenger trips beginning or ending at Minneapolis or St. Paul Stations. The third busiest region will be Milwaukee, with 41% of trips originating or ending at Milwaukee Intermodal or Milwaukee Airport.

Significant direct Operations and Maintenance (O&M) jobs will be based at the two endpoints as well as Madison, where select double short-turn trainsets will be turned around.

As a truly "new mode" of transportation, providing downtown to downtown Chicago-Minneapolis running time of less than 3 hours, the HSR will produce a significant mode shift in transportation from air, auto and conventional rail, while also generating substantial induced demand. This "new mode" impact will be greatest in percentage terms for intermediate cities, such as Milwaukee, Madison, La Crosse and Rochester. This is especially important as there is currently limited or no existing rail or air service for many of the city pair combinations. Over time, this new mobility is expected to produce dramatic changes in property value, residential and commercial location decisions, employment, etc. The following summary table lists some of these key qualitative economic impact findings.

Table 34. HSR Regional Economic Impacts

Key Cities (Metro. Population)	City-Proper Population	Current Intercity Public Transportation Availability	Recent % Unemployment Current Econ Activity	Avg. HSR Economic % Development Growth
Chicago (9.5 mil)	2.8 million	Excellent	9.5%/Good	+0.73%
Milwaukee (1.6 mil)	595,000	Good	8.5%/ Fair	+2.17%
Madison (560,000)	233,000	Fair	6.5%/ Good	+2.5%
La Crosse (134,000)	51,000	Poor	%/ Fair	+2.25%
Rochester (186,000)	107,000	Fair	5.6%/Good	+2.17%
Twin Cities (3.3 mil)	383,000*	Good	6.7%/Good	+1.17%

*Minneapolis only city-pop; St. Paul 285,000

One of the most impressive findings of this study is the number of jobs forecast to be created during the prime construction period. The base number of solid annual construction industry jobs is estimated at 19,000 for the 11 year period. When the secondary "multiplier effect" is counted, there will be a total of over 40,000 jobs.

Table 35. HSR Construction/ O&M Job Creation

	Cost-Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (assume 11-year period)	Avg. Annual Jobs w/ Multiplier
Total	**$19,543**	**209,622**	**19,057**	**40,019**

After project completion, the new HSR will conservatively employ 632 skilled workers, as well as additional support positions. Including the multiplier effect, we would anticipate 1,327 permanent jobs.

Table 36. Long-Term Ongoing HSR Direct Job Creation

	O&M jobs (incl. mgmt. & supv.)	Annual Ongoing Jobs w/ Multiplier
Total	**632**	**1,327**

Lastly is the very substantial anticipated long term job creation of nearly 45,000 jobs in all regions surrounding HSR Stations resulting from increased regional economic activity created by improved access and mobility.

Table 37. Long-Term Ongoing HSR Development-Related Job Creation

Estimated Current Total Jobs	Overall Avg. Econ % Growth	Estimated New Jobs Created
4,760,000	**+0.94%**	**44,800**

6.1.1 Economic Benefits for Chicago (as part of the Twin Cities Corridor)

Chicago is the business and commerce capital of the Midwest with city population of 2.8 million and (tri-state) MSA population of nearly 10 million. It has a massive business employment base including multiple corporate headquarters, an agricultural and commodities stock exchange, several major universities, and one of the largest convention centers in North America.

Chicago has historically been the major Midwest hub of intercity passenger railways since the mid 1800's and remains so today with Amtrak. It is also the only common end-point shared by all of the proposed new Midwest HSR routes. Chicago's O'Hare airport is the busiest in North America with direct flights to most domestic and many international destinations. Chicago's Midway Airport is a major connecting hub for low-cost Southwest Airlines, with non-stop flights to a wide range of destinations, including Minneapolis as well as several other proposed HSR end-points and a couple of intermediate cities.

Chicago will be the cornerstone of the proposed Chicago-Minneapolis HSR, with over 79% of forecast passenger trips beginning or ending in Chicago. With end-point downtown to downtown running times of less than 3 hours, the HSR service will essentially create a "new mode" of transportation Chicago, significantly faster than upgraded conventional rail or auto to all intermediate destinations, and at least equal in total end-point trip time than air.

The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new trips, known as "induced demand." For instance, with the new HSR service it will now be extremely easy to make a same-day, or arguably half-day trip to Madison (1 hour 5 mins) or even Rochester, MN (2 hours 20 mins) with travel times roughly one-third as long as driving.

As discussed in greater detail in Section 1.1, there will be a large construction-industry job creation impact during the anticipated 11 year construction period. The likely direct annual job creation (just for the Minneapolis route) for Chicago MSA is estimated at 4,593. When the secondary impact ("multiplier") is taken into account, this annual job number increases to 9,646.

Since the Chicago and surrounding metro will have the some of the busiest HSR stations, as well as being the terminal for operating crews, it will enjoy the highest staffing level. Including station, onboard services, train operating crews, and maintenance, permanent metro job creation is estimated at 253. Adding the secondary "multiplier-related" impact results in 532 jobs. There will also be an anticipated indirect long-term job creation of 16,000 jobs resulting from the increased overall economic activity in the greater Chicago MSA resulting from the Minneapolis HSR.

6.1.2 Economic Benefits for Milwaukee

General Description

Milwaukee, located in south eastern Wisconsin on the shore of Lake Michigan is the largest city in the state and seat of Milwaukee County. It has a city population of 595,000 and an MSA of 1.75 million. Milwaukee has successfully reengineered itself from a formerly predominant manufacturing to a broader corporate, entertainment and services industry base. It has a strong downtown, including re-gentrified urban housing, especially along the river and lakefront.

Current Economy

After a historic city-proper population peak of 740,000 in 1960, Milwaukee has declined rapidly in the 70's and 80's and very gradually (i.e. near stabilization) there since for a total of 20%. Consistent with its traditional European background, Milwaukee continues to have an unusually high per-capita education level. The relatively solid education level and successful outreach to the corporate world have landed the headquarters of such famous firms as: Johnson Controls, Kohl's, Harley-Davidson, Briggs & Stratton, GE Healthcare Diagnostics among others.

Current Intercity Passenger Transportation

Milwaukee is the northern end point of one of the more successful state-sponsored Amtrak short-distance corridors, with the Chicago-Milwaukee Hiawatha Service carrying over 750,000 annual passengers in 2010 on seven daily round trips. In addition to a major rebuilding of Milwaukee passenger rail station into a multi-modal transportation center, the region has added a successful airport-rail access station adjacent to Milwaukee Mitchell Field in 2005, served by all Hiawatha trains and connected to the air terminal by shuttle bus. Milwaukee is also served by the once-daily (Seattle) – Twin Cities-Milwaukee-Chicago Empire Builder Amtrak service. Frequent bus service is provided by Badger Bus Lines to Madison and Greyhound to Chicago. Four daily Minneapolis-Milwaukee-Chicago round trips are offered by Megabus. Milwaukee Mitchell Field has 13 daily round trips to Chicago (ORD); 9 daily round trips to Twin Cities Airport in addition to direct service to several other major hub cities.

Proposed HSR Alignment and Service

The proposed HSR alignment would approach Milwaukee southeasterly from Waukesha along I-94. It would transition at the Menomonee River to parallel the CP (ex-Milw.) RR including several flyovers and a high aerial structure near downtown. The HSR could either be on a high-level location at Milwaukee Intermodal, north of St. Paul Ave or an at-grade site east of the existing station, if the post office were relocated. South of the station, the HSR alignment would have two new crossings of the Milwaukee River before paralleling the CP (ex.-Milw) RR on an aerial structure towards Mitchell Field. Milwaukee will be a "primary" HSR station to be served by all of the 25 daily Twin Cities-Chicago round trips. Running times will be 2 hrs to Minneapolis; 1 hr 40 min's to Rochester; 25 min's to Madison; 20 minutes to O'Hare Airport and 40 min's to Chicago.

Anticipated Mobility Impact

The proposed HSR service will provide a sizable transportation improvement for Milwaukee. Most noteworthy will be 40 min express running time to downtown Chicago, less than half the best typical current driving time or Hiawatha Amtrak trip time, and actually quicker than many of the routine home-to-work Chicago-area commute trips! Similarly, the very fast trip time to Madison would make it an easy commute to the University or State Capitol. A frequent, affordably priced 2-hour trip to Twin Cities would make it a viable 1 day business or recreational trip. A change of this magnitude is anticipated to produce significant positive economic impacts for Milwaukee. In addition to diverting sizable percentage of existing trips, it may be expected to generate significant net new "induced" demand.

Potential Station Area Development

There was no question that the new HSR Station will be coincident with the existing and recently upgraded Milwaukee Intermodal Terminal. It may be reasonably anticipated that there will be strong demand for new, high-quality commercial and residential space in the immediate nearby area, helping to further the existing planned TOD investment around the station.

Potential Job Creation Impact

As discussed in greater detail in Section 1.1, there will be an immense construction-industry job creation impact during the anticipated 11 year construction period. The likely direct annual job creation for greater Milwaukee is estimated at 2,482. When the positive secondary impact (or so-called "multiplier") is taken into account, this annual job number increases to 5,211. Station staffing and related jobs will lead to a Milwaukee-area total (including Mitchell Field Station) of 45 full time permanent HSR positions. When the multiplier is applied, a total of 96 jobs can be expected for the region. There will also be a long-term job creation of over *10,000* jobs from increased economic activity due to the dramatic improvement in mobility.

6.1.3 Economic Benefits for Madison

General Description

Madison, located in south central Wisconsin is the State Capital, Dane County Seat and home to the legendary University of Wisconsin. With a city population of 235,000 it is the second largest city in Wisconsin, and center of a broad reaching MSA of more than 550,000. In large part because of the university, high-tech and state-government employment it has a vibrant concentrated urban core as well as solidly developed surrounding areas.

Current Economy

The high education level, consistent employment of the university and state government and growth of the high-tech industry also contribute to an unusually stable and successful regional economy. Madison has historically enjoyed one of the lowest unemployment rates in the country, and managed to remain below 4% even during

the depth of the recent recession. In addition to Univ. of WI and Univ. of WI Hospital System, major employers include: Spectrum Brands; Alliance Energy; American Family Insurance; American Girl (Mattel) and world-famous Oscar-Meyer (now owned by Kraft).

Current Intercity Passenger Transportation

Although Madison has had no direct passenger rail service since May 1, 1971, there is nearby once-daily (Seattle) – Twin Cities-Milwaukee-Chicago Empire Builder Amtrak service, via a connecting shuttle bus. Frequent, high quality Chicago O'Hare and Downtown bus service offered by Megabus and Van Galder Bus Lines. There is also limited Jefferson/Greyhound Lines intercity bus service to Minneapolis and Milwaukee. Madison Airport has 12 daily round trips to Chicago (ORD) and 5 daily round trips to Twin Cities Airport in addition to direct service to several other major hub cities.

Proposed HSR Alignment and Service

The proposed HSR alignment would approach Madison southeasterly from Wisconsin Dells along the I-90/94 corridor to a hypothetical greenfield station site located at the intersection of I-90/94 and the Wisconsin Southern (ex-Milwaukee) Railroad. Although an optimal location for through service providing new-development potential, it unfortunately requires a (rail or bus) shuttle service to access downtown, State Office Complex and the University of Wisconsin. The alignment would continue due east along I-94 toward Milwaukee.

Madison is presumed to be a "primary" HSR station to be served by all of the 25 daily Twin Cities-Chicago round trips. Running times will be 1 hr 35 min's to Minneapolis; 1 hr 15 min's to Rochester; 25 min's to Milwaukee; 45 minutes to O'Hare Airport and 1 hr 5 min's to Chicago.

Anticipated Mobility Impact

The proposed HSR service will revolutionize transportation access for Madison. Most noteworthy is the 1 hr 5 min express running time to downtown Chicago, roughly 1/3 of the typical current driving time, and actually shorter in time than many of the routine home-to-work Chicago-area commute trips! Similarly, the 1 hr 15 min's travel time to Rochester could allow long distance commuting linking the biotech research industry in Madison with the massive Mayo-related medical facilities in Rochester. Students, faculty and business community members would now easily be able to make a one-day business or recreational trip to either the Twin Cities or Chicago.

A change of this magnitude in access to major business/activity centers is anticipated to have very significant positive economic impacts for Madison. The new availability high-quality, affordably priced public transportation will open new travel alternatives for existing trips as well as create significant net new "induced" demand. It can also be anticipated that new ultra fast (45 min's) access to ORD Airport Chicago should be more attractive and reliable than the existing commuter air option.

Potential Station Area Development

The issue of proper station location for Madison was debated at length during preparations for the (ultimately cancelled) ARRA Madison-Milwaukee Higher Speed Rail Project. It does appear that the ability for the service to run through without changing ends between Twin Cities and Milwaukee is important enough to justify the proposed non-central location. Furthermore, the anticipated high volume of ridership and availability of land for development may ultimately generate more net HSR-related development than a true downtown/University area location. It is anticipated that there will be strong demand for new, high-quality commercial and residential space in the immediate nearby area. A likely multi-level parking facility may also provide ground floor (or station platform-level) retail space.

Potential Job Creation Impact

As discussed in greater detail in Section 1.1, there will be an immense construction-industry job creation impact during the anticipated 11 year construction period. The likely direct annual job creation for greater Madison is estimated at 3,747. When the positive secondary impact (or so-called "multiplier") is taken into account, this annual job number increases to 7,869.

Madison will create more jobs than any other intermediate station because the much higher capacity demands south of Madison will require operation of double trainsets on many frequencies between Madison and Chicago. As a result there will be an intermediate T&E and OBS Crew base for those "short-turn" trains. Those jobs, in addition to a small mechanical force and station staffing will lead to a Madison total of 94 full time permanent HSR positions. When the multiplier is applied, a total of nearly 200 jobs can be expected for the region.

There will also be a significant anticipated long-term job creation of 0ver 6,000 jobs resulting from the increased overall Madison-area economic activity and mobility created by the HSR System. Because the relative mobility improvement is the greatest for Madison it will enjoy one of the highest percentage job creation ratios.

6.1.4 Economic Benefits for La Crosse

General Description

La Crosse, WI is a successful, small western Wisconsin city located at the juncture of the La Crosse and Mississippi Rivers with population of just over 50,000. The La Crosse MSA, including La Crosse County and adjacent Houston, MN County has a population of 135,000. La Crosse is primarily a college town, home of University of Wisconsin-La Crosse in addition to Viterbo University and Western Technical College.

Current Economy

In addition to the above-mentioned higher education institutions, the largest employers in La Crosse are: Gunderson Lutheran Medical Center, Franciscan Skemp Medical Center, Trane (now Ingersoll-Rand) Kwik Trip, and public sector employers. Large student populations (U WI-La Crosse at 13,000 and Western Tech at 20,000) nearly double the city's adult population during the school year. The students provide additional demand for goods and services, as well as seasonal intercity transportation. In large part due to the university presence, unemployment has remained below 7.5% even in the recent recession.

Current Intercity Passenger Transportation

La Crosse is served by one daily Amtrak round-trip of the (Seattle)-Twin Cities-Milwaukee-Chicago Empire builder, operating on the CP (ex-Milwaukee Road) mainline. The current staffed Amtrak station, located at the edge of town at on Andrew St. is not directly served by the local bus system because of difficult geography and road access. There is also limited (one daily local round-trip) scheduled Jefferson Bus Lines intercity service Minneapolis-Rochester-La Crosse-Madison-Milwaukee, with connection to Chicago. La Crosse Airport (LSE) is served by five daily round trips to ORD as well as four daily round trips to Twin Cities, providing connections to virtually all destinations at these hubs.

Proposed HSR Alignment and Service

Coming east from Rochester, MN along Interstate 90, the HSR would enter a greenfield alignment (retained cut/embankment) and cross the Mississippi on a new bridge, returning to the I-90 alignment through the city. The HSR Station is proposed to be located near Rose St., at the I-90 interchange nearest to downtown, and only 4 miles from the large Univ. Wisconsin – La Crosse campus. East of La Crosse the HSR line would continue following I-90 towards Camp Douglas. Although the stopping pattern has not been determined, it is likely that roughly half of the 25 daily round trips Twin Cities-Chicago HSR trains would likely stop at La Crosse.

Scheduled running times from La Crosse are anticipated to be: Minneapolis 45 min's; Milwaukee 1 hr 15 min's; ORD Airport 1 hr 35 min's; Chicago 1 hr 55 min's.

Anticipated Mobility Impact

Besides the dramatic increase in frequency, the scheduled running time of 1 hr 55 min's to Chicago vs. the current Amtrak 5 hours will give La Crosse significantly improved mobility. Similarly, the 45 min schedule to Minneapolis compared to the Amtrak's current 3 hour running time will make the Twin Cities an easy day trip by rail for business or entertainment. In both directions, the HSR travel time is at least twice as fast as driving and the exceptionally fast service to ORD can be expected to divert a sizable percentage of current auto and commuter air travelers to HSR.

Local planners hypothesize that improved access time to multiple major destinations and related perceptions of improved mobility should produce enhanced attractiveness for La Crosse. It is expected the HSR will change fundamental travel perceptions and likely encourage new residential and employment opportunities. In addition to diverting a portion of existing highway trips, it can be anticipated that there will be substantial "induced demand," i.e. creation of net new trips to Twin Cities, Milwaukee and downtown Chicago.

Potential Station Area Development

Given the proposed station location roughly 4 miles north of Downtown, depending on total growth and specific land-use plans, there may be a good opportunity for multi-purpose TOD including: commercial, office and residential space. The new station's distance from existing dense development also allows easy creation of parking. The economic energy of the gateway to high-frequency, high quality HSR service would be a good driver for focused development in the immediate surrounding area. It is assumed that demand from the volume of HSR travelers will entice the local transit operator to serve the station site, and provide good access to downtown and Univ. WI-La Crosse.

Potential Job Creation Impact

As discussed in more detail in Section 1.1, there will be an immensely positive construction-industry job creation impact during the anticipated 11 year construction period. This likely annualized job creation for the greater La Crosse region (defined as the area along the HSR line from half-way to Madison to half-way to Rochester) is estimated at 3,143. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 6,600.

As with all other intermediate HSR stations, the ongoing staffing requirements will create quality permanent jobs supporting operations of the HSR Service. The La Crosse Station and small MOW workforce is estimated to create 156 permanent jobs and a total of 31 jobs including the secondary multiplier effect. There will also be an anticipated indirect long-term job creation of 900 jobs resulting from the increased overall economic activity enabled by the HSR System.

6.1.5 Economic Benefits for Rochester

General Description

Rochester, MN is a medium sized city in Southeast Minnesota, seat of Olmstead County, with population of 107,000 and best known for its world-renowned Mayo Clinic. It is Minnesota's 3rd largest city and second most populous MSA. There is a relatively vibrant downtown, with more hotels than typical for a city its size due to business- and medical needs-visitations of the city's large health care industry centered on the Mayo Clinic. There are also substantial surrounding area activity centers involving the health care and other industries.

Current Economy

The Mayo Clinic's 32,000 employees account for a remarkable more than 75% of total city employment. Other significant employers include: IBM, Wal-Mart, HyVee and the public sector (city and county). Because of the inherent stability in the demand for health care, Rochester has been able to keep unemployment below 6% despite the recession.

Current Intercity Passenger Transportation

Rochester has not been served directly by passenger rail since 1965. There is a scheduled shuttle bus service connecting at Winona to the daily Chicago-Twin Cities-Seattle Empire Builder Train. There is also very limited (one daily local round trip) scheduled Jefferson Bus Lines intercity bus service Minneapolis-Rochester-Madison-Milwaukee, with connection to Chicago. Rochester, MN Airport (Rochester) is served by five daily round trips to ORD as well as five daily round trips to Twin Cities, providing connections to virtually all destinations at these hubs. .

Proposed HSR Alignment and Service

Coming from St. Paul, the new HSR Line is proposed to generally follow US Highway 52 until joining the (now) abandoned Chicago Great Western ROW, thence roughly paralleling the existing Duluth, Minnesota & Eastern (Canadian Pacific) ROW. It is anticipated that the majority of the urban ROW would need to be elevated (including an elevated Downtown Rochester HSR Station) because of high development density. The line would continue eastward along the DM&E until picking up an Interstate Highway 90 alignment towards La Crosse. Because of the Mayo Clinic, Rochester is presumed to be a "primary" HSR Station to be served by all of the 25 daily Twin Cities-Chicago round trips. Running times will be 20 min's to Minneapolis; 1 hr 15 min's to Madison; 1 hr 45 min's to Milwaukee; 2 hrs to O'Hare Airport and 2 hrs 20 min's to Chicago.

Anticipated Mobility Impact

HSR Service will provide a highly significant new transportation alternative to Rochester. Given the lack of any direct passenger rail service and extremely limited present intercity bus service, the planned HSR hourly (half-hour) peak service, coupled with affordable fares should revolutionize Rochester's mobility. The high-frequency and short running time to Madison should provide expanded opportunity to interconnect its University with Mayo's medical community. HSR's much greater frequency plus direct 2-hour service to Chicago's O'Hare Airport may also provide a very attractive and cost-effective alternative to commuter air. For trips to Chicago, the HSR service will be twice to three times faster than driving, opening up significant opportunity for easier business and expanded recreational trips.

A positive mobility change of this magnitude should have a very favorable impact on Rochester and its immediate surroundings. In addition to making existing trips easier, faster and more affordable, the HSR will create new mobility opportunities resulting in significant net new "induced" demand. There should be a measurable positive impact on the greater Rochester MSA.

Potential Station Area Development

Notwithstanding the current success of downtown Rochester, it is envisioned that the intense economic activity of the new downtown HSR Station will be a focus of intense development. There would be clear opportunity for a hotel/residential/commercial complex centered around the station site. The ultimate preparation, planning, siting and zoning would have to be developed in conjunction with the city to best coordinate with future land-use plans.

Potential Job Creation Impact

As discussed in greater detail in Section 1.1 there will be an immense construction-industry job creation impact during the anticipated 11 year construction period. The likely direct annual job creation for greater Rochester is

estimated at 2,681. When the positive secondary impact (or so-called "multiplier") is taken into account this annual job number would increase to slightly over 6,000.

As with other intermediate stations, the staffing and operations of the HSR Service is only estimated to create 25 permanent station-related and MOW jobs for the Rochester region; when the multiplier for related job-creation is counted, there will be a total of 53 jobs.

There will also be an anticipated long-term job creation of nearly 4,000 jobs resulting from the increased overall economic activity inspired by the HSR System and the new level of access/mobility.

6.1.6 Economic Benefits for Minneapolis/St. Paul

General Description/Economy

Greater Minneapolis/St. Paul, collectively known as the Twin Cities, has a combined population of over 3.5 million and is located in southeastern Minnesota at the confluence of ht e Minnesota and Mississippi Rivers. Minneapolis has a city-proper population of 383,000 and St. Paul, the state Capital, has a population of 285,000. Respectively, they are the largest and second-largest cities in Minnesota. Minneapolis is a modern, major, highly successful business and commercial center, recognized for its extensive network of enclosed inter-office-building "Skywalk" network. In addition to being the State Capital, St. Paul is also a vibrant as well as historic-conscious urban center, and home to University of Minnesota.

Minneapolis is the headquarters for: Target, US Bancorp, Ameriprise Financial and Pepsi, among others; as well as location of multiple major sports and entertainment venues. St. Paul is headquarters for: Ecolab, Securian Financial, Lawson software and suburban 3M, among many others; as well as location of Minnesota state offices and UM.

On the local transportation front, Metro Transit's highly successful modern "Hiawatha Corridor" LRT introduced in 2007 and directly links Downtown Minneapolis with the Minneapolis-St. Paul International Airport and Mall of America. Their second line, the "Central Corridor" LRT currently under construction, will link downtown Minneapolis with downtown St. Paul via the University by 2014.

Current Intercity Passenger Transportation

Although once historically a major passenger railroad city, served by multiple carriers, since the creation of Amtrak, Twin Cities has generally been served only once daily, by the Chicago-Milwaukee-Twin Cities-Seattle "Empire Builder" train. MN DOT has been actively involved the Midwest Regional Rail Initiative with particular interest in expanded frequency to Chicago as well as new conventional service to Duluth and high-speed service to Rochester. As such, there would likely be solid support (if appropriate funding could be identified) for the true HSR Line of the nature being examined here. The proposed Minneapolis-Chicago HSR Line would fulfill the state's goal of a greenfield high-speed line to Rochester, and complement (or consume) plans for incremental improvements on the so-called "River" alignment on the CP (ex-Milw.) RR currently served by Amtrak.

The Twin Cities currently enjoys excellent air service, with 21 daily round trips to Chicago O'Hare Airport 15 daily round trips to Chicago Midway. There are also five daily round trips to Madison and nine to Milwaukee, just along the corridor being studied. Minneapolis-St. Paul is a major hub for Delta (formerly NW), with a very large network of nonstop flights to virtually all US and many international destinations. Minneapolis also enjoys a combined 14 daily bus round trips to Chicago operated by Greyhound and Megabus.

Proposed HSR Alignment and Service

The proposed HSR line routing would approach St. Paul from the south on aerial structures roughly parallel to freight alignments, crossing the Mississippi river entering St. Paul Union Depot. It would serve the Depot, site of significant redevelopment and eastern terminus of the new Central LRT Corridor (mentioned above). It would then continue along the BNSF corridor, but on an aerial alignment to the Target Field Station Site in Minneapolis, where it would make intermodal connections with both LRT and the Minneapolis-Big Lake "Northstar" commuter train.

All 25 daily round trips will stop at St. Paul and Minneapolis, with their combined ridership contributing 52% of all corridor ons/off's. With end-point downtown to downtown running times of under three hours, the HSR service will essentially create a "new mode" of transportation for the Twin Cities, significantly faster than conventional rail or auto to all intermediate destinations, and at least equal, in total end-point trip time to air. The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new "induced demand" trips.

Potential Station Area Development

Although there is already a strong commitment in the business community and among the region's professional planners to develop the areas surrounding St. Paul Union Depot and Minneapolis Target Station, it is unquestionable that the arrival of HSR will substantially increase the intensity and density of the already-proposed TOD.

Potential Job Creation Impact

There will be significant construction-industry job creation impact during the anticipated 11 year construction period. The direct annual job creation for MSA is estimated at 2,231. With secondary multiplier, this job number increases to 4,685.

Since the two MSA stations combined are the second largest regional market on the corridor, as well as a terminal for T&E and OBS crews, it will enjoy the second highest staffing level: railroad employment of 199; total after multiplier is 418. Perhaps most importantly, there will also be an anticipated indirect long-term job creation of 7,250 jobs resulting from the increased overall economic activity.

6.1.7 Chicago-Minneapolis Corridor Summary Statistics

Construction of the Chicago-Minneapolis HSR will utilize 209,622 job-years which translates to 19,057 jobs over the 11 year period to fully construct the line. Including indirect support jobs, the total is **40,019 new project positions.** A total of 1,327 permanent jobs will be created due to operations and maintenance of the new line and service and support services, and 44,800 new permanent jobs will be created through the direct regional economic expansion and development impacts of the new HSR.

Time savings due to the faster and more frequent service will save users $448 million a year. Reductions in accident costs will save $314 million a year. Cost savings due to lower transportation costs result in a $650 million benefit per year. These societal savings total an impressive $1.412 billion a year.

6.2 Economic Impacts for the Principal Cities in the Chicago - Detroit/Cleveland Corridor

This and the following sections break out the impact of the implementation of the HSR by the individual cities proposed to be served. For each a summary of the existing intercity access available is provided followed by a discussion of economic benefits, focusing on job creation, in terms of jobs related to construction of the HSR, as well as ongoing operations, and, most importantly, the anticipated long term increase related to economic development spurred by the introduction of high speed rail service. Finally a brief discussion of the specific way the HSR is proposed to fit into each community and the anticipated benefits is provided.

The Chicago Metro Region will be the cornerstone of the proposed Chicago-Detroit/Cleveland HSR, with 91% of forecast passenger trips beginning or ending in Chicago Metro. Detroit Metro will be the second most heavily patronized region with 58% of forecast passenger trips. The third busiest region will be greater Cleveland, generating 31% of trips (originating or ending).

Significant direct Operations and Maintenance (O&M) jobs will be based at the three endpoints as well as Toledo, where the Chicago-Toledo double trainsets split to the separate Detroit and Cleveland destination end-points.

As a truly "new mode" of transportation, providing downtown to downtown Chicago-Detroit running time of less than 2 hours, and Chicago-Cleveland in 2 ¼ hours, the HSR will produce a significant mode shift in transportation from air, auto and conventional rail, while also generating substantial induced demand. This "new mode" impact will be greatest in percentage terms for intermediate cities, such as Ft. Wayne and Toledo where there is currently limited existing rail and air service. Over time, this new mobility is expected to produce dramatic changes in property value, residential and commercial location decisions, employment, etc. The following summary table lists some of these key qualitative economic impact findings.

Table 38. HSR Regional Economic Impacts

Key Cities (Metro. Population)	City-Proper Population	Current Intercity Public Transportation Availability	Recent % Unemployment Current Econ Activity	Avg. HSR Economic % Development Growth
Chicago (9.5 mil)	2.8 million	Excellent	*9.5%/Good*	*+0.54%*
Ft. Wayne (414,000)	254,000	Fair	*8.5%/ Fair*	*+1.63%*
Toledo (651,000)	287,000	Fair	*7.0%/ Good*	*+1.38%*
Detroit (5.2 mil)	714,000	Good	*12+%/ Poor*	*+0.61%*
Cleveland (2.9 mil)	397,000	Good	*8.0%/Good*	*+0.71%*

One of the most impressive findings of this study is the number of jobs forecast to be created during the prime construction period. The base number of solid annual construction industry jobs is estimated at 16,900 for the 11 year period. When the secondary "multiplier effect" is counted, there will be a total of over 35,000 jobs.

Table 39. HSR Construction/ O&M Job Creation

	Cost-Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (assume 11-year period)	Avg. Annual Jobs w/ Multiplier
Total	$26,953	186,223	16,929	35,552

After project completion, the new HSR will conservatively employ 672 skilled workers, as well as additional support positions. Including the multiplier effect, we would anticipate 1,411 permanent jobs.

Table 40. Long-Term Ongoing HSR Direct Job Creation

	O&M jobs (incl. mgmt. & supv.)	Annual Ongoing Jobs w/ Multiplier
Total	672	1,411

Lastly is the very substantial anticipated long term job creation of nearly 36,600 jobs in all regions surrounding HSR Stations resulting from increased regional economic activity created by improved access and mobility.

Table 41. Long-Term Ongoing HSR Development-Related Job Creation

Estimated Current Total Jobs	Overall Avg. Econ % Growth	Estimated New Jobs Created
5,518,000	+0.66%	36,661

6.2.1 Economic Benefits for Chicago (as part of the Detroit/Cleveland Corridor)

Chicago is the business and commerce capital of the Midwest with city population of 2.8 million and (tri-state) MSA population of nearly 10 million. It has a massive business employment base including multiple corporate headquarters, an agricultural and commodities stock exchange, several major universities, and one of the largest convention centers in North America.

Chicago has historically been the major Midwest hub of intercity passenger railways since the mid 1800's and remains so today with Amtrak. It is also the only common end-point shared by all of the proposed new Midwest HSR routes. Chicago's O'Hare airport is the busiest in North America with direct flights to most domestic and many international destinations. Chicago's Midway Airport is a major connecting hub for low-cost Southwest Airlines, with non-stop flights to a wide range of destinations, including both endpoint of this corridor, Cleveland and Detroit.

Chicago will be the cornerstone of the proposed Chicago-Detroit/Cleveland HSR, with over 91% of all forecast passenger trips beginning or ending in Chicago. With downtown to downtown running times of less than 2 hours to Detroit and 2 hours 15 min's to Cleveland, the HSR service will create a "new mode" of transportation

for Chicago, unquestionably faster than conventional rail or auto to all intermediate destinations, and at least equal if not better in total end-point trip time than air.

The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new trips, known as "induced demand." For instance, with the new HSR service it will be feasible to make a same-day, or arguably half-day trips to/from Toledo and easy one-day trips to/from Detroit or Cleveland, all with travel time one-third as long as driving.

As discussed in greater detail in Section 2.1, there will be a large construction-industry job creation impact during the anticipated 11 year construction period. The likely direct annual job creation for Chicago MSA is estimated at 4,446. When the secondary impact ("multiplier") is taken into account, this annual job number increases to 9,337.

Since the Chicago will have the busiest HSR stations, as well as being the terminal for operating crews, it will enjoy the highest staffing level. Including station, onboard services, train operating crews, and maintenance, permanent job creation is estimated at 312. Adding the secondary "multiplier-related" impact results in 655 jobs. There will also be an anticipated indirect long-term job creation of 13,400 jobs resulting from the increased overall economic activity in the greater Chicago MSA resulting from the Detroit/Cleveland HSR.

6.2.2 Economic Benefits for Ft. Wayne

General Description

Ft. Wayne is a medium-sized city with population 254,000 located in northeastern Indiana and serving as Allen County Seat. The larger Ft. Wayne MSA, including immediately adjacent counties has a 414,000 population. Although once largely industrial, Ft. Wayne now has a more diversified work base to offset manufacturing losses.

Current Economy

In addition to lesser known companies, Ft. Wayne is headquarters to Genteq, North American Van Lines, Rea Magnet Wire, and Steel Dynamics, the 5th largest steel producer. Ft. Wayne's largest current employers include: Lutheran Health, G-M, Parkview Health, Lincoln Financial and ITT. Ft. Wayne is home of Indiana Univ./Purdue – Ft. Wayne, with nearly 15,000 students.

Current Intercity Passenger Transportation

Ft. Wayne has not been directly served by passenger rail since the 1990 rerouting of Amtrak's NYC-Pittsburgh-Ft. Wayne-Chicago Broadway Limited from the CR (former PRR) route through Ft. Wayne, to the more northerly NS (former NYC) route serving Waterloo, 25 miles to the north. Ft. Wayne currently has only one daily bus round trip to Chicago operated by Greyhound-affiliate Lake Front Lines. Ft. Wayne Airport has six daily regional commuter jet round trips to Chicago O'Hare Airport.

Proposed HSR Alignment and Service

Coming east from Gary, the proposed HSR alignment would largely follow the former PRR alignment, up to a new HSR Station at the traditional former PRR Baker St. location. Continuing eastward from Ft. Wayne, the HSR alignment would follow the NS (ex-NKP) alignment towards Toledo. Although the exact stopping pattern has not been determined, it is likely that roughly half of the 25 daily round trips Chicago-Detroit/Cleveland HSR trains would likely stop at Ft. Wayne. Scheduled running times are anticipated to be: Chicago 1 hr 10 min's; Toledo 25 min's; Detroit 55 min's; Cleveland 1 hr 15 min's.

Anticipated Mobility Impact

Because Ft. Wayne is near the geographic mid-point of the route, and the speeds are so high, Ft. Wayne will be in the unique position of being only roughly one hour from any end point! The HSR travel times to Chicago, Detroit and Cleveland are roughly 1/3 of typical driving times. Local planners hypothesize that improved access time, especially to Chicago, would make Ft. Wayne a more attractive location to attract new business and high skill employees. It can be expected that HSR will change fundamental travel perceptions and likely encourage new residential and employment opportunities. There should be substantial "induced demand," i.e. creation of net new trips to downtown Chicago.

Potential Station Area Development

The Baker St. Station site is already a transit hub for the small, but growing and well-received Ft. Wayne local bus system. The economic energy of a gateway to high-frequency, high quality HSR service should induce significant property value increase and spur new TOD in the several surrounding blocks.

Potential Job Creation Impact

As discussed in more detail in Section 2.1, there will be an immensely positive construction-industry job creation impact during the anticipated 11 year construction period. This likely annualized job creation for the greater Ft. Wayne region (defined as the area along the HSR line from half-way to Gary to half-way to Toledo) is estimated at 3,276. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 6,880.

As with other smaller intermediate HSR stations, the ongoing staffing requirements will create a small number of quality permanent jobs supporting operations of the HSR Service. Ft. Wayne Station and small MOW workforce is estimated to create 27 permanent jobs and a total of 56 jobs including the secondary multiplier effect. There will also be an anticipated indirect long-term job creation of 2,700 jobs resulting from the increased overall economic activity enabled by the HSR System

6.2.3 Economic Benefits for Toledo

General Description

Toledo is the 4th largest Ohio city, with population 287,000 located in northwestern Ohio and serving as Lucas County Seat. The larger Toledo MSA, including adjacent counties has a population of over 650,000. Like many other formerly industrial Midwestern cities, Toledo has experienced a population loss of nearly 25% in the last forty years, although it has been successful in recent CBD revitalization to stem the tide.

Current Economy

Although once the corporate HQ of several Fortune 500 companies, several of these (predominantly automotive supply chain) companies have been merged into other entities, located elsewhere. Toledo does remain the HQ location of Jeep, Libbey Glass and Dana Corporation. Toledo is also known for innovation and major production of glass (automotive, industrial and other purpose). Offshoots of Owens-Illinois, Owens-Corning and Pilkington North America are still significant in the Toledo economy.

Current Intercity Passenger Transportation

Toledo is served by two daily Amtrak round trips: the "Capitol Limited" operating Washington-Chicago and the "Lakeshore Limited" operating NYC-Chicago. The current Amtrak Station, known as M.L.K., Jr. Plaza is the former NYC "Toledo Central Union Terminal." Toledo is served by 2 daily Cleveland-Chicago round trips operated by Megabus and 2 daily round trips to Chicago by Greyhound. Toledo Airport has three daily commuter round trips to Chicago O'Hare Airport.

Proposed HSR Alignment and Service

Coming from the southwest along I-75, the proposed HSR alignment would briefly pick up the CSX alignment before crossing the Maumee River on a new bridge north of the existing CP bridge and then paralleling the railroad alignment to M. L. K. Jr. Plaza (Central Union Terminal). All HSR trainsets would split at Toledo going east/north-bound toward Cleveland and Detroit. They would conversely merge in the opposite direction. The alignment towards Cleveland would retrace itself over the new HSR Maumee River Bridge and then follow multiple RR alignments until ultimately reaching the I-80/90 corridor towards Cleveland. The alignment towards Detroit would initially follow the NS westward to Airline Junction, from whence a northerly route is proposed paralleling Conrail Shared Assets RR lines.

As the point where Chicago-Toledo "double" trainsets will split into "singles" for Detroit and Cleveland (or the opposite in the Chicago-bound direction) it is presumed that all HSR trains will make a station stop at Toledo. Thus Toledo will enjoy 25 daily round trips to Chicago, Detroit and Cleveland. Scheduled running times are anticipated to be: Chicago 1 hr 35 min's; Detroit 20 min's; Cleveland 40 min's.

Anticipated Mobility Impact

The two most significant likely impacts for Toledo will be new availability of frequent, affordably priced service to downtown Chicago in 1 ½ hours and Detroit in only 20 minutes. This will make one-day trips to Chicago easily viable less than 1/3 the current driving time) and commuting to Detroit in much less time than most current home-to-work local Detroit commutes. Local planners believe that improved access time to Chicago would make Toledo more attractive. Conversely, local business leaders fear the (likely) loss of scheduled commuter air service to O'Hare resulting from HSR, and also cite easy access to and availability of frequent air service at Detroit Wayne County Airport (only 45 minutes from Toledo) as adequate public transportation obviating the need for Chicago HSR. Notwithstanding different perspectives, it can still be expected that HSR will favorably change broad perception of access to/from Toledo and encourage new residential and employment opportunities. There will very likely be substantial "induced demand," for trips to Chicago and moderate numbers of new trips to Detroit and Cleveland.

Potential Station Area Development

The M. L. K., Jr. Toledo Union Terminal site is a target for development and new growth, which should definitely be helped by the energy of a frequent-service HSR Station. Even long before higher- and true high-speed rail was in the planning stages, the local Port Authority made a $10 million investment to upgrade the historic station into a modern multimodal (passenger rail/bus) facility including commercial office space. There is substantial nearby available property for (re) development and TOD.

Potential Job Creation Impact

As discussed in more detail in Section 2.1, there will be an immensely positive construction-industry job creation impact during the anticipated 11 year construction period. This likely annualized job creation for the greater Toledo region (defined as the area along the HSR line from half-way to Detroit to half-way to Toledo as well as 1/3 of the way to Cleveland) is estimated at 4,334. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 9,101. Ongoing staffing requirements will create quality permanent jobs supporting operations of the HSR Service, including splitting and merging of trains at the station. Toledo Station is estimated to create 51 permanent jobs and a total of 108 jobs including the secondary multiplier effect. There will also be an anticipated indirect long-term job creation of 3,967 jobs resulting from the increased overall economic activity enabled by the HSR System

6.2.4 Economic Benefits for Detroit

General Description/Economy

Detroit, Michigan's largest city and Wayne County Seat is located on the Detroit River in southeastern Michigan. Despite significant legendary population decline (from 5th US City in 1950 to 18th in 2010), Detroit still has a population of 714,000. The Detroit MSA has declined much less, and is US 11th largest, coming in at 4.3 million. Despite significant change and decline in local auto manufacturing, Detroit is still unquestionably recognized as the US auto capital or "Motor City." It is also very well known for its major sports franchises and venues.

Detroit is most notably corporate headquarters of: General Motors, Ford and Chrysler, as well as Compuware, HP Enterprise Services, Ernst & Young, and Quicken Loans.
The downtown skyline is dramatic, centered on the futuristic Renaissance Center, but has very little residential or mixed use housing stock.

On the local transportation front, other than the small elevated automated Downtown People Mover system, local transit is limited to bus service operated by Detroit Dept. of Transportation. After countless "false starts," it appears that the long-planned Woodward Corridor LRT will finally begin construction of a starter segment soon. Several plans for commuter rail restoration either north to Pontiac or west to Ann Arbor) have not materialized.

Current Intercity Passenger Transportation

Although once a major rail hub, with three separate passenger rail stations, the most famous and grandest of which is the abandoned Michigan Central Depot, Detroit has only been served by the Amtrak Pontiac-Detroit-Chicago "Wolverine Corridor" service for the last several years. In large part due to substantial MI DOT capital investment in the western half of the corridor and in rolling stock, this has been one of the Midwest's most successful passenger routes, carrying just under a half-million annual passengers. The downtown Detroit station site was relocated to a small but modern facility at "New Center" roughly 20 years ago, in conjunction with extension of the Michigan corridor to Pontiac via suburban Birmingham. There is also a well patronized, modern station with parking in Dearborn, west of Detroit.

Detroit Wayne County Airport is a major hub for Delta (ex-NW) and has excellent air service, including 19 daily round trips to Chicago O'Hare Airport 12 daily round trips to Chicago Midway. Detroit also has a combined 7 daily bus round trips to Chicago operated by Greyhound and Megabus.

Proposed HSR Alignment and Service

The proposed HSR line routing would approach Detroit on an aerial structure paralleling CR/MC from the south to a new HSR Station adjacent to the Amtrak New Center Station. Unlike the other HSR Corridors that largely parallel the intermediate routes of existing/incrementally improved state-sponsored Amtrak services, the Detroit-Chicago routing is entirely different from (hence complementary to) the planned upgraded MI-sponsored corridor, which serves (and will continue to serve): Ann Arbor, Jackson, Battle Creek, Kalamazoo and Michigan City.

Twenty-five daily round trips will serve Detroit with their ridership contributing to 58% of all Cleveland/Detroit-Chicago Corridor on's/off's. With end-point downtown to downtown running times of just under two hours, the HSR service should be a "game changer" for Downtown Detroit, essentially creating an entirely "new mode" of transportation, significantly faster than conventional rail to Chicago, than auto to all intermediate destinations, and equal, if not actually better in total end-point trip time than air. The combination of fast

running times, highly reliable service and affordable fares will also result in substantial generation of new "induced demand" trips.

Potential Station Area Development

Detroit is working hard to redefine and re-energize its greater downtown area, with a focus, among others, on new center. The presence of the new HSR Station, further helped by its proximity to the planned LRT for local access should provide a good impetus to development.

Potential Job Creation Impact

There will be significant construction-industry job creation impact during the anticipated 11 year construction period. The direct annual job creation for the expanded greater Detroit region is estimated at 1,604. With secondary multiplier, this job number increases to 3,369.

Since Detroit is the second largest market (after Chicago) on the corridor, as well as a terminal for T&E and OBS crews, it will experience railroad employment of 138; total after multiplier is 289. Perhaps most importantly, there will also be an anticipated indirect long-term job creation of 9,900 jobs resulting from the increased overall economic activity.

6.2.5 Economic Benefits for Cleveland

General Description/Economy

Cleveland is a major city in northeastern Ohio on the southern shore of Lake Erie with a city population of 395,000 and MSA population of 2.2 million. Cleveland is the county seat of Cuyahoga County. Notwithstanding still representing the largest MSA in Ohio, Cleveland has the unfortunate distinction of being one of the most rapidly declining major cities in the US. The city-proper population decline is explained by both the loss of an industrial/manufacturing base (especially steel and auto) and significant resettlement to the suburbs. It is still recognized as a center of commerce, culture, entertainment and education.

Cleveland is corporate headquarters of: Applied Industrial Technologies, Sherwin-Williams, Forest City Enterprises, among others. The massive health care complex centered around the Cleveland Clinic and related facilities are a major growth-employer.

On the local transportation front, Cleveland RTA operates two modern LRT lines (legacy of the independent Shaker Heights Rapid Transit) as well as a single-route heavy rail metro that directly connects Cleveland Hopkins Airport with downtown and the eastern suburbs. Cleveland RTA has also recently introduced a successful and widely recognized bus rapid transit, known as the Euclid Corridor "Health Line."

Current Intercity Passenger Transportation

Although once a significant passenger railroad city, served by multiple carriers, and with a grand, centrally located underground station at Cleveland Terminal Tower, since the creation of Amtrak, Cleveland has generally been served by only two daily round trips, unfortunately usually in the middle of the night (due to schedule requirements) by overnight Washington and New York-Chicago long distance trains. For cost and operational reasons the station location was moved from Terminal Tower to a slightly edge of downtown location on the NS main line on which the trains operate through Cleveland. As a result of the service limitations, local ridership to/from Chicago is very light

Cleveland Hopkins Airport has good air service, with 18 daily round trips to Chicago O'Hare Airport 8 daily round trips to Chicago Midway. Cleveland also has a combined 7 daily bus round trips to Chicago operated by Greyhound and Megabus.

Proposed HSR Alignment and Service

The proposed HSR line routing would approach Cleveland on an aerial structure paralleling the NS from the west, with an intermediate stop at Cleveland Hopkins Airport, and continuing along the NS to the existing Amtrak Lakefront Station above which the HSR would have a new elevated station. This would allow potential connections to other (expanded) Amtrak service as well as a branch line of the RTA LRT.

All 25 daily round trips will stop at Cleveland Lakefront and Cleveland Hopkins, with their combined ridership contributing 31% of all Cleveland/Detroit-Chicago Corridor on's/off's. With end-point downtown to downtown running times of just over two hours, the HSR service will essentially create a "new mode" of transportation for metropolitan Cleveland, significantly faster than conventional rail or auto to all intermediate destinations, and at least equal, if not actually better in total end-point trip time than air. The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new "induced demand" trips.

Potential Station Area Development

Although there is already some redevelopment along the waterfront area, in part due to the Rock and Roll Hall of Fame, the new presence of a very high volume HSR terminus should provide a great impetus to development. Local planners support the concept of this station location as part of long-term growth and would also recommend a potential maintenance facility to the east of the proposed passenger station.

Potential Job Creation Impact

There will be significant construction-industry job creation impact during the anticipated 11 year construction period. The direct annual job creation for the expanded greater Cleveland region is estimated at 3,269. With secondary multiplier, this job number increases to 6,865.

Since the two stations combined are the third largest regional market (after Chicago and Detroit, in order) on the corridor, as well as a terminal for T&E and OBS crews, Cleveland will experience railroad employment of 144; total after multiplier is 303. Perhaps most importantly, there will also be an anticipated indirect long-term job creation of 6,600 jobs resulting from the increased overall economic activity.

6.2.6 Chicago-Detroit/Cleveland Corridor Summary Statistics

Construction of the Chicago-Detroit/Cleveland HSR will utilize 186,223 job-years which translates to 16,929 jobs over the 11 year period to fully construct the line. Including indirect support jobs, the total is 35,552 new project positions. A total of 1,411 permanent jobs will be created due to operations and maintenance of the new line and service and support services, and 36,600 new permanent jobs will be created through the direct regional economic expansion and development impacts of the new HSR.

Time savings due to the faster and more frequent service will save users $461 million a year. Reductions in accident costs will save $314 million a year. Cost savings due to lower transportation costs result in a $312 million benefit per year. These societal savings total an impressive $1.087 billion a year.

6.3 Economic Impacts for the Principal Cities in the Chicago - Cincinnati Corridor

This and the subsequent sections break out the impact of the implementation of the HSR, as described in previous sections, by the individual cities proposed to be served. For each a summary of the existing intercity access available is provided followed by a discussion of economic benefits, focusing on job creation, in terms of jobs related to construction of the HSR, as well as ongoing operations, and, most importantly, the anticipated long term increase related to economic development spurred by the introduction of high speed rail service. Finally a brief discussion of the specific way the HSR is proposed to fit into each community and the anticipated benefits is provided.

Chicago will be the cornerstone of the proposed Chicago-Cincinnati HSR, with 95% of forecast passenger trips beginning or ending in Chicago. Indianapolis will be the second most heavily patronized station, with nearly 54% of forecast passenger trips beginning or ending there. The third busiest station will be Cincinnati, with 49% of trips starting or ending there. The predominance of the permanent direct job creation will reside at the end-point cities where Operations and Maintenance (O&M) Crews and On Board Service Crews will report and where equipment maintenance will be performed.

Although the largest city-pair ridership and major operations facilities involve the endpoint cities Chicago and Cincinnati, somewhat larger relative local economic benefits will accrue to intermediate cities: Lafayette and Indianapolis. The explanatory factor is that the base economic activity level is so lower so the newly added value contributes a much larger percentage.

As effectively a new mode of transportation, providing downtown to downtown Chicago-Cincinnati in less than 2 hours, and Chicago-Indianapolis in slightly over one hour, the HSR will produce a significant mode shift from air, auto and conventional rail, while also generating substantial induced demand. This impact will be the greatest in percentage terms for Lafayette and Indianapolis, which are just below and above one hour's trip time to Chicago. This is especially important as there is currently limited passenger rail service and no scheduled air for Lafayette. This new mobility is expected to produce dramatic changes in property value, residential and commercial location decisions, employment, etc. The following summary table lists some of these key qualitative economic impact findings.

Table 42. HSR Regional Economic Impacts

Key Cities (Metro. Population)	City-Proper Population	Current Intercity Public Transportation Availability	Recent % Unemployment Current Econ Activity	Avg. HSR Economic % Development Growth
Chicago (9.5 mil)	2.8 million	Excellent	9%/Excellent	+0.57%
Lafayette (183,000+)	67,000	Fair	7.5%/Fair	+2.0%
Indianapolis (2.0 mil.)	830,000	Good	8%/ Good	+0.79%
Cincinnati (2.1 mil.)	297,000	Fair	9%/Fair	+0.84%

One of the most impressive findings of this study is the number of jobs forecast to be created during the prime construction period. The base number of solid annual construction industry jobs is estimated at over 14,400 for the 7 year period. When the secondary "multiplier effect" is counted, there will be a total of over 30,000 jobs.

Table 43. HSR Construction/ O&M Job Creation

	Cost-Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (assume 7-year period)	Avg. Annual Jobs w/ Multiplier
Total	$14,648	101,202	14,457	30,361

After project completion, the new HSR will employ 378 skilled workers, as well as additional support positions. Including the multiplier effect, we would anticipate 794 permanent jobs.

Table 44. Long-Term Ongoing HSR Direct Job Creation

	O&M jobs (incl. mgmt. & supv.)	Annual Ongoing Jobs w/ Multiplier
Total	378	794

Lastly is the very substantial anticipated long term job creation of over 20,641 jobs in all regions surrounding HSR Stations resulting from increased regional economic activity created by improved access and mobility.

Table XX Long-Term Ongoing HSR Development-Related Job Creation

Estimated Current Total Jobs	Overall Avg. Econ % Growth	Estimated New Jobs Created
3,820,000	+0.69%	26,215

6.3.1 Economic Benefits for Chicago (as part of the Cincinnati Corridor)

Chicago is the business and commerce capital of the Midwest with city population of 2.8 million and (tri-state) MSA population of nearly 10 million. It has a massive business employment base including multiple corporate headquarters, an agricultural and commodities stock exchange, several major universities, and one of the largest convention centers in North America.

Chicago has historically been the major Midwest hub of intercity passenger railways since the mid 1800's and remains so today with Amtrak. It is also the only common end-point shared by all of the proposed new Midwest HSR routes. Chicago's O'Hare Airport is the busiest in North America with direct flights to most domestic and many international destinations. Chicago's Midway Airport is a major connecting hub for low-cost Southwest Airlines, with non-stop flights to a wide range of destinations, including Indianapolis (*but not Cincinnati)* as well as several other proposed HSR end-point and intermediate cities.

Chicago will be the cornerstone of the proposed Chicago-Cincinnati HSR, with over 95% of forecast passenger trips beginning or ending in Chicago. With downtown to downtown running times of less than 2 hours, the HSR service will essentially create a "new mode" of transportation for Chicago, unquestionably faster than conventional rail or auto to all intermediate destinations, and at least equal if not better in total end-point trip time than air.

The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new trips, known as "induced demand." For instance, with the new HSR service it will be feasible to make a same-day, or arguably half-day trip to Indiana's State Capitol, Indianapolis, with travel time roughly one-third as long as driving.

As discussed in greater detail in Section 3.1, there will be a large construction-industry job creation impact during the anticipated 7 year construction period. The likely direct annual job creation for Chicago MSA is estimated at 3,825. When the secondary impact ("multiplier") is taken into account, this annual job number increases to 8,032.

Since the Chicago will have the busiest HSR stations, as well as being the terminal for operating crews, it will enjoy the highest staffing level. Including station, onboard services, train operating crews, and maintenance, permanent job creation is estimated at 214. Adding the secondary "multiplier-related" impact results in 450 jobs. There will also be an anticipated indirect long-term job creation of 12,500 jobs resulting from the increased overall economic activity in the greater Chicago MSA resulting from the Cincinnati HSR.

6.3.2 Economic Benefits for Lafayette

General Description

Lafayette is a small Indiana city with population 67,000 located in western Indiana along the Wabash River and serving as Tippecanoe County Seat. The larger Lafayette/West Lafayette MSA, has a 183,000 population. The most recognized regional entity is the 40,000 student campus of Purdue in West Lafayette.

Current Economy

In addition to Purdue University, Lafayette has facilities of several well known industries: Alcoa, Subaru, TRW and Caterpillar among several others. There are two large hospital complexes serving the greater region: Indiana University Hospital and Catholic Hospital.

Current Intercity Passenger Transportation

Lafayette is served by the single daily Indianapolis-Chicago round trip of the "Hoosier State," at a relatively new station built along a large freight rail mainline consolidation project. Former street-running tracks of the CSX (ex-Monon) were combined and relocated in a grade-separated trench with those of the NS and TP&W. The Amtrak service continues on to WV and the Northeast 3 times a week as the "Cardinal." Lafayette has 3 daily round trips to Chicago on Greyhound, but no scheduled air service.

Proposed HSR Alignment and Service

Coming from Gary and the west, paralleling I-65, the proposed HSR alignment would divert from the Interstate onto the CSX corridor where it would parallel the consolidated freight alignment to the existing Lafayette Amtrak Station. South of the station, the alignment would parallel the Wabash River and use the NS (ex-CCC&Stl) until rejoining I-65. Although the exact stopping pattern has not been determined, it may be assumed that half of the 25 daily round trips Chicago-CIN HSR trains would likely stop at Lafayette. Scheduled running times are anticipated to be: Chicago 50 min's; Indianapolis 20 min's; Cincinnati 1 hr 5 min's.

Anticipated Mobility Impact

Because Lafayette is near to the mid-point of the route, and the speeds are so high, it will be in the unique position of being only roughly one hour from either Chicago or Cincinnati! The HSR travel times to these cities are less than ½ typical driving times. Local planners hypothesize that such dramatically improved access time, especially to Chicago, would make Lafayette a significantly more attractive location for business and residence.

Although Purdue is able to attract a very high quality faculty at present, HSR would even allow the possibility of long distance commuting from Chicago, an option that might be particularly attractive to temporary or visiting professors. In the same increased mobility context, there should be substantial "induced demand," i.e. creation of net new trips to downtown Chicago.

Potential Station Area Development

The 200 No. Second St. station site will provide a good center point for concentrated development, being less than a half-mile NW of downtown and near the State St. (IN-26) arterial street river crossing to West Lafayette. In part because of the student demand for local bus travel, Lafayette already has a well-patronized, 7-day "pulse" "CityBus" service with an intermodal transit center adjacent to the Amtrak/HSR station. The economic energy of a new gateway to high-frequency, high quality HSR service should induce significant overall property value increases and spur specific new TOD in the adjacent blocks.

Potential Job Creation Impact

As discussed in more detail in Section 3.1, there will be an immensely positive construction-industry job creation impact during the anticipated 7 year construction period. This likely annualized job creation for the greater Lafayette region (defined as the area along the HSR line from half-way to Gary to half-way to Indianapolis) is estimated at 3,804. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 7,989.

As with other smaller intermediate HSR stations, the ongoing staffing requirements will create a small number of quality permanent jobs supporting operations of the HSR Service. Lafayette Station and mid-route MOW workforce is estimated to create 33 permanent jobs and a total of 70 jobs including the secondary multiplier effect. There will also be an anticipated indirect long-term job creation of 2,000 jobs resulting from the increased overall economic activity enabled by the HSR System

6.3.3 Economic Benefits for Indianapolis

General Description

Indianapolis, IN is the state capital of Indiana and second largest city in the Midwest with a population of 830,000. Indianapolis is also the county seat of Marion County and the focus of a greater CSA with population in excess of 2 million. Unlike many other Midwestern cities, Indianapolis has a vibrant economy, well-developed and successful downtown with major office buildings and hotels, a very large convention center as well as multiple professional and amateur athletic event venues and other business/entertainment activities.

Current Economy

Indianapolis is home to a multitude of corporate headquarters, including: Eli Lilly, Brightpoint, Wellpoint, Republic (Frontier) Airlines, Roche Diagnostics, Dow Agroscientists, among others. Other significant employers include: Indiana Univ. Heath, Sallie Mae, Delta Faucet, GM, etc. Primarily because of good air and highway access, Indianapolis is a major freight distribution center, including FedEx's second largest operational hub. Because of its diversified employment base, Indianapolis has been able to keep its unemployment well below the Indiana average, and below x% even during the recession.

Current Intercity Passenger Transportation

Although historically a major passenger railroad hub, served by multiple routes, for the last two decades, Indianapolis has been served by only one daily Amtrak frequency operating to/from Chicago, with a thrice weekly long-distance extension to Cincinnati, West Virginia and the Northeast. Indianapolis has a solid intercity bus service to Chicago with "curb-operator" Megabus providing 6 daily non-stop round trips and conventional

intercity Greyhound providing eleven daily round trips (combined local and express services). Indianapolis has one of the few brand new airports in the United States, opened in 2008. Its expansive terminal is served by ten major airlines. Particularly relevant to our study, Indianapolis has 4 daily round trips to Chicago Midway on Southwest as well as 18 daily round trips to ORD on the major "legacy" air carriers.

Proposed HSR Alignment and Service

The likely alignment from the Cincinnati direction will follow the CSX (ex-CCCStl "Big Four Route") passing Belt Crossing before multiple curves leading into the historic Indianapolis Union Station site. A good portion of the HSR alignment will be elevated on the side closer to the city to provide separation from freight lines as well as full highway separation. It has been hypothesized that locating the HSR platforms on the north side of Union Station would allow flatter curves and hence slightly better speeds entering and leaving the new station. Continuing northwest towards Lafayette, the HSR alignment will follow two freight rail lines: CSX (ex-CCCStl) and THIE/CR (ex-P&E) before briefly following I-74 and then transitioning to CSX (ex-PRR) to Lebanon. Indianapolis is presumed to be a "primary" HSR Station to be served by all of the 25 daily Chicago-Cincinnati round trips. Running times will be 1 hr 10 min's to Chicago and 45 min's Cincinnati.

Anticipated Mobility Impact

HSR Service will provide an essentially new transportation alternative to Indianapolis, with downtown to downtown running time to Chicago significantly faster than any existing mode, including air, yet very affordably priced (proposed OW average HSR fare of only $35.40). It is anticipated that the high speed and low fare will divert the entirety of the limited existing passenger rail service and a sizable percentage of current air and intercity bus service. Furthermore, HSR will be extremely competitive with auto, especially for trips to Chicago, where it will be twice to three times faster and much more reliable than driving, opening up significant opportunity for easier business and expanded recreational trips. HSR will undoubtedly create new mobility opportunities resulting in significant net "induced" demand and an overall measurable positive economic impact on the greater Indianapolis region.

Potential Station Area Development

Notwithstanding the current vibrancy of downtown Indianapolis, it can be anticipated that further value and additional economic activity will be encouraged downtown, especially in the several blocks surrounding Union Station as a result of HSR. There are already multiple hotels (combined capacity four thousand rooms) and other commercial spaces with direct connection to the nearby massive Indianapolis Convention Center and close to Union Station. Local planners anticipate further new development continuing on the opposite side of Union Station, helping to fill in those less densely developed blocks.

Potential Job Creation Impact

As discussed in greater detail in Section 3.1 there will be an immense construction-industry job creation impact during the anticipated 7 year construction period. The likely direct annual job creation for Indianapolis and its surroundings is estimated at 3,633. When the secondary impact (or so-called "multiplier") is taken into account, this annual job number will increase to 6,710. Staffing and operations of the HSR Service is estimated to create 25 permanent jobs, mostly at the downtown HSR Station; when the multiplier for related job-creation is counted, there will be a total of 53 jobs.

There will also be an impressive anticipated long-term job creation of 5,200 jobs resulting from the increased overall Indianapolis-area economic activity inspired by the HSR System and the new level of access/mobility.

6.3.4 Economic Benefits for Cincinnati

General Description/Economy

Cincinnati is a major city in southwestern Ohio with population of 297,000. Although only the 3rd largest Ohio city by city-proper population, Cincinnati has an MSA population of 2.2 million, making it the largest Ohio MSA (noting that a portion of the MSA includes neighboring counties in KY and IN). Cincinnati also serves as the county seat for Hamilton County. Like many other formerly industrial leader cities, Cincinnati has experienced a 35% decline in urban population over the last 40 years. It still has a vibrant downtown area with impressive modern and classic architecture and a broad base of major corporate offices.

In addition to the largest and best known symbol, Proctor & Gamble, Cincinnati is also corporate headquarters of: Kroger, Macy's, American Financial, Chiquita Brands, Great American Insurance, General Cable and GE Aviation, among many others. Notably, there are nine Fortune 500 and fifteen Fortune 1000 HQ's. On the public sector side, the University of Cincinnati, including its extensive health care research and teaching arm is the largest single employer in city.

On the local transportation front, Southwest Ohio RTA operates Metro, an extensive Cincinnati regional bus system, which is supplemented by Transit Authority of Northern Kentucky's suburban KY service feeding into downtown. Several planned attempts to introduce modern LRT to the region have failed, but there is a well-advance recent plan to build a starter-segment downtown streetcar circulator system, which has a good likelihood of attainment.

Current Intercity Passenger Transportation

Although once a significant passenger railroad hub, centered on the truly monumental 1930's Cincinnati Union Terminal, once served by more than a half-dozen different carriers and over 100 daily round trips, there has been very limited passenger rail service to Cincinnati since the introduction of Amtrak. For the last couple of decades, Amtrak service only consists of a tri-weekly round trip "Cardinal," operating New York-West Virginia-Cincinnati-Indianapolis-Chicago. Furthermore, because the schedule is set for end-point times, it typically serves Cincinnati in the middle of the night, and therefore generates next to no local corridor ridership. The current station is a tiny, but comfortable and modern sub-slice of the grand Cincinnati Union Terminal, which ahs been successfully reengineered into a major Museum.

Cincinnati Airport (actually located in neighboring northern Kentucky) has reasonable air service, primarily by Delta, which once operated a major hub there, but the stark absence of Southwest, or any other low-cost carrier, has left Cincinnati with the highest short-distance corridor fares of any MWHSR Network end-point cities. In fact, the average fares for the 22 daily round trips to Chicago O'Hare Airport operated by the major legacy air carriers are between double and triple the comparable fares from other HSR end-point cities! Cincinnati also has a combined 9 daily bus round trips to Chicago operated by Greyhound and Megabus.

Proposed HSR Alignment and Service

Of two alternatives considered the more likely proposed HSR alignment would approach Cincinnati from the northwest along the CSX (ex-B&O) along the Ohio River and then turn north on an aerial structure to reach Union Terminal having avoided conflict with the massive CSX Queensgate freight classification yard. The new HSR Station would be adjacent to CUT.

All 25 daily round trips will terminate at CUT, with their combined ridership contributing 49% of all Cincinnati-Chicago Corridor on's/off's. With end-point downtown to downtown running times of just under two hours, this HSR service will clearly represent a "new mode" of transportation for Cincinnati, much faster than driving

to destinations, and at least equal, if not likely better in total end-point trip time than air. Especially taken in the context of historically high air fares to Chicago, the combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new "induced demand" trips.

Potential Station Area Development

The site of the station, at the far NW edge of Downtown, roughly 1½ miles away, in the so-called Queensgate Neighborhood, could provide opportunity for substantial new development. To the west is bounded by railroad yards and industrial-related applications, but there should be ample opportunity to capitalize on the spaces to the north and south of the "grand entrance boulevard" as well as nearby "West End" Neighborhood, east of CUT. There will also likely be the need for a circulator-style shuttle bus between the vibrant downtown area and the station. In any case, the new introduction of a high volume of economically substantial travelers traversing the HSR Station will provide a great impetus to local (TOD) and general regional development.

Potential Job Creation Impact

There will be significant construction-industry job creation impact during the anticipated 7 year construction period. The direct annual job creation for the expanded greater Cincinnati region is estimated at 3,195. With secondary multiplier, this job number increases to 6,710.

Since Cincinnati is the end-point and second largest single station on the corridor, as well as a terminal for T&E and OBS crews, it will generate railroad employment of 105; total after multiplier is 221. Perhaps most importantly, there will also be an anticipated indirect long-term job creation of over 5,000 jobs resulting from the increased overall economic activity.

6.3.5 Corridor Summary Statistics

Construction of the Chicago-Cincinnati HSR will utilize 101,202 job-years which translates to 14,457 jobs over the 7 year period to fully construct the line. Including indirect support jobs, the total is 30,361 new project positions. A total of 794 jobs will be created due to operations and maintenance of the new line and service and support services, and *26,340* new permanent jobs will be created through the direct regional economic expansion and development impacts of the new HSR.

Time savings due to the faster and more frequent service will save users $150 million a year. Reductions in accident costs will save an additional $150 million a year. Cost savings due to lower transportation costs result in a $321 million benefit per year. These societal savings total an impressive $621 million a year.

6.4 Economic Impacts for the Principal Cities in the Chicago - St. Louis Corridor

This and the subsequent sections break out the impact of the implementation of the HSR, as described in previous sections, by the individual cities proposed to be served. For each a summary of the existing intercity access available is provided followed by a discussion of economic benefits, focusing on job creation, in terms of jobs related to construction of the HSR, as well as ongoing operations, and, most importantly, the anticipated long term increase related to economic development spurred by the introduction of high speed rail service.

Finally a brief discussion of the specific way the HSR is proposed to fit into each community and the anticipated benefits is provided.

Chicago will be the cornerstone of the proposed Chicago-St. Louis HSR, with 95% of forecast passenger trips beginning or ending in Chicago. St. Louis will be the second most heavily patronized station on the Chicago-St. Louis HSR, with nearly 40% of forecast passenger trips beginning or ending there. The predominance of the permanent direct job creation will reside at these end-point cities where Operations and Maintenance (O&M) Crews and On Board Service Crews will report and where equipment maintenance will be performed.

Although the largest city-pair ridership and major operations facilities involve the endpoint cities Chicago and St. Louis, larger *relative local economic* benefits will accrue to intermediate cities: Champaign-Urbana, Decatur and Springfield. The explanatory factor for this seeming paradox is that the base economic activity level is so much lower in the intermediate points, and the newly added value contributes a much larger percentage.

As a truly "new mode" of transportation, providing downtown to downtown Chicago-St. Louis running time of less than 2 hours, the HSR will produce a significant mode shift in transportation between Chicago and St. Louis, from air, auto and conventional rail, while also generating substantial induced demand. This "new mode" impact will be greatest in percentage terms for such cities as Champaign-Urbana, Decatur and Springfield, all of which are roughly one hour from an end-point. This is especially important as there is currently limited, or no, existing rail or air service for many of the city pair combinations. Over time, this new mobility is expected to produce dramatic changes in property value, residential and commercial location decisions, employment, etc. The following summary table lists some of these key qualitative economic impact findings.

Table 45. HSR Regional Economic Impacts

Key Cities (Metro. Population)	City-Proper Population	Current Intercity Public Transportation Availability	Recent % Unemployment Current Econ Activity	Avg. HSR Economic % Development Growth
Chicago (9.5 mil)	2.8 million	Excellent	9%/Excellent	+0.5%
Champaign (150,000+)	75,000	Fair	7.5%/ Good	+1.67%
Decatur (109,000)	81,900	Poor	10%/ Fair	+2.0%
Springfield (200,000)	111,500	Fair	6%/Good	+1.33%
St. Louis (2.9 mil.)	354,000	Good	8%/Fair	+0.88%

One of the most impressive findings of this study is the number of jobs forecast to be created during the prime construction period. The base number of solid annual construction industry jobs is estimated at over 16,000 for the 7 year period. When the secondary "multiplier effect" is counted, there will be a total of nearly 34,000 jobs.

Table 46. HSR Construction/ O&M Job Creation

	Cost-Capital Construction (000,000)	Estim. Total Construction Job-Years	Annual Jobs (assume 7-year period)	Avg. Annual Jobs w/ Multiplier
Total	$16,327	112,805	16,115	3,841

After project completion, the new HSR will conservatively employ 381 skilled workers, as well as additional support positions. Including the multiplier effect, we would anticipate 800 permanent jobs.

Table 47. Long-Term Ongoing HSR Direct Job Creation

	O&M jobs (incl. mgmt. & supv.)	Annual Ongoing Jobs w/ Multiplier
Total	381	800

Lastly is the very substantial anticipated long term job creation of over 20,641 jobs in all regions surrounding HSR Stations resulting from increased regional economic activity created by improved access and mobility.

Table 48. Long-Term Ongoing HSR Development-Related Job Creation

Estimated Current Total Jobs	Overall Avg. Econ % Growth	Estimated New Jobs Created
3,125,423	+0.66%	20,641

6.4.1 Economic Benefits for Chicago (as part of the St. Louis Corridor)

Chicago is the business and commerce capital of the Midwest with city population of 2.8 million and (tri-state) MSA population of nearly 10 million. It has a massive business employment base including multiple corporate headquarters, an agricultural and commodities stock exchange, several major universities, and one of the largest convention centers in North America.

Chicago has historically been the major Midwest hub of intercity passenger railways since the mid 1800's and remains so today with Amtrak. It is also the only common end-point shared by all of the proposed new Midwest HSR routes. Chicago's O'Hare airport is the busiest in North America with direct flights to most domestic and many international destinations. Chicago's Midway Airport is a major connecting hub for low-cost Southwest Airlines, with non-stop flights to a wide range of destinations, including St. Louis as well as several other proposed HSR end-points and a couple of intermediate cities.

Chicago will be the cornerstone of the proposed Chicago-St. Louis HSR, with over 95% of forecast passenger trips beginning or ending in Chicago. With downtown to downtown running times of less than 2 hours, the HSR service will essentially create a "new mode" of transportation for Chicago, unquestionably faster than conventional rail or auto to all intermediate destinations, and at least equal if not better in total end-point trip time than air.

The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new trips, known as "induced demand." For instance, with the new HSR service it will be feasible to make a same-day, or arguably half-day trip to the State Capital of Springfield, with travel time roughly one-third as long as driving.

As discussed in greater detail in Section 4.1, there will be a large construction-industry job creation impact during the anticipated 7 year construction period. The likely direct annual job creation for Chicago MSA is estimated at 4,454. When the secondary impact ("multiplier") is taken into account, this annual job number increases to 9,353.

Since the Chicago will have the busiest HSR stations, as well as being the terminal for operating crews, it will enjoy the highest staffing level. Including station, onboard services, train operating crews, and maintenance, permanent job creation is estimated at 172. Adding the secondary "multiplier-related" impact results in 362 jobs.

There will also be an anticipated indirect long-term job creation of 11,515 jobs resulting from the increased overall economic activity in the greater Chicago MSA resulting from the St. Louis HSR.

6.4.2 Economic Benefits for Champaign-Urbana

General Description

Champaign, IL is a successful northern Illinois city 129 miles south of Chicago, with population of 75,000, and over 150,000 in the MSA, including adjacent Urbana. In addition to serving as the seat of Champaign County, it is best known as home to the state's main land grant school, the University of Illinois at Urbana-Champaign. In part due the commercial activity of the University, Champaign has maintained a higher level of downtown commercial activity than typical for this population.

Current Economy

In addition to primary employer and business generator U of I, there is a successful and growing high tech and biotech business. U of I-related Research Park includes field locations of SAIC, State Farm, IL Water Survey, and other technical specialty organizations. In large part due to the U of I presence, unemployment has remained below 6% even in the 2008 recession.

Current Intercity Passenger Transportation

Champaign is served by Amtrak operating on the CN (ex-IC) Chicago-Carbondale mainline. In addition to two daily locally-oriented Carbondale-Chicago Amtrak round trips, Champaign is also served by the daily New Orleans-Memphis-Carbondale-Chicago City of New Orleans. Average scheduled time to Chicago is about 2.5 hours. There is also regularly scheduled intercity bus service on a number of routes operated by several carriers. There is limited air service to Chicago O'Hare.

The former IC Station was replaced by the striking new "Illinois Terminal" multimodal station nearly 10 years ago. This brings together all intercity rail and bus service as well as local transit operations. It is proposed to that the new HSR service would stop here as well.

Proposed HSR Alignment and Services

Because of the high quality and direct north-south route of the CN route, which already has several grade separations, it is proposed that the HSR line exactly parallel the current rail alignment through Champaign County. The right-of-way generally has room for the proposed additional tracks. Some track shifting will be required to avoid conflicts between the HSR and freight tracks. The alignment will gradually transition on a short segment of new ROW near the village of Toledo to gain access to the NS route towards Decatur. Champaign is proposed to be an "express train" station, to be served by 25 daily hourly Chicago-St. Louis round trips.

Anticipated Mobility Impact

Although the existing IDOT-sponsored Amtrak service is well-patronized, its success has been limited by long travel times, which result partly from the awkward backup movement required to enter/leave Chicago Union Station, and poor on-time performance resulting from sharing what is now a predominantly single track route with CN's extensive freight operations. The new HSR service will provide a radically improved new transportation alternative given the "memory-pattern" hourly (half-hour peak service) departures and 45 minute running time to Chicago. In the opposite direction, running times will be only 30 minutes to Springfield, and 1 hour 15 minutes to St. Louis. These new times are 2-3 times faster than existing Amtrak or typical driving times to Chicago and almost 3 hours faster than driving to St. Louis.

Local planners hypothesize that this new access time and related perceptions of mobility will produce a significant improvement to attractiveness of Champaign-Urbana. It is expected the HSR will change fundamental

travel perceptions and encourage new residential and employment opportunities in the Champaign-Urbana region. In addition to attracting a major portion of existing highway trips, it can be anticipated that there will be substantial "induced demand," i.e. creation of net new trips, especially to Chicago, given the ability to effectively access the Loop in less time than some of its existing suburbs.

Potential Station Area Development

Notwithstanding comments by City officials that they are pleased with the "Illinois Terminal" multimodal station as a city transportation hub, in nearly ten years of operation, it has not stimulated measurable new commercial/residential development or redevelopment. It is precisely for this reason that it is believed the arrival of a high quality, hourly HSR service could stimulate significant development for several blocks surrounding the station.

In addition to likely high quality TOD including residential, commercial and light industrial development surrounding the station site, and there will be major related economic stimulus from radically increased activity at the Illinois Terminal Station location, because of the desire of businesses to locate close to the station and the new and all-day long flow of mid- to high-income passengers. The new HSR service should also strengthen demand for the proposed east-west Bus Rapid Transit (BRT) corridor being studied by local transit operator Champaign-Urbana Mass Transit District.

Potential Job Creation Impact

As discussed in greater detail in Section 4.1, there will be an immensely positive construction-industry job creation impact during the anticipated 7 year construction period. This likely annualized job creation for greater Champaign-Urbana is estimated at 3,092. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 6,493.

As with all other intermediate HSR stations, the ongoing staffing requirements will create quality permanent jobs supporting operations of the HSR service. The Champaign Station and small maintenance requirements are estimated to create 25 permanent jobs, mostly at the significantly expanded "Illinois Terminal" Multimodal Terminal, and a total of 53 jobs including the secondary multiplier effect.

There will also be an anticipated indirect long-term job creation of 1,594 jobs resulting from the increased overall Champaign-Urbana-area economic activity inspired by the HSR.

6.4.3 Economic Benefits for Decatur

General Description

Decatur, IL is a central Illinois city with population of 81,000 and MSA population of 109,000. Decatur is the county seat of Macon County. Although there is still a substantial downtown with viable commercial activity, much of the population growth and shift has occurred at the outer edges of the city, sprawling into adjacent Macon County communities.

Current Economy

Decatur is an industrial and agricultural center with its most notable employer, ADM, having its world headquarters in Decatur. Other substantial employers include: Caterpillar, Tate & Lyle, Firestone, Richland Community College and Millikin University. Recent historic unemployment rates have been better than other central Illinois cities, and had only risen to 7.9 %, in 2008 at the beginning of the current recession.

Current Intercity Passenger Transportation

Decatur has relatively limited public transportation options. The minimal service Decatur Airport currently has 3 weekday round trips to St. Louis Lambert on small turboprops operated by Great Lakes Airlines. Rail passenger service was discontinued on May 1, 1971 and, except for a brief experimental service funded by IDOT in the 1980s, has not been available. Immediately prior to Amtrak, there was one daily N&W round trip to/from Chicago. Intercity bus service is operated by Greyhound, including 4 daily trips to Chicago, via Champaign, and 3 daily trips to St. Louis, via Springfield.

Proposed HSR Alignment and Service

In order to avoid speed limitations and congestion passing ADM, Firestone, Caterpillar and NS car shops, the HSR alignment is proposed to briefly leave the existing NS (ex N&W) ROW. Coming from Champaign, the new route would depart the NS ROW near Cerro Gordo and continue due west, crossing Lake Decatur, thence southwesterly to join the CN (ex-IC) ROW. This alignment will pass through downtown Decatur, including a station stop near the historic passenger rail station site, before returning to the main NS Line ROW.

Decatur is proposed to be a "local train" station, presumably served by roughly 2/3 of the 25 daily Chicago-St. Louis round trips.

Anticipated Mobility Impact

HSR service will provide unique new transportation to Decatur as it is virtually the mid-point of the Chicago- St. Louis route. As such, the running time to Chicago will be 1 hr 5 min and similarly to St. Louis will be 1 hour. This new timelines are typically 2/3 faster than driving times to Chicago and 50% faster to St. Louis area destinations.

A change of this magnitude in access to the two major business/activity centers of the region is anticipated to have very significant economic impacts for Decatur. The new availability high-quality, affordably priced public transportation will open new opportunities to existing inhabitants/visitors as well as create significant net new demand. Decatur area residents will now easily be able to make a same-day business or recreational trip to Chicago, previously not possible, or at best very tedious. It can be anticipated that new fast access to downtown Chicago may have a measurable positive impact on the desirability of residential location in Decatur / Macon County.

Similarly in the St. Louis bound direction, it will now be easy for Decatur area residents to make a same day trip for business or to one of the many easily accessible St. Louis area sports / recreation / entertainment venues because of the substantial travel time improvement. As with Chicago, it is expected there will be substantial induced demand, i.e. creation of net new trips, in addition to the switch of former auto users.

Potential Station Area Development

As with many other medium sized cities, the areas along the freight railroad right-of-way, including the downtown area around the proposed new passenger station has become somewhat blighted. There have already been plans for commercial or industrial development near the station site, and there is unquestionable significant potential economic benefit and stimulus that would arise from the new regional intercity transportation hub that would likely result if this proposed HSR line is built. The desire of businesses to locate near the station and the flow of relatively "high value" customers should generate strong economic demand for nearby commercial space, housing and related support services. One could envision measurable "Transit Oriented Development" (TOD) for several blocks surrounding the proposed station site.

Potential Job Creation Impact

As discussed in greater detail in Section 4.1, there will be an immense construction-industry job creation impact during the anticipated 7 year construction period. The likely direct annual job creation for greater Decatur / Macon County is estimated at 3,029. When the positive secondary impact (or so-called "multiplier") is taken into account, this annual job number increases to 6,630.

As with other intermediate stations, the staffing and operations of the HSR service is estimated to create 10 permanent jobs at the downtown Decatur HSR Station. Furthermore, as a likely location of the mid-point Maintenance of Way (MOW) base for the HSR, there could be an additional 33 permanent jobs at a new MOW Facility, likely to be built along the existing NS or CN RR ROW. When the multiplier is applied to these 43 permanent railroad jobs, a total of 90 jobs can be expected for the region.

There will also be a significant anticipated long-term job creation of 1,594 jobs resulting from the increased overall Decatur-area economic activity and mobility created by the HSR. Because the relative mobility improvement is the greatest for Decatur of any it will have a higher percentage job creation percentage than any other intermediate city.

Unique Circumstances

Although all proposed intermediate stations will enjoy significant improvements in their transportation mobility, Decatur is in a truly unique positive position for two reasons. As the geographic and time-line midpoint, it will enjoy HSR service to *every* possible on-line destination with a running time of roughly one hour or less. Secondly, having *no current intercity Amtrak service*, it will gain new direct access to an extremely high quality rail passenger service.

6.4.4 Economic Benefits for Springfield

General Description

Springfield, IL is the vibrant and successful state capital of Illinois. It is located in the middle of the state, 185 miles south of Chicago, with an urban population of 166,000 and MSA population of over 200,000. In addition to serving as Sangamon County seat, it is well known as the home of Abraham Lincoln for 25 years. Because of the prominent location of the State Capitol and many of the related supporting state office buildings, as well as several popular historic sites, Springfield has a very well developed and economically successful downtown.

Current Economy

In addition to the Illinois State Government as primary employer, Springfield is the home to a branch of Southern Illinois University (SIU), a large and growing Cancer and Health Sciences Center and multiple finance and Insurance operations. In large part due to the stabilizing job influence of state government, unemployment has been much lower than the Illinois average, and only reached 6% in the 2008 recession.

Current Intercity Passenger Transportation

Springfield is served by Illinois' largest Amtrak operation, the 5 daily round trip Chicago- St. Louis "Lincoln Service" Corridor, operating primarily on the UP (ex-GM&O) route. When increased IDOT sponsorship provided funding for two additional daily frequencies in 2007, public response was excellent. Typical running times are: 3 hr 20 min Springfield-Chicago and 2 hr 10 min Springfield-St. Louis. One of the daily Chicago-St. Louis frequencies continues on to Kansas City, and another is part of Amtrak's long-distance "Texas Eagle" service, continuing past St. Louis to Little Rock, Dallas, San Antonio, and on to Los Angeles. There is also limited regularly scheduled intercity bus service, primarily on Greyhound's Chicago-Champaign-Decatur-Springfield-St.

Louis route. United Express operates 4 daily commuter jet round trips between Springfield Abraham Lincoln Airport and O'Hare; American operates 2 daily regional jet trips on the route.

It should be observed that the IDOT-sponsored Amtrak Chicago-Springfield-St. Louis route has long been considered as the most likely candidate for incremental (*higher)* speed improvements, and was once the test bed for a "high-technology" Positive Train Control (PTC) system. There will likely be substantial speed, and eventual frequency improvements in the existing service, presumably well in advance of the ultimate goal of "world class" HSR 220 MPH service.

Proposed HSR Alignment and Services

The proposed HSR route will approach Springfield from the northeast on the NS (ex-Wabash) line. A short segment of new alignment would be required to reduce curvature in the vicinity of the Sangamon River, before attaining the proposed north-south alignment along existing NS rail corridor paralleling 10th Street. The 10th Street alignment already has several grade separations. A new station site is proposed near St. John's Hospital. The route would then continue south along the NS right-of-way until transitioning to and continuing south along the UP right-of-way. In order to provide full grade separation of the HSR line through Springfield, it is proposed to use a combination of aerial guideway and open-cut trench as appropriate. In addition, there will be several highway overpasses where the HSR line will operate at grade. These grade separations are designed to provide separation from adjacent freight tracks as well, providing additional safety and time loss benefits. Because there are no local customers along this section of the line, it may be most logical to relocate the NS freight route through Springfield, including the small yard which is located east of downtown.

As the State Capital, Springfield will arguably be the most significant intermediate station on the Chicago-St. Louis HSR. As an "express train" station, it will be served by 25 daily hourly (half-hourly peak) Chicago-St. Louis round trips. Express train running times to Chicago will be only 1 hr 20 min and only 37 min to St. Louis.

It should be observed that highly animated local planning efforts have already been ongoing to consider potential rail consolidation and/or relocation for the NS 10th Street corridor (proposed for the new HSR) and the UP 3rd Street corridor, currently used by Amtrak. It is the assumption in the HSR sketch plan that the Amtrak conventional service would be relocated to the same 10th Street corridor as the new HSR, allowing a shared station facilitating transfers and taking advantage of economies of scale. Conversely, there is a potential alternative routing for the HSR, following an abandoned IC corridor northeast of downtown to connect from the NS route to the UP 3rd Street corridor and thus sharing the site of the existing Amtrak station. This routing would also need to be grade-separated, probably in a trench.

Anticipated Mobility Impact

Notwithstanding the success of expanded IDOT-sponsored Amtrak rail service, the proposed new HSR service will provide a completely new and highly attractive transportation alternative to Springfield. Hourly departures and average 1 hr 20 min running time to/from Chicago should revolutionize mobility for state employees and all those doing business with the State. It will now be easy for metro-Chicago residents to make a same-day trip to visit legislators or State offices in Springfield. Conversely, legislators, State employees (and all other greater Springfield residents) could easily make a same-day trip to Chicago, the business and entertainment center of Illinois.

The HSR travel time to Chicago will easily be two hours faster than driving, even when road conditions are favorable. In the southbound direction, the 40 min HSR travel time to St Louis is likely to divert existing auto travel as well as create newly "induced" demand for travel. It is believed that St. Louis will be viewed by Springfield area residents as a very easy sports, entertainment and recreation destination for HSR. This is largely because of the unique "single transfer" direct connection to public transit at the City-owned Gateway

Transportation Center multimodal station provided by the Bi-State MetroLink LRT, which directly serves Stadiums, downtown, key suburbs, casinos, and other major entertainment venues, as well as the airport.

Regional economic development planners believe that the new faster access time to/from Chicago will further help residential and commercial activity in Springfield. Affordably priced, fast, reliable and frequent HSR service should favorably impact location decision making.

Potential Station Area Development

It was observed by local development planners that a potential new multimodal transportation center on the NS 10th St. corridor could be a cornerstone for redevelopment and new economic activity. In addition to consolidation with IDOT-sponsored Amtrak, intercity bus and local transit bus service, the contribution of high-quality, hourly HSR service to Chicago and St. Louis would stimulate significant development in the surrounding neighborhood.

Specifically there is good potential for high quality residential units in addition to other typical TOD including: various support services, commercial and entertainment. There will be very strong larger area economic stimulus from the forecast continuous flow of demographically higher-end travel that HSR typically generates. The new Springfield Multimodal HSR Station would likely have much of the impact of a successful airport, but located in the downtown area.

Potential Job Creation Impact

As discussed in greater detail in Section 4.1, there will be a sizable positive construction-industry job creation impact during the anticipated 7 year construction period. This likely annualized job creation for greater Springfield is estimated at 3,491. When the positive secondary impact (or so-called "multiplier" effect) is added, the annual job number increases to 7,330.

As with other key intermediate HSR stations, ongoing labor requirements will create quality permanent station staffing and other supporting operations jobs. Springfield Station is estimated to create 16 permanent jobs, and when the regional multiplier is added, a total of 33 jobs can be forecast.

There will also be an anticipated indirect long-term job creation of 1,413 jobs resulting from the increased overall Springfield-area economic activity resulting from the HSR.

Unique Circumstances

As in the case of the more deeply analyzed California HSR model, we expect that this new Chicago-Champaign-Springfield-St. Louis HSR will complement and intermesh well the already successful and expanding conventional speed IDOT-sponsored Amtrak intercity service. It is anticipated that there will be continuing demand for service at intermediate points (most notably Bloomington) not served by the newly proposed HSR route. Furthermore, there should be likely feeder/transfer riders, many of whom (e.g. Lincoln and Carlinville) may decide to use Springfield as their connecting point to HSR.

6.4.5 Economic Benefits for St. Louis

St. Louis is the largest city in Missouri, and a major business center. St. Louis has a city population of 354,000 and MSA population of nearly 3 million. It has a solid business employment base and also provides major sports and entertainment venues.

St. Louis had historically been the second largest, or alternate connecting hub of intercity passenger railways but today only supports Amtrak service to Chicago, Kansas City and Texas. Although St. Louis Lambert Airport, St. Louis, is no longer a major connecting hub, it maintains a large base of non-stop domestic and limited international destinations. It serves as a secondary hub for Southwest Airlines (including frequent service to Chicago Midway) and has significant nonstop service on American and United Airlines (both with service to O'Hare). It is also an intercity bus service hub, now co-located at the Gateway Transportation Center.

St. Louis will be the second most heavily patronized station on the Chicago-St. Louis HSR Line, with nearly 40% of forecast passenger trips beginning or ending there. With end-point downtown to downtown running times of less than 2 hours, the HSR service will essentially create a "new mode" of transportation for St. Louis, significantly faster than conventional rail or auto to all intermediate destinations, and at least equal, if not better, in total end-point trip time than air. The combination of fast running times, reliable service and affordable fares will result in significant mode shift for existing trips and substantial generation of new "induced demand" trips. For instance, with the new HSR service it will be feasible to make a same day trip to Chicago, the commercial capital of the Midwest.

The study assumes use of the Gateway Transportation Center multimodal station, near downtown, which includes convenient connection to the frequent Bi-State Metrolink LRT service. The study proposes a secondary station in the St. Louis MSA called "Metro East", located on the Illinois side of the Mississippi River area at a greenfield site at the intersection with I-255, northwest of Edwardsville and southeast of Roxana.

There will be significant construction-industry job creation impact during the anticipated 7 year construction period. The direct annual job creation for St. Louis MSA (excluding station and new bridge) is estimated at 2,050. With secondary multiplier, this job number increases to 4,305.

Since the St. Louis Gateway Station is the second busiest HSR Station as well as terminal for operating crews, it will enjoy the second highest staffing level. Including station, onboard services, train operating crews, and maintenance, permanent job creation is estimated at 125. Adding the secondary job "multiplier" results in a total of 262 jobs. There will also be an anticipated indirect long-term job creation of 4,362 jobs resulting from the increased overall economic activity in greater St. Louis resulting from the HSR.

6.4.6 Corridor Summary Statistics

Construction of the Chicago-St. Louis HSR will utilize 112,805 job-years which translates into 16,115 jobs over the 7 year period to fully construct the line. Including indirect support jobs, the total is **33,841 new project positions**, most in Illinois. A total of 800 permanent jobs will be created due to operations and maintenance of the new line and service and support services, and nearly 21,000 new permanent jobs will be created through the direct regional economic expansion and development impacts of the new HSR.

Time savings due to the faster and more frequent service will save users $141.3 million a year. Reductions in accident costs will save $129.4 million a year. Cost savings due to lower transportation costs result in a $280.7 million benefit per year. These societal savings total $551.4 million a year.

7.0 Summary of Economic Benefits

In this section the various forms of economic benefits are combined to be able give an idea of their total value.

7.1 Job Creation

In some ways the most important economic benefit is the creation of jobs. Operation and maintenance of the high speed rail network itself is expected to require over 2000 people. With the multiplier effect this would mean over 4300 permanent additional jobs. Much more important are the jobs that will result from an increase in economic activity in the Midwest generated by the increased synergies that will result from the tremendous reductions in travel time and expense for travel within the region which will make it easier to do business, increase educational opportunities, and encourage tourism. As discussed in Section 1, while the level of job creation is expected to vary between cities and between corridors, an overall net average increase in economic activity of approximately 0.66% is expected which, in turn is projected to lead to over 128,000 additional permanent jobs.

During the construction period there are expected to be an average of over 66,000 jobs each year (expected to last about 11 years). With the multiplier effect that results from the creation of jobs (this concept is discussed in Section 1) this would expand to over 140,000 added jobs. Thus, there would be an immediate boost to the economy, even before the system is fully operational. The system would be opened in phases, as sections are completed.

When the 128,000 new permanent jobs from the increase in economic activity are added to the 4300 jobs created to operate and maintain the system (including the associated multiplier) over 132,000 permanent jobs are expected to be added to the Midwest economy.

7.2 Other Economic Benefits

The other types of benefits are more readily assigned a monetary value than job creation. Summarizing the results presented in Sections 3 through 5, these total more than $2 Billion per year.

Table 49. Summary of Monetary Value of Economic Benefits

Category	Approximate Annual Value ($mil)
Value of Time	$1,200
Consumer Surplus	$,945
Accident Reduction	$905
TOTAL	**$2,050**

Another economic benefit that has not been quantified is the infrastructure costs avoided by shifting travel to rail from auto and air. Each lane mile of highway would cost millions of dollars and airport runways and terminals are very expensive. In California it was found that the cost for the increases in capacity required to accommodate anticipated growth would cost much more than the HSR system.

The total benefits from significant job creation, value of time, consumer surplus, accident reduction, and avoidance in improvements to highway and air facility capacity will most likely more than offset the projected $83.6 billion cost of the 220 mph Midwest HSR network.

8.0 Environmental Benefits

Migrating existing and future travelers to travel options like the 220 mph High Speed Rail (HSR) trains should bring about net improvements in environmental conditions in the affected region. Positive impacts on the area's carbon footprint, fuel consumption, and air quality are likely to be observed. When HSR is adopted in place of expanding or creating new roadways, the anticipated environmental impacts from building new or expanding roadways are also avoided. This results in positive environmental impacts on noise levels, water quality, land use patterns and many other areas of our natural environment that are impacted by roadway expansion.

Changing modes of travel in the Midwest will result in positive environmental benefits due to reductions in air pollution from electric rail service replacing automobile, traditional train, and air travel, particularly through non-attainment areas. The riders who choose HSR travel over personal automobiles or air travel will not only decrease their individual carbon footprint, but contribute to the improved air quality of the entire region. The availability of a fast, reliable, and affordable transportation option other than an automobile or an airplane (which are technically the "most impactful" modes of travel) will influence the mode choice made for short trips as well as long trips. The development of multimodal connections at HSR stations would encourage the use of "greener" transport modes, such as local rail service, bus, bicycling and walking, which would further contribute to the improvement of air quality.

To identify the potential air quality benefits of the HSR, this analysis presents total emissions of carbon dioxide (CO_2) and criteria air pollutant emissions from the three modes that could be diverted to HSR travel: air, conventional Amtrak rail service, and auto. Table 1 summarizes the number of per passenger round trips that could be diverted from auto, rail, or air to HSR, as well as new "induced" trips that would be expected to occur on the HSR. These trips are broken out by the four primary rail corridors of the HSR. As shown in this table, over 76 percent of the trips expected to be taken on the HSR will replace existing auto trips. A more detailed breakdown of the passengers diverted can be found in Table A.1. Emissions were calculated by first multiplying the number of passenger trip-miles that would be diverted from each of these three modes by an appropriate emission factor expressed. The amount of emissions diverted by the HSR was then compared to the emissions caused by the operation of HSR. Emissions from the operation of the HSR were estimated by multiplying the expected power consumption of the HSR trains by an emission rate from electricity generation. Emission comparisons were prepared based on conditions expected in 2030, including expected ridership, electricity fuel mix, and expected emission rates in 2030. The comparison showed that HSR will generate a substantial net CO_2 savings, as well as reductions in most criteria air pollutants.

8.1 Greenhouse Gas and Air Pollutant Emissions

The number of miles a person travels each year has a significant impact on an individual's carbon footprint. The transportation sector is the largest source of domestic CO_2 emissions, and 99 percent of the energy needed in this category comes from burning fossil fuels. Emissions from transportation account for about 27 percent of total U.S. greenhouse gas emissions. Greenhouse gas emissions from transportation are comprised primarily of CO_2, methane (CH_4), and nitrous oxide (N_2O). The sum of the emissions of each of these pollutants multiplied by their 100-year global warming potential (1 for CO2, 310 for N_2O, and 21 for CH_4) results in an estimate known as CO2-equivalent (CO_2e) emissions.

The Midwest HSR network has the potential to not only reduce greenhouse gas emissions and the carbon footprint of intercity travel in the Midwest, but also to improve the region's air quality by reducing emissions of a number of criteria air pollutants currently regulated by the US Environmental Protection Agency (EPA). Many of the metropolitan areas that will be served by the Midwest HSR are in nonattainment of one or more of the National Ambient Air Quality Standards (NAAQS). For example, the Chicago metropolitan area is in nonattainment of the 8-hour ozone NAAQS as well as the 1997 NAAQS for particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). The eastern portion of the Chicago region[1] is also a maintenance area for carbon monoxide (CO). Unlike greenhouse gas emissions, the location of sources of these emissions must be considered when determining their impacts on improving air quality or in helping an area to come into attainment of one of these NAAQS. Based on the resources available for this project, no attempt was made to estimate the effect on attainment of the NAAQS in any particular area. However, a rough estimate was made of the changes in air pollutant emissions that might result with implementation of the HSR network by 2030, over the entire area served by the HSR. Emissions were estimated for the following air pollutants: volatile organic carbons (VOCs), oxides of nitrogen (NO_x), CO, particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), $PM_{2.5,}$ and sulfur dioxide (SO_2).

The availability of a lower emission transportation mode in the Midwest can significantly reduce the environmental impact of the area commuters' needs. HSR travel on trains powered by electricity offers a low-emission alternative to other modes. The sections below summarize the methodology used to estimate emissions from the high speed trains, as well as the avoided emissions from auto, air, and rail. The resulting impact of HSR on the area is presented at the end of this section.

High Speed Rail Emissions

In order to estimate the emissions savings from HSR, the emissions offset need to be compared against the emissions from the electricity generated to power this new rail line. Electricity emissions were estimated based on the total kilowatt-hours (kWh) of electricity needed for the trains multiplied by a regional emission factor for electricity. The US Department of Energy Energy Information Administration's Annual Energy Outlook 2011 (AEO 2011)[2] was used to estimate a regional electricity emission factor based on the projected mix of electricity generation sources in the Midwest for the year 2030. AEO 2011 provides estimates of total CO_2 emissions from electricity, as well as total electricity generation in the Midwest in 2030. CO_2 emissions were divided by total electricity generation to estimate CO_2 emissions per kWh of electricity consumed in the Midwest in 2030.

To estimate CO_2e emissions, the 2008 CO_2 emission factor for electricity generation in the Midwest was calculated in the same manner as the 2030 emission factor from AEO 2011 data. The resulting 2008 CO_2 emission factor was very similar to the 2008 emission factor from EPA's eGRID[3] database, which provides electricity emissions factors based on smokestack monitoring of individual power plants. This provides a useful quality assurance check. The eGRID database includes both CO_2 and CO_2e emission factors. For the Midwest region, the CO_2e emission factor was 7 percent higher than the CO_2 emission factor in 2008. Therefore, the 2030 CO_2 electricity emission factor for HSR was converted to CO_2e by multiplying by the 2030 CO_2 emission factor by 1.07.

NO_x and SO_2 emissions factors were also estimated using 2030 emissions data for the Midwest region from AEO 2011 divided by electricity generation for the same year. Electricity emission factors for VOC, CO, PM_{10},

[1] This refers to a portion of Lake County, Indiana.
[2] Energy Information Administration. Annual Energy Outlook 2011. http://www.eia.gov/forecasts/aeo/
[3] US EPA. EGrid 2010 version 1.1. Spreadsheets are available for download at: http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html

and $PM_{2.5}$ are not included in the Annual Energy Outlook. Therefore, for this analysis, the emissions factors for electricity generation for these pollutants were obtained from Argonne National Laboratory's GREET model[4]. Electricity consumption for HSR is estimated based on information provided by Siemens for their Valero High Speed Rail trains. Annual emissions were estimated by multiplying the following factors:

A - The number of passengers per train: This study has assumed the use of trains with 500 seats, and also assumes that the trains run at an 80 percent load factor (i.e., 400 passengers per train).

B - The power consumption rate of the trains: Emission factors in emissions per kWh of electricity generated are converted to emissions per passenger mile based on Siemens specification for the Velaro trains that indicate the trains have power consumption of 46 Watt-hours per passenger-kilometer at 300 km per hour.

C – The number of trips per day: The trains operate 25 round trips for each of the four routes per day. Coupled double sets of trains were assumed to be required to accommodate the projected ridership for the Chicago to Madison portion of the Minneapolis route and for the Chicago to Toledo portion of the Cleveland/Detroit route, with trains split (or combined) at Toledo before continuing on to (or from) Detroit or Cleveland.

D – Total distance of each route: The route distances are based on the proposed path of the HSR, as provided in the Economic Impacts Analysis report of the HSR[5].

E – Days per year (365)

Total Annual Electricity Emissions = A * B * C * D * E

Electricity consumption and emissions estimates for CO_2e are summarized by corridor in Table 50 below. Total annual electricity consumption for the HSR project is estimated to be 6.3 million megawatt-hours (MWh), and this figure is multiplied by the emissions factor for CO_2e, SO_2 and NO2 to estimate the emissions for each of these pollutants. Table 51 shows the expected emissions of the criteria pollutants from the HSR trains in 2030.

Table 50. Summary of CO_2 Emissions from High Speed Rail (metric tons)

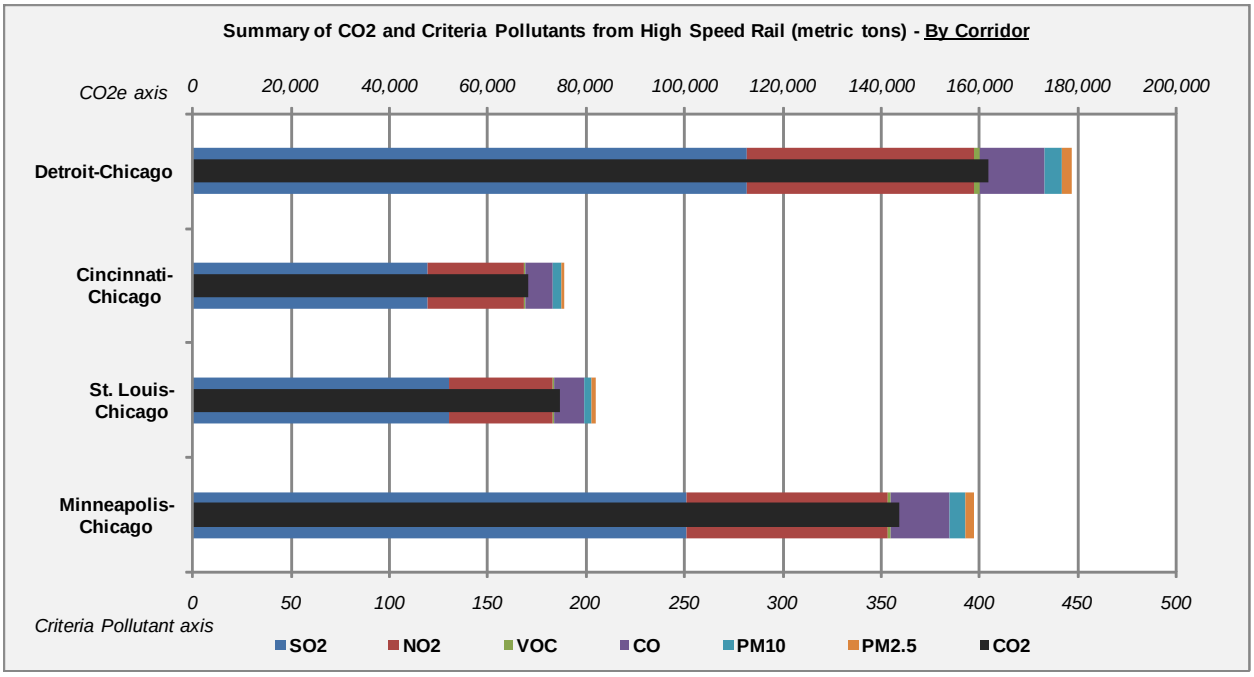
Corridor	Annual Passenger-Miles	Annual Electricity Consumption (MWh)	Annual CO_2e Emissions (Metric Tons)
Minneapolis-Chicago	7,025,430,298	200,808	143,697
St. Louis-Chicago	3,653,693,683	104,434	74,732
Cincinnati-Chicago	3,336,491,981	95,367	68,244
Detroit-Chicago	7,906,546,138	225,993	161,719
Total	**21,922,162,099**	**626,603**	**448,393**

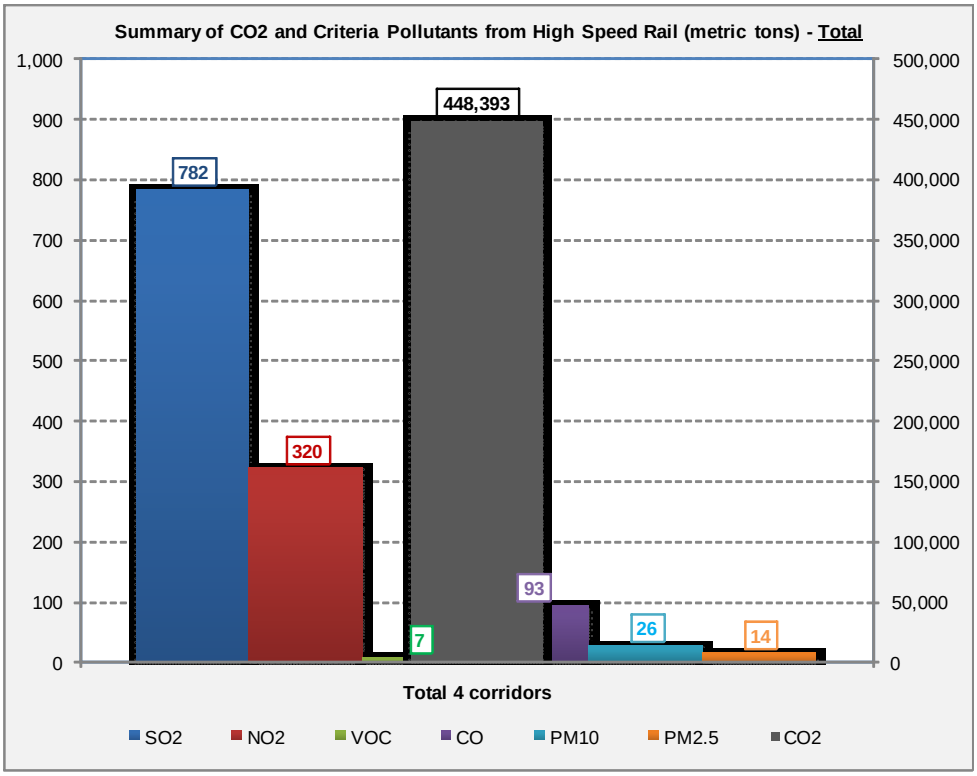
[4] Argonne National Laboratory. GREET Model, version 1.8d. 2010. GREET model available online at: http://greet.es.anl.gov/

[5] Midwest High Speed Rail Association, "The Economic Impacts of High Speed Rail: Transforming the Midwest, Technical Report," prepared by Economic Development Research Group and AECOM, May 2011.

Table 51. Summary of Criteria Pollutants from High Speed Rail (metric tons)

Corridor	SO_2	NO2	VOC	CO	PM_{10}	$PM_{2.5}$
Minneapolis-Chicago	251	102	2	30	8	4
St. Louis-Chicago	130	53	1	15	4	2
Cincinnati-Chicago	119	49	1	14	4	2
Detroit-Chicago	282	115	3	33	9	5
Total	**782**	**320**	**7**	**93**	**26**	**14**





Avoided Emissions – Autos

The emission rates for automobile trips were developed using the Environmental Protection Agency (EPA) Motor Vehicle Emissions Simulator (MOVES2010a) emission model. MOVES2010a is EPA's state-of-the-art tool for estimating emissions from highway vehicles. The model is based on analysis of millions of emission test results. The CO_2 auto emission rates developed with MOVES2010a incorporate new car and light truck greenhouse gas emissions standards affecting model years 2012-2016 and the effects of corporate average fuel economy (CAFE) standards affecting model years 2008-2011. However, it is important to note that on July 29, 2011, the EPA and National Highway Traffic Safety Administration issued a Notice of Intent announcing plans to propose more stringent greenhouse gas standards for model years 2017-2025. The impact of these standards is not included in this analysis and would likely reduce CO_2 auto emissions in year 2030 (thus reducing the benefit from high speed rail). Below is a description of the approach that was used to develop the auto emission rate and the assumptions that were made.

The analysis year (i.e. calendar year for which we performed the MOVES simulation) is 2030. Only passenger cars and passenger trucks (light-duty) vehicles were included (both gasoline and diesel). Emissions were calculated for the following pollutants: CO_2e ("CO_2equivalent", which includes CO_2, N_2O, and CH_4), CO, NO_x, SO_2, $PM_{2.5}$, PM_{10}, and VOC. The emissions included in this analysis are those generated when vehicles start (start exhaust and crankcase start exhaust processes) and while they are driving (running exhaust, brakewear, tirewear, crankcase running exhaust, and refueling processes). Evaporative VOC emissions, which typically come from unburned fuel that escapes from storage tanks and fuel lines, were also included.

Auto emission rates (g/mile and g/start) were developed by State, for the seven States where at least one of the HSR origin or destination cities is located: Illinois, Indiana, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Emission rates were computed for each different city pair trip. The "trip emission rate" was calculated as the average between the emission rates of the origin/destination city (each city was assigned the emission rate of its State). EPA's regional defaults were used for the vehicle fleet mix characteristics (i.e. passenger cars vs.

passenger trucks mix, fuel type mix, or age mix). To develop start emissions, it was estimated that a driver would cover a distance of about 200 miles between stops (i.e. 4 hours at an average of 50 mph). For instance, between Minneapolis and Rochester (one way distance of approximately 131 miles), emissions for one single start were included each way (since the distance is less than 200 miles). Between Minneapolis and Madison (one way distance of approximately 467 miles), emissions for three starts were included. This led to total roundtrip auto emissions in grams per vehicle per roundtrip.

Emissions were then estimated based on the number of auto trips avoided between each destination. The number of passengers between each city pair who will use the HSR system instead of driving was estimated earlier in this analysis. In order to convert this figure into number of auto trips avoided, the average number of passengers from various trips was used, as estimated by the US Department of Transportation[6]. This provided an average vehicle occupancy of 1.13 people per vehicle for work trips, and 2.2 people per vehicle for non-work trips. The ratio of business to non-business trips was also estimated earlier in the analysis for each corridor, and this ratio is provided in Table 52 below.

Table 52. Ratio of Business to Non-Business Travel by Corridor

Corridor	Business	Non-Business
Minneapolis-Chicago	18.7%	81.3%
St. Louis-Chicago	17.0%	83.0%
Cincinnati-Chicago	15.7%	84.3%
Detroit-Chicago	22.1%	77.9%

The total number of passengers was divided by the average number of people in each vehicle to estimate the total number of trips avoided. For example, in the Minneapolis-Chicago corridor, the average number of people in each vehicle is equal to (1.13 * 18.7%) + (2.2*81.7%), which equals an average vehicle occupancy of 2.01 people per vehicle.

Total Vehicle emissions were calculated using the following formula:

Total Emissions = A*B/C where

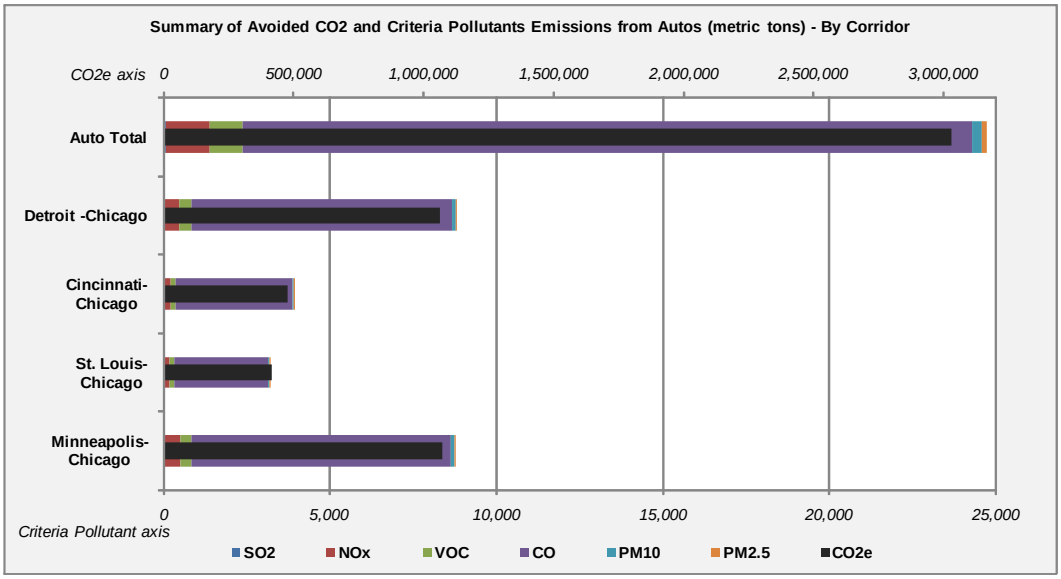
A=Emissions per vehicle roundtrip, based on MOVES data
B=Number of passengers
C=Average occupancy of each vehicle

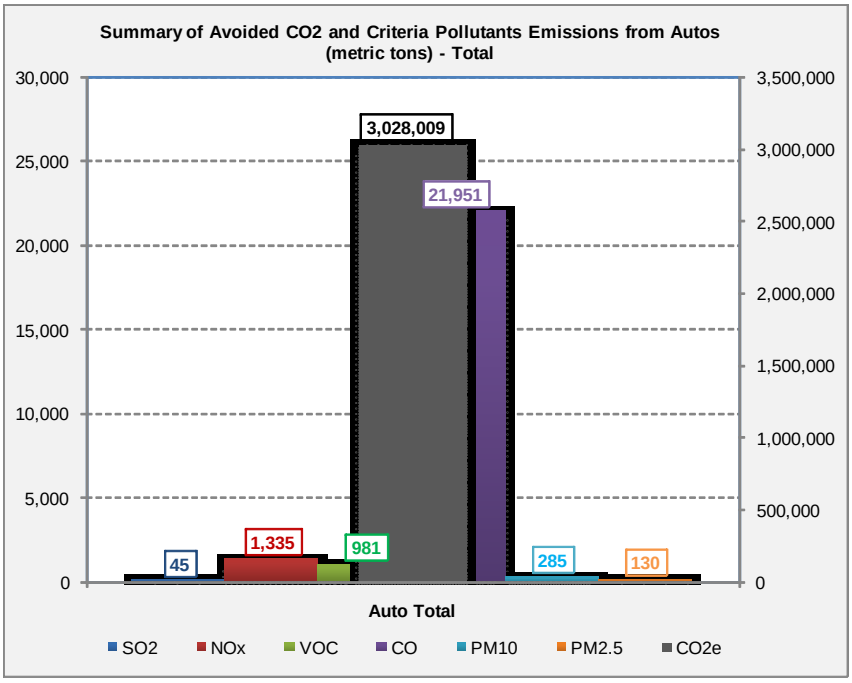
The resulting total vehicle emissions for each corridor are displayed in Table 53.

[6] "U.S. Department of Transportation, Federal Highway Administration, 2009 Nationwide Personal Transportation Survey: Summary of Travel Trends, FHWA-PL-11-022, June 2011, Table 16." Can be located online at: http://nhts.ornl.gov/2009/pub/stt.pdf

Table 53. Avoided Emissions from Autos (metric tons)

Estimated Emissions (metric tons)	CO_2e	VOC	NO_x	CO	SO_2	$PM_{2.5}$	PM_{10}
Minneapolis-Chicago	1,069,362	343	481	7,792	16	48	102
St. Louis-Chicago	417,213	136	180	2,819	6	17	39
Cincinnati-Chicago	476,866	156	209	3,499	7	20	44
Detroit -Chicago	1,064,568	346	465	7,842	16	45	100
Auto Total	**3,028,009**	**981**	**1,335**	**21,951**	**45**	**130**	**285**



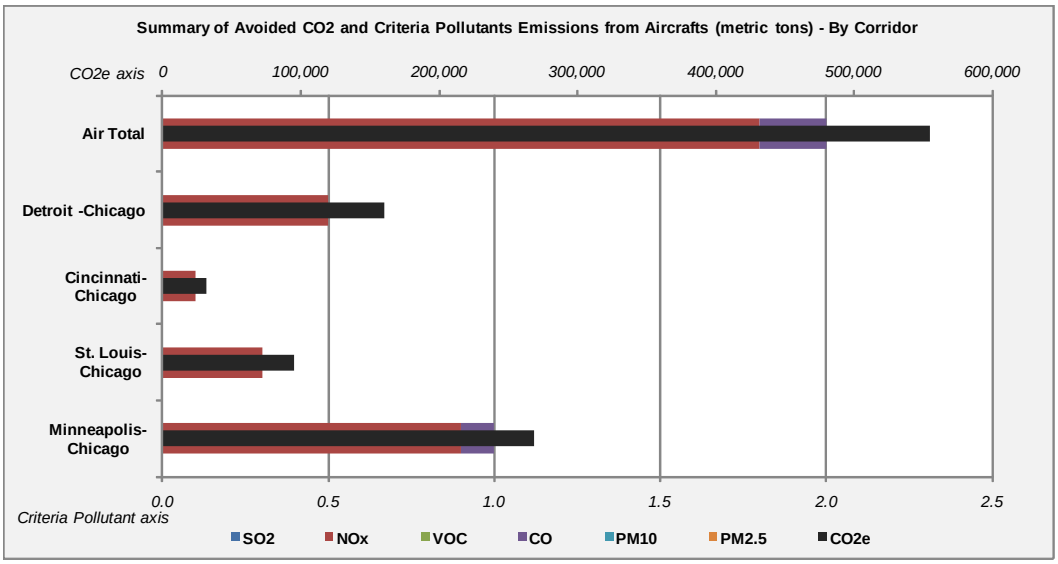


Avoided Emissions - Aircraft

In order to estimate CO_2 emissions from avoided aircraft travel (i.e., a reduction in scheduled flights), an estimate of emissions per passenger mile is needed. Bureau of Transportation data was used for total domestic aircraft fuel consumption and total domestic aircraft passenger miles[7]. This fuel consumption figure was then multiplied by the CO_2 emissions factor for jet fuel, from The Climate Registry[8]. This provided an estimate of CO_2 emissions from domestic aircraft flights of 109 MMt CO_2e. When these emissions are divided by total passenger miles from domestic aircraft, it provides an emissions factor of 0.197 kg CO_2/passenger mile. This figure was then multiplied by the avoided passenger miles from aircraft to estimate total avoided CO_2 emissions. Avoided emissions from criteria pollutants (VOC, NO_x, CO, SO_2, $PM_{2.5}$, and PM_{10}) and other GHGs (CH_4 and N_2O) were estimated based on emissions/passenger mile from the EPA's MARKAL model[9]. The emissions from CH_4 and N_2O were very small compared to CO_2, and these are combined into a single CO_2e figure, which accounts for the different global warming potentials of CH_4 and N_2O. Total avoided emissions from aircraft are displayed in Table 54. For VOC, SO_2, and PM, avoided emissions were greater than zero, but less than 0.1 metric tons per year.

Table 54. Avoided Emissions from Aircraft (metric tons)

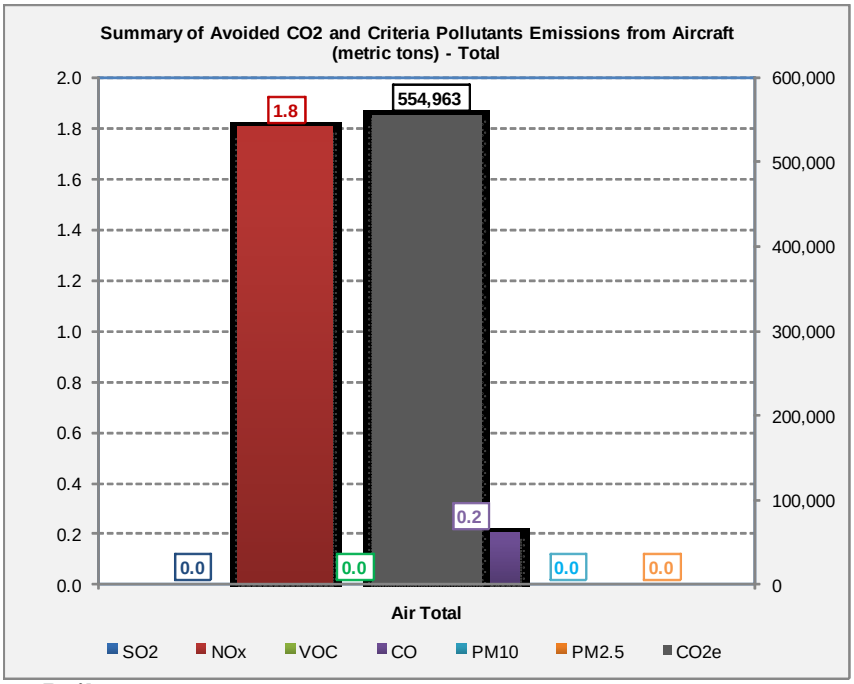
Estimated Emissions (metric tons)	CO_2e	VOC	NO_x	CO	SO_2	$PM_{2.5}$	PM_{10}
Minneapolis-Chicago	268,773	0.0	0.9	0.1	0.0	0.0	0.0
St. Louis-Chicago	94,897	0.0	0.3	0.0	0.0	0.0	0.0
Cincinnati-Chicago	31,328	0.0	0.1	0.0	0.0	0.0	0.0
Detroit -Chicago	159,964	0.0	0.5	0.0	0.0	0.0	0.0
Aircraft Total	**554,963**	**0.0**	**1.8**	**0.2**	**0.0**	**0.0**	**0.0**



[7] Bureau of Transportation Statistics. National Transportation Statistics. Table 4-21 Located online at: http://www.bts.gov/publications/national_transportation_statistics/html/table_04_21.html

[8] The Climate Registry. Jet fuel Emissions factor from the General Reporting Protocol.

[9] EPA Market Allocation Model (MARKAL). For more information see: http://www.epa.gov/nrmrl/appcd/climate_change/markal.htm



Avoided Emissions – Rail

Avoided GHG emissions from rail, resulting from converting from diesel to electrically powered trains, were estimated based on the average emissions of CO_2 per passenger mile of existing rail nationwide. Total rail CO_2 emissions were estimated based on the total electricity and diesel fuel consumption from Bureau of Transportation Statistics data on intercity passenger rail[10]. The diesel fuel consumption was multiplied by the CO_2 per gallon diesel emissions factor from The Climate Registry. Electricity consumption was multiplied by the 2008 eGRID CO_2 emissions factor for US electricity consumption. When these two figures are added together, it provides an estimate of total CO_2 emissions from passenger rail of 1.1 MMt CO_2e. Total rail passenger miles in the US in 2008 also came from the Bureau of Transportation Statistics[11]. Total 2008 passenger rail CO_2 emissions / 2008 rail passenger miles = 0.178 kg CO_2e/passenger mile. This figure is then multiplied by the avoided passenger miles for each stop in each corridor to estimate total CO_2e emissions.

Avoided emissions from criteria pollutants (VOC, NO_x, CO, SO_2, $PM_{2.5}$, and PM_{10}) and other GHGs (CH_4 and N_2O) were estimated based on emissions/passenger mile from the EPA's MARKAL model[12]. The emissions from CH_4 and N_2O were very small compared to CO_2, and these are combined into a single CO_2e figure, which accounts for the different global warming potentials of CH_4 and N_2O. Total avoided emissions from rail are displayed in Table 55.

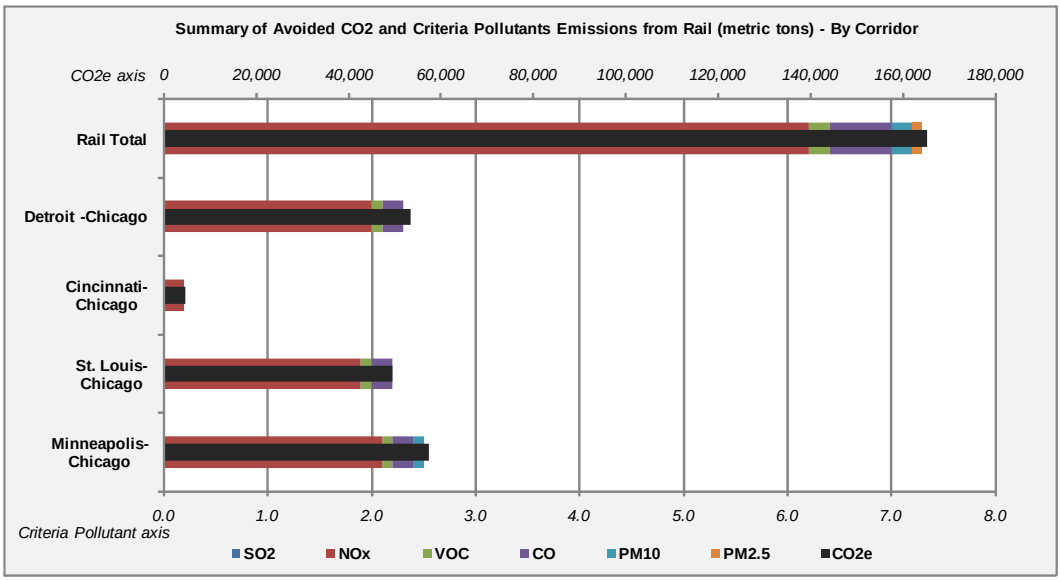
[10] 2008 passenger rail diesel fuel and electricity consumption are from Bureau of Transportation Statistics. Table 4-27: Energy Intensity of Amtrak Services. Located online at: http://www.bts.gov/publications/national_transportation_statistics/html/table_01_40.html

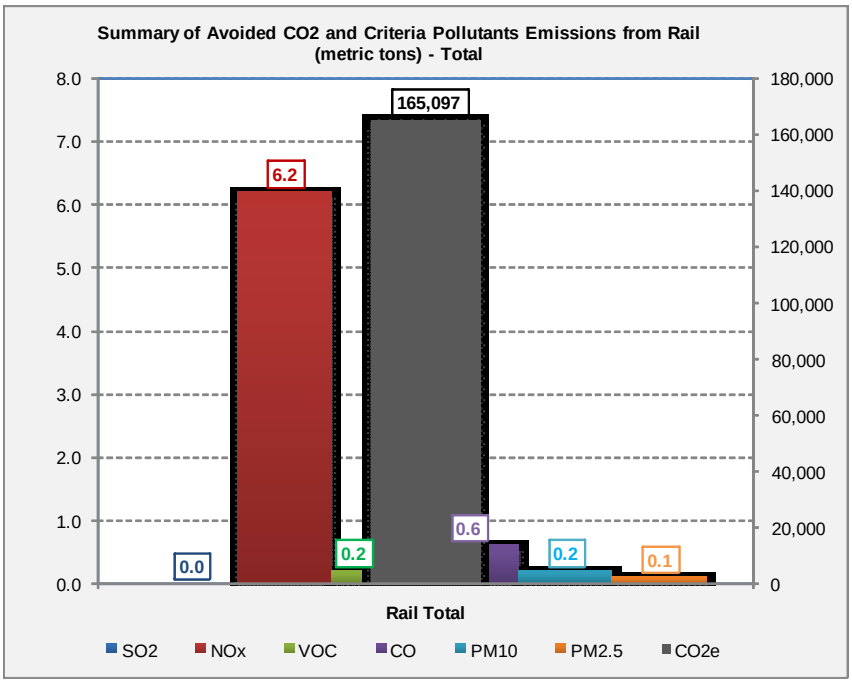
[11] 2008 Rail Passenger Miles is from Bureau of Transportation Statistics. Table 4-27: Energy Intensity of Amtrak Services. Located online at: http://www.bts.gov/publications/national_transportation_statistics/html/table_01_40.html

[12] EPA Market Allocation Model (MARKAL). For more information see: http://www.epa.gov/nrmrl/appcd/climate_change/markal.htm

Table 55. Avoided Emissions from Rail (metric tons)

Estimated Emissions (metric tons)	CO_2e	VOC	NO_x	CO	SO_2	$PM_{2.5}$	PM_{10}
Minneapolis-Chicago	57,272	0.1	2.1	0.2	0.0	0.0	0.1
St. Louis-Chicago	49,592	0.1	1.9	0.2	0.0	0.0	0.0
Cincinnati-Chicago	4,740	0.0	0.2	0.0	0.0	0.0	0.0
Detroit -Chicago	53,494	0.1	2.0	0.2	0.0	0.0	0.0
Rail Total	**165,097**	**0.2**	**6.2**	**0.6**	**0.0**	**0.1**	**0.2**



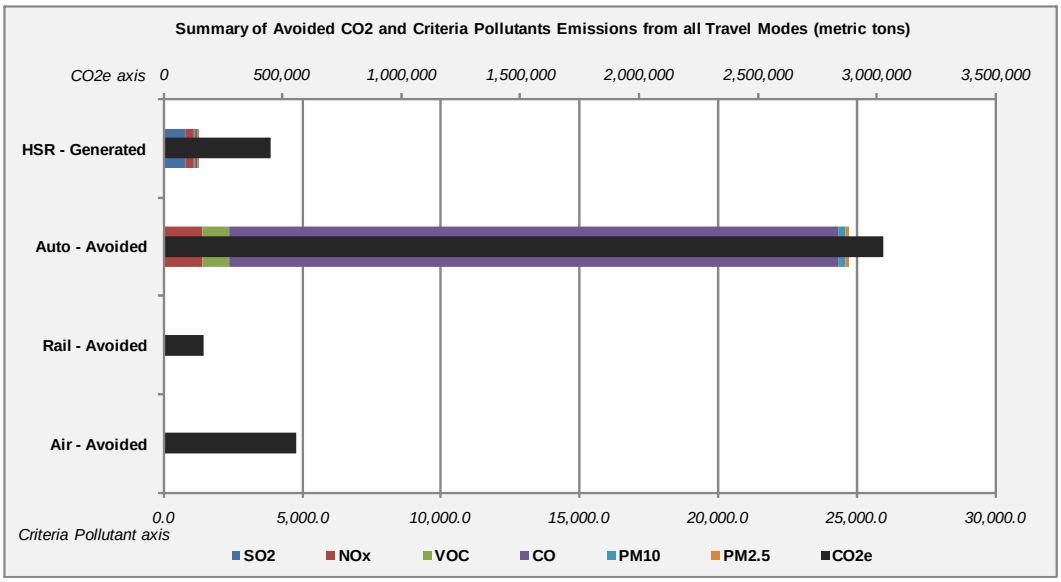


Summary of HSR Impact on Air Emissions

By comparing the total emissions from the operation of the HSR network to the total emissions diverted by the HSR, as shown in Table 56, it is evident that HSR will be a more energy-efficient and less-polluting travel mode than the current modes of travel. Table 8 shows that CO_2e emissions could be reduced by nearly 3.3 million metric tons in 2030 with adoption of HSR service. In addition, the region also realizes a net reduction in all criteria pollutants, with the exception of SO_2. These reductions could assist metropolitan areas in the Midwest to reach (or stay in) attainment of the ozone and PM NAAQS. There is also the potential to see additional net savings in the future; as more renewable sources of electricity generation are developed, more efficient train models are developed, and ridership shifts continue, air quality in the Midwest will continue to see a significant improvement in the future years.

Table 56. Summary of Avoided Emissions due to the Midwest HSR

	Avoided Emissions (Metric Tons)						
Travel Mode	**CO_2e**	**VOC**	**NO_x**	**CO**	**SO_2**	**$PM_{2.5}$**	**PM_{10}**
Air	554,963	0.01	1.77	0.16	0.04	0.01	0.01
Rail	165,097	0.25	6.18	0.62	0.00	0.14	0.15
Auto	3,028,009	981	1,335	21,951	45	130	285
HSR	448,393	7	320	93	782	14	26
Net Avoided Emissions	**3,299,676**	**974**	**1,023**	**21,859**	**-737**	**116**	**259**



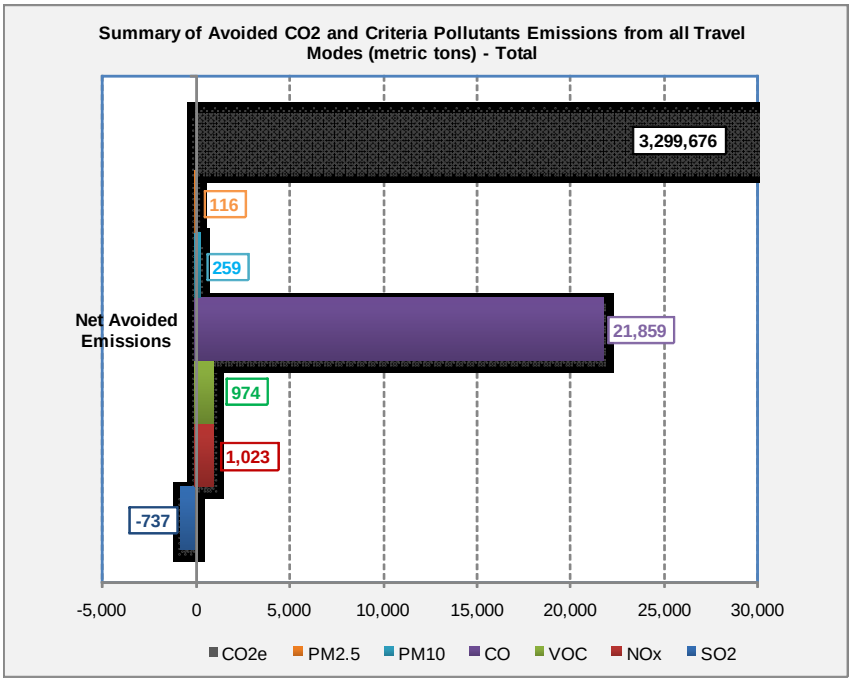


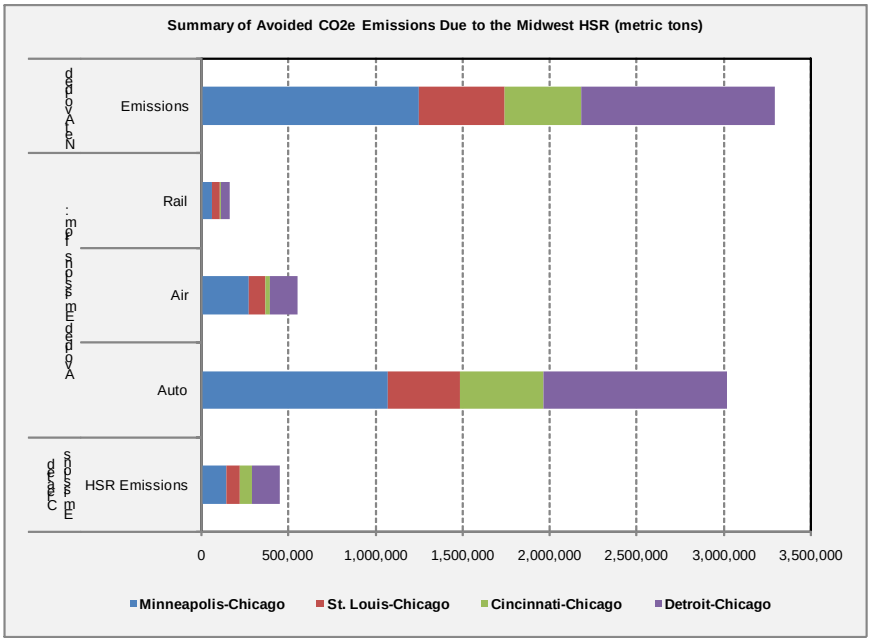
Table 57 presents more detailed results of the net avoided CO_2e emissions, with breakdowns by corridor for the HSR and subcorridor for the avoided travel. More than 80 percent of the avoided CO_2e emissions are from the auto mode of travel, followed by 15 percent from avoided air travel. The new emissions that would occur from HSR account for 12 percent of the CO_2e emissions that would have otherwise been emitted by passenger vehicles, aircraft, and traditional rail.

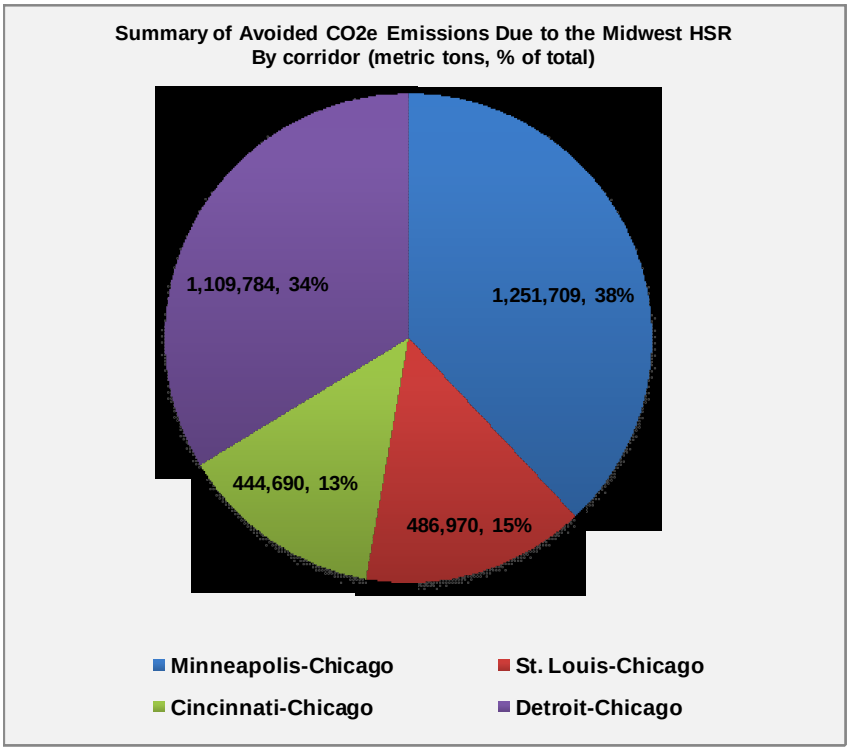
It is important to note that when calculating the emissions from HSR, many assumptions were made that may influence the resultant change in emissions. More detailed and further study is needed to fully assess the air pollution emissions avoided due to implementation of the HSR network.

Table 57. Summary of Avoided CO2e Emissions Due to the Midwest HSR Network

Rail Corridor	CO_2e Emissions (metric tons)				
		Avoided Emissions from:			Net Avoided Emissions
	HSR Emissions	Auto	Air	Rail	
Minneapolis-Chicago	**143,697**	**1,069,362**	**268,773**	**57,272**	**1,251,709**
Minneapolis - Rochester		*11,053*	*38*	*0*	*11,091*
Minneapolis - Madison		*59,086*	*2,339*	*0*	*61,425*
Minneapolis - Milwaukee		*120,746*	*34,153*	*0*	*154,899*
Minneapolis - Chicago		*587,752*	*226,511*	*15,896*	*830,160*
Rochester - Madison		*4,983*	*16*	*0*	*4,999*
Rochester - Milwaukee		*14,247*	*121*	*0*	*14,368*
Rochester - Chicago		*96,017*	*4,938*	*0*	*100,954*
Madison - Milwaukee		*11,790*	*3*	*0*	*11,794*
Madison - Chicago		*78,528*	*483*	*0*	*79,011*
Milwaukee - Chicago		*85,160*	*170*	*41,375*	*126,705*
St. Louis-Chicago	**74,732**	**417,213**	**94,897**	**49,592**	**486,970**
St. Louis - Springfield		*4,994*	*3*	*1,174*	*6,171*
St. Louis - Decatur		*2,798*	*0*	*0*	*2,798*
St. Louis - Champaign		*3,114*	*2*	*0*	*3,116*
St. Louis - Chicago		*174,586*	*82,454*	*25,582*	*282,621*
Springfield - Decatur		*322*	*0*	*0*	*322*
Springfield - Champaign		*1,113*	*0*	*0*	*1,113*
Springfield - Chicago		*108,613*	*5,966*	*14,859*	*129,439*
Decatur - Champaign		*204*	*0*	*0*	*204*
Decatur - Chicago		*43,733*	*0*	*0*	*43,733*
Champaign - Chicago		*77,738*	*6,472*	*7,976*	*92,186*
Cincinnati-Chicago	**68,244**	**476,866**	**31,328**	**4,740**	**444,690**
Cincinnati - Indianapolis		*8,460*	*9*	*0*	*8,469*
Cincinnati - Lafayette		*3,193*	*0*	*0*	*3,193*
Cincinnati - Chicago		*271,892*	*21,251*	*0*	*293,143*
Indianapolis - Lafayette		*572*	*0*	*0*	*572*
Indianapolis - Chicago		*186,788*	*10,069*	*2,979*	*199,835*
Lafayette - Chicago		*5,961*	*0*	*1,761*	*7,722*

Rail Corridor	CO_2e Emissions (metric tons)				
		Avoided Emissions from:			Net Avoided Emissions
	HSR Emissions	Auto	Air	Rail	
Detroit-Chicago	**161,719**	**1,064,568**	**159,964**	**53,494**	**1,116,306**
Cleveland - Detroit		*5,954*	*521*	*0*	6,476
Cleveland - Toledo		*7,474*	*1*	*0*	7,475
Cleveland - Fort Wayne		*9,448*	*15*	*0*	9,463
Cleveland - Chicago		*345,620*	*80,057*	*3,214*	428,890
Detroit - Toledo		*7,848*	*5*	*0*	7,853
Detroit - Fort Wayne		*11,553*	*82*	*0*	11,635
Detroit - Chicago		*579,440*	*76,859*	*47,217*	703,516
Toledo - Fort Wayne		*336*	*0*	*0*	336
Toledo - Chicago		*71,404*	*1,858*	*3,063*	76,325
Fort Wayne - Chicago		*25,490*	*568*	*0*	26,058
All Corridors	**448,393**	**3,028,009**	**554,963**	**165,097**	**3,299,676**





8.3 Noise

Noise is also a factor when considering impacts on the environment. Very often, it is aversion to the anticipated noise level of high speed travel that limits support for HSR projects. Noise level is described in decibels (dB) and uses an A-weighting (dBA) to indicate that the measurements have filtered out very low and very high frequencies in much the same way that the human ear works[13]. The A-weighted sound levels range from the 40s to the 90s, with the indoor sound of a refrigerator at a distance of three feet rating an approximate 40 dBA, and the sound of shop tools at three feet at approximately 95 dBA.

Noise levels from high speed travel depend upon the propulsion or machinery noise; wheel-to-rail interaction noise or guideway vibrations; and airflow noise depending upon aerodynamics. The specification of the Siemens Velaro high speed train indicate that at 300 km per hour, the resulting noise level would be 91 dBA, for a train passing on an open track at a distance of 25 m without a sound barrier wall. This is roughly equivalent to the sound of a jack hammer at 50 feet. While this reference point could be concerning, it is necessary to note the likely duration of the sound--based on the specifications of the Siemens Velaro high speed train, with a train length of 200 m and a speed of 300 km per hour, a single train would pass in 2.4 seconds, and a double train in 4.8 seconds. In addition, the decibel level decreases depending upon the distance of the receiver, and by maintaining a certain distance from the HSR tracks, the perceived noise level can be reduced. For cities that are developed around HSR stations, the noise level will not be as high due to the decreased speed as trains approach the station stop. Also, where tracks are located in below grade trenches, the sound level will be greatly attenuated. Sound barriers can be constructed in noise-sensitive segments.

[13] High Speed Ground Transportation Noise and Vibration Impact Assessment. U. S. Department of Transportation Federal Railroad Administration. October 2005. <http://www.fra.dot.gov/downloads/RRDev/final_nv.pdf>

In comparison, the decibel level of highway traffic at 50 feet is 72 dBA but is a source of continuous sound[14]. When considering the noise impact of high speed rail travel, one must compare the impact of a 91 dBA noise source over 2 to 5 seconds twice an hour compared to the consistent 72 dBA noise level of highway travel. While a high speed train will be louder than the sound of an automobile travelling the highway, the high speed noise event will be a singular occurrence lasting only several seconds as opposed to the persistent noise level of highway traffic.

Other factors affecting the noise impacts on the local environment, including the noise path (e.g. existence of sound barriers, etc.) can be more fully examined in an expanded environmental study where individual circumstances can be examined and mitigated if necessary.

8.4 Water

Working to prevent water pollution resulting from transportation is a major task. Automobiles can leave behind a myriad of hazardous fluids on the roadway, including oil, transmission fluid, brake fluid and antifreeze. In the Victoria Transport Policy Institute's *Transportation Cost and Benefit Analysis II – Water Pollution*, it is estimated that almost half (46%) of U.S. vehicles leak pollutants onto the nation's roadways. Colder climates that require salting or sanding of roadways lead to additional build-up on the roadway surface of materials that lead to diminished water quality.

But it is not just the highways that collect toxic metals and other pollutants from our vehicles; the lots built to park those vehicles also collect the fluids. When rain falls, it sends the collected fluids into the water supply. Additionally, herbicides used on roadside vegetation are collected and delivered into the water supply with the other pollutants. These nonpoint sources of water supply pollution can lead to contamination that can affect wildlife and humans alike if means to mitigate the damage are not taken[15].

Consideration of the runoff resulting from the parking lots at HSR stations, the actual trains and stations themselves, the railroad tracks and other requirements at full build-out can fully outline the impacts of HSR travel on the HSR corridors' water supply; at this time, not enough information is available to quantify the possible impact. However, the total impact on the water supply should be compared with the impact of building highway infrastructure to the equivalent long-term load factor of HSR travel and the subsequent increase in parking demand. It is evident that impact on water quality from a shift to high speed rail travel will show a positive impact to the region's water quality. If feeder trips to the HSR stations could be shifted from auto to other modes like bike or pedestrian, additional improvements could be made in the region's water quality.

8.5 Land Use

Ultimately the HSR's effects on land use will be determined by the long term effects of providing a cost-efficient alternative to travel by personal automobile. It is through reducing demand for roads that high speed rail will most distinctly affect the use of the area's land. By providing a transportation alternative to owning a car, HSR sets the stage for the curbing of sprawl. As demonstrated throughout Europe, the existence of a high speed train

[14] Miller, Nicholas. "Addressing the Noise from U.S. Transportation Systems: Measures and Countermeasures," TR News, Sept-Oct 2005. http://onlinepubs.trb.org/onlinepubs/trnews/trnews240.pdf>
[15] FHWA Environmental Technology Brief: Is Highway Runoff A Serious Problem? <http://www.tfhrc.gov/hnr20/runoff/runoff.htm>

station can greatly contribute to the development – or redevelopment – of a community[16]. By ensuring that the development that occurs around these train stations contains a mix of uses, from office to residential and in between, a transit oriented development supports a scenario where cars are no longer a requirement to meet its residents' and visitors' basic needs. While availability of travel by HSR may discourage long trips made alone in an automobile, the development of strong multimodal connections at the HSR stations themselves can further encourage a shift to "greener" modes, such as local rail service, buses, bicycling and walking[17]. By further reducing reliance upon automobiles for short trips in city cores, additional environmental benefits are gained in terms of additional air quality improvements and less land going towards the expansion of roadways and parking facilities. While planning for such a community, whose residents, workers and visitors will not need a personal vehicle to travel, will be in the hands of local municipalities, the majority of the environmental – and economic – benefits of such development will be felt on the local level.

8.6 Environmental Summary

The proposed Midwest HSR network will confer many environmental benefits to the region. Reducing CO_2e emissions, as well as other air pollutant emissions by reducing the demand for auto travel, the availability of a HSR option for new travel, and the types of communities that are likely to develop around the transit hubs is an efficient way to use resources and encourage smart growth throughout the region. Overall, the new HSR is expected save almost 3.3 million metric tons of CO_2e emissions annually, as well as significantly reduce criteria air pollutants. The environmental benefits of HSR are especially notable when compared against the environmental impacts of other alternatives. An increase in population will no doubt increase travel demand, and it is important that planning be done now to ensure that the future demand is met with the least amount of impact on the environment.

[16] Gertler, Peter. "The Train and the City." Forbes.com. May 5, 2009.
< http://www.forbes.com/2009/05/05/state-of-the-city-opinions-contributors-high-speed-rail.html>
[17] HST Impact Study: Final Report. April 2008.
<http://www.hstimpactstudy.net/HTdocs/Images/mainreport150408.pdf>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