Assessing the Capacity of Class I Railroads in the Upper Mississippi and Illinois River Basins

Center for Transportation Research
The University of Tennessee

May, 2007

Executive Summary

Historically, freight transportation capacity has not been a prominent issue. As populations and attendant commerce grew modal capacities were expanded by modifying transportation networks and by populating these networks with larger, more heavily loaded, and faster vehicles. As the effectiveness of the network growth strategy began to diminish during the last decades of the 20th Century, new capacity was, instead, gleaned through the efficiencies that resulted from modal deregulation. In any case, however, the matter of freight transport capacity escaped public attention. Somewhat remarkably, as the first decade of the 21st Century nears its conclusion, both the strategy of network expansions and that of institutional reforms appear to largely be spent. Thus, for the first time, perhaps ever, we are observing cases where substantial new freight capacity is needed, but where there is no immediately identifiable remedy.

Because, historically, freight capacity has not been a challenge, it is not surprising that the analytical methodologies employed by the US Army Corps of Engineers (USACE) have simply assumed sufficient land-side freight capacity when evaluating the potential benefits of navigation improvements. Heretofore, this assumption has clearly been valid. At the same time, on a forward-looking basis, simply assuming that future alternative modal capacity will be available may lead to substantial errors in public policy. Thus, a closer look at corridor-specific railroad and motor carrier capacities is, at least, prudent.

Within this context, the current analysis provides a qualitative glimpse at potential railroad capacity issues in four corridors located roughly within the Mississippi River basin. The analysis develops estimates of current traffic volumes, evaluates the physical infrastructures and operating practices that support these traffic flows, then considers the abilities of the relevant Class I rail carriers to improve these capacities. Importantly, while this exercise was undertaken based on the potential diversion of inland navigation traffic onto the rail network, the results, in fact, apply to any scenario that substantially increases railroad traffic in or around the corridors considered.

The corridors examined likely have between 50 million and 100 million annual tons of reserve capacity. Certainly, there are specific network links that are currently at capacity, but there are generally routing alternatives within each corridor that could be used to accommodate additional traffic. At the same time, of the 120 million tons of freight traffic currently observed on the upper Mississippi and Illinois Rivers, at most 70 million to 80 million tons could reasonably be diverted to rail alternatives. Moreover, if diverted river traffic is allowed to rejoin the inland navigation system at St. Louis, railroad capacity is even less of an issue.

In short, in a static setting and considering only the four corridors examined here, the railroad network appears capable of the long-run absorption of any river traffic that might be foreseeable diverted to rail. Moreover, while the four corridors considered here represent a substantial amount of the railroad capacity within the two basins, there are additional rail routings (particularly, those that use Kansas City) that were not considered in the current analysis, but which represent important additional freight capacity. Thus, based on a snap-shot that reflects current (or recent) conditions, the traditional USACE assumptions regarding modal capacity remain valid.

Unfortunately, this conclusion must be tendered with great caution. The current analysis provides a static glimpse at a very dynamic setting. The annual number of railroad ton-miles of freight transport provided has more than doubled since 1980. To date, the railroads have made the physical investments necessary to accommodate this growth, but their willingness and/or ability to continue this trend is not a certainty. Recently, the public sector has participated with Class I railroads in partnerships designed to improve railroad capacity. Will such partnerships become increasingly necessary and, if so, how might public funding requirements affect decisions regarding navigation investments? There are many, as yet, unanswered questions.

The current analysis was not intended to be definitive in nature. Instead we sought to illustrate the issues at hand, as well as, some of the analytical tools that are useful in evaluating these questions. To date, we see no need to sound any alarm of deviate from current methodologies. At the same time, we feel strongly that continued vigilance with regard to available railroad capacity is in the public's best interest.

Respectfully submitted by:

Mark L. Burton
The University of Tennessee

David B. Clarke
The University of Tennessee

1. Introduction and Motivation

In February of 1998, the Tennessee Valley Authority (TVA) delivered an assessment of freight railroad capacity to the US Army Corps of Engineers as a part of a package of products that TVA was preparing for the Corps in conjunction with the upper Mississippi and Illinois basin studies.[1] The TVA study concluded that, for the most part, the existing rail network possessed the capacity necessary to accommodate new traffic and that, where this was not the case, new capacity could be added without substantially impacting unit transportation costs.

However, the TVA study was based on 1995 data and in the intervening decade freight traffic in the United States has undergone a major transformation. International commerce has brought about a growth in railroad container movements that has exceeded ten percent in all but one year. Moreover this same commerce has altered the corridors over which manufactured products flow. Historically rail traffic was largely east-west in nature. Currently, however, north-south flows continue to grow as a result of the North American Free Trade Agreement. As a consequence of these changes the issue of railroad capacity within the context of navigation decision-making must be revisited. Accordingly, the University of Tennessee's Center for Transportation Research (CTR), in conjunction with the TVA, has prepared the current analysis.

The 1998 TVA analysis focused on correlating physical network characteristics with traffic volumes in order to identify how rail capacity is created. Unfortunately, this process requires substantial time and funds, neither of which are available in the current setting. Therefore, as an alternative, the study team has evaluated a number of potential supply chain scenarios that are concentrated on four principal rail routings. Specifically, the team considered the Union Pacific route between Chicago, St. Louis and New Orleans, the BNSF Railway route between southern Minnesota and St. Louis, the Canadian National (former Illinois Central) route between Chicago and New Orleans, and Norfolk Southern's routing between Chicago and St. Louis. [2]

The balance of the current document is organized as follows: Section 2 outlines currently observed trends in traffic flows as well as forecasts of how these flows may change over the foreseeable future given a number of broader economic issues. Section 3, describes the elements that are central to rail capacity creation and exhaustion. The actual evaluations of the four networks described above are provided in Section 4. Section 5 provides some broad, generalized of specific infrastructure improvement costs. Section 6 distinguishes between short-run and long-run capacity issues and concluding remarks may be found in Section 7.

---

[1] See, "The Incremental Cost of Capacity in Freight Railroading," Tennessee Valley Authority, February, 1998.

[2] The rail routings consider here include the route segments outlined in the Scope of Work. However, the original routings were expanded to include additional network links. The study team felt that this expansion would yield results that are more robust, so that the additional work was worth undertaking.

2. Anticipating Future Rail Capacity Needs

A generation ago the US railroad industry underwent a metamorphosis, through which it was transformed from a highly regulated and stagnant remnant of past import to an efficient, vibrant, and probably essential component of America's freight transportation landscape. Similar changes were wrought in the motor carrier industry through equally substantive changes in public policy. These changes had a positive effect on the railroad industry's desire to reinvest in capacity and a similar effect on the financial community's willingness to support such investments. Still, the world keeps changing ever more rapidly, so that looking forward with any clarity is, at best, difficult

Analysts must begin with what we know, then move to the speculative to form an assessment of how various strategies may affect related outcomes. Regarding what we know, a few points are largely unarguable. These include:

- Nationally, our ability to meet future transportation demands by expanding networks, increasing velocity, and adopting larger capacity vehicles is, at best, limited;
- Absent a catastrophic security breach, patterns of global commerce will continue to become ever-more prominent; and
- The productivity gains achievable through regulatory reform have been largely realized.

As we move toward the more speculative, additional issues emerge. These include:

- How will near-term fluctuations in energy prices affect the price of freight transportation fuels and the demand for fuel transport;
- Is the currently observed surge in the promotion of bio-fuels transitory;
- To what extent can China continue its aggressive capture of US final goods markets; and
- How can we secure international freight flows so that the vitality of the US economy is not made vulnerable?

All seven points are treated in turn.

2.1 Physical Infrastructure Expansion

In the 10 years between 1995 and 2005, the number of expressway miles has grown by 5.1 percent, while the number of vehicle miles on the same roadways has grown by 31.6 percent. Figure 2-1 depicts the growth in the number of railroad transport ton-miles between 1960 and 2005. The ability to continue these trends is not assured. Highway congestion in both urban and rural highway corridors has moved from projection to reality and conditions for rail shippers are no better.

2.2 Growth in Global Trade

Figure 2-2 depicts the growth in international trade as a percentage of overall economic activity in the United States during the past 20 years. There is no apparent abatement in this trend. A recent academic exercise by one study team member resulted in the conclusion that a pair of Chinese-produced tennis shoes could be shipped to a vendor in the eastern US for approximately $0.33.

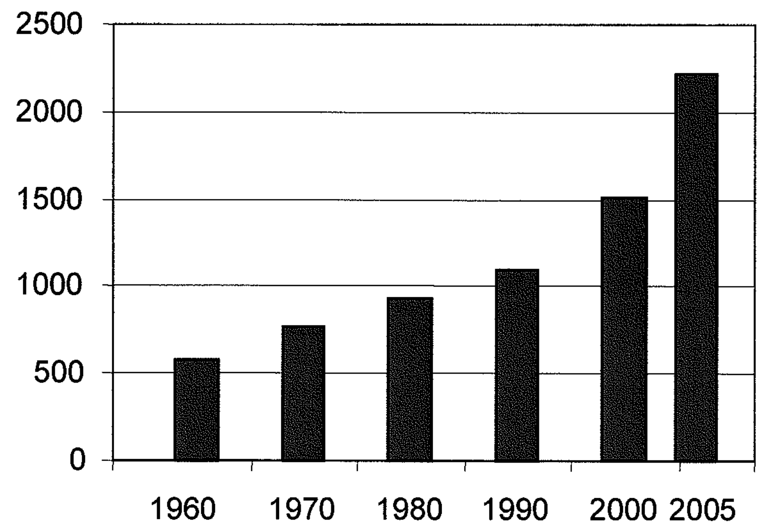

Figure 2-1. U.S. Railroad Traffic, Million Ton-Miles Annually

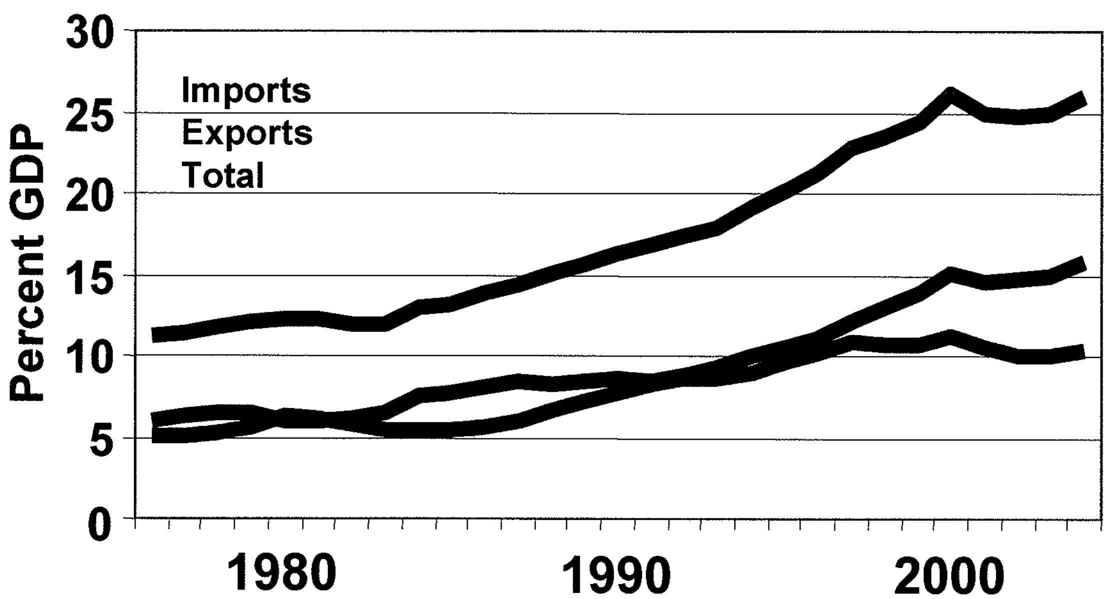

Figure 2-2. International Trade as a Percent of U.S. GDP

2.3 Regulatory Reforms Are Exhausted

Both the Staggers Act and the Motor Carrier Deregulation Act of the same year are nearly three decades old. The changes they engendered in the surface transportation of freight were profound, but those changes are now fully engrained within the management practices of both modes.[3]

2.4 Retail Fuel Price Fluctuations Are Pronounced

Figure 2-3 depicts retail gasoline price changes since January 2000. Over that period, two trends are immediately clear. First, there is an upward temporal trend in fuel prices and, second, the amount of volatility evident in these prices has increased substantially.[4] The upward trend and volatility in natural gas prices have been as pronounced. Even the spot market prices for coal have followed the same temporal paths.[5] As fuel prices change, the relative competitiveness of various modes also changes. As fuel flows change, so does the demand for fuel transport.[6]

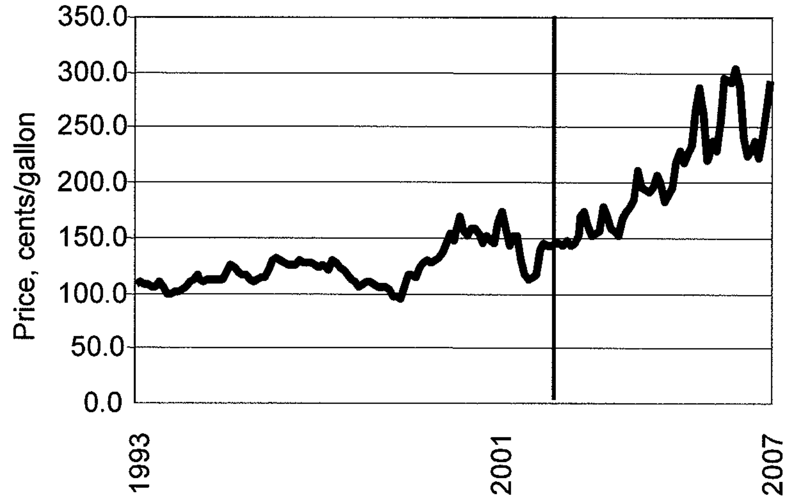

Figure 2-3. Average Domestic Gasoline Prices (All Grades)

---

3 The Staggers Act provided regulatory relief in a number of areas. With regard to rates, carriers are now allowed adhere to market forces within certain bounds. They are also allowed to engage in confidential contracts with shippers. Operationally, Staggers substantially reduced the regulatory processes for engaging in mergers or abandoning trackage. For motor carriers, deregulation essentially tore down the fence that had been erected between Truck-Load (TL) and Less-Than-Truck-Load (LTL) carriers. More importantly, it abolished the geographic restrictions on where carriers can operate.

4 The overall upward trend is primarily the result of increased world (Chinese) demand. The increased volatility is the result of post-9/11 security concerns.

5 Because petroleum, natural gas and coal are, to some degree, substitutable in the production of electricity, as well as in other down-stream uses, their prices tend to track each other. Thus, any event that generates a price increase for petroleum will also lead to increased prices for other fuels.

6 As an example, several years ago Australia was able to increase coal production and lower the price of outputs. As a result, it captured a share of the Asian coal market that had been supplied by mines in western Canada. Lacking the Asian markets, the western coal found a new home in eastern Canadian electricity generation, thereby, displacing coal mined in Central Appalachia. This overall shift in market sources lead to observable changes in rail movements of coal.

2.5 Bio-Fuels

For the second time in a generation, there is tremendous speculation that bio-fuels will grow in importance within the US economy. Whether or not this speculation comes to fruition depends on both the ultimate identification of the most efficient feed stocks and the extent to which those feed stocks (and finished products) can be transported efficiently. Importantly, while bio-diesel and ethanol are often lumped into the same analytical bin, doing so could potentially be very misleading. Prudence would suggest treating each bio-fuel separately.

2.6 The Chinese Influence

Without question, the Chinese economic reforms and restructuring initiated in the middle 1980's has profoundly affected the US economy and the flow of consumer goods. Over fifty percent of international container movements world-wide has a Chinese origin and/or destination. Still, the growth in the Chinese manufacturing sector is very closely tied to currency manipulations that have been largely targeted at US markets. Absent, non-transient changes in economic relationships, the currency manipulations and their attendant effects cannot be sustained. China has become a significant part of the global economic reality, but the growth in the Chinese influence must peak at some point.

2.7 International Freight Security

For the first time in history, international container movements emerged as the number one revenue producer for US rail carriers in 2006. As indicated, this breathtaking trend tends to influence railroad investment decisions. The only foreseeable abatement to this trend would be a domestic response to an internationally associated security breach.

In considering these various realizations and potential influences, the current analysis must consider the specific impacts they may on the upper Mississippi or Illinois River basins. Toward this end, there are several points worth making. These include:

- To the extent that global commerce continues to expand, near-term east-west rail capacity will continue to be exhausted by the related and relatively lucrative intermodal flows;
- The increase in domestic corn flows associated with near-term domestic ethanol production will likely be absorbed by domestic modes other than rail.[7] Rail carriers, given alternative opportunities, are unlikely to invest in acquiring what is perceived as a transitory corn traffic surge.[8]

7 In many areas the transit distances between corn production regions and ethanol production facilities are sufficiently short to allow truck transport.

8 EIA estimates suggest that corn-based ethanol will largely be replaced by ethanol produced with other feed stocks within the coming decade. Railroad hopper cars have an average asset life of roughly 20 years. Thus, investors are likely to be hesitant to expand car fleets with equipment that may not be needed.

- The Class I carriers that are most highly invested in the upper Mississippi and Illinois River basins are the same carriers that have shown the greatest propensity to engage in the agonizing process that results in effective public-private partnerships. Accordingly, it would not be surprising to see a proportionately high share of public funding come to projects within the two river's basins. [9]

3. The Creation and Exhaustion of Long-Run Railroad Capacity

The goal of the current analysis is to provide a defensible qualitative evaluation of the capacities of four rail network subsets. In order to understand the basis on which necessary judgments are made, the reader may find it useful to understand the study team's orientation with respect to long-run railroad capacity issues. The material in this section is, by no means, intended to be comprehensive. Rather, it simply provides an overview of the study team's orientation. Moreover, the current discussion is focused on the long-run, so that discussions of labor or equipment constraints are not included.

3.1 Capacity Concepts

Capacity is, in general, a measure of the ability of a transportation facility or network to handle traffic. Methods for evaluating overall traffic performance under various facility design and traffic flow conditions are essential for the economical and efficient operation of transportation systems. As a discipline, capacity evaluation is extremely well developed in highway transportation. Rail capacity, by contrast, has received relatively little attention, although elements of highway capacity theory may be extended to railroads.

Capacity can be defined as the maximum number of traffic units which can pass over or through a facility during a given time period under prevailing facility and traffic conditions. The maximum possible traffic flow on a facility is termed the ultimate capacity. Capacity analysis examines the relationship between traffic volume and vehicle performance (speed, travel time, emissions, etc.) on a facility. Congestion or capacity functions describe the relationship between total flow and vehicle performance.

Freight railroad capacity is traditionally defined as the traffic volume above which the performance of a facility becomes unacceptable. The railroad definition of capacity is, therefore, somewhat analogous to the "practical" capacity definition formerly employed in highway engineering. The facility is capable of higher throughput, but traffic performance measures are not tolerable at these volumes. From this point in the report, the term capacity, unless otherwise qualified, will employ the acceptable performance definition.

[9] Historically, the public sector has been reluctant to invest in privately held railroad properties and the rail carriers have been reluctant to encourage such investments for fear of losing operational or financial control. However, over the past decade, both the railroads and a number of governmental jurisdictions have begun working on public-private partnerships that have resulted in a substantial public investment in railroad infrastructure.

In the railroad industry, a facility may be evaluated either as a line (e.g. a line haul track segment) or a point (e.g. a terminal or junction). The traffic unit for a line haul track segment is usually the train, which is a set of vehicles operating as a unit. Terminal performance is more typically measured in terms of vehicle throughput, since the function of the terminal is to process single vehicles or vehicles in groups much smaller than train size. Given a measure of the mean number of vehicles in a train, line haul throughput can, if necessary, be expressed in terms of equivalent vehicles.

3.1.1 Line Segments

Capacity is normally measured as the total traffic in both directions on a section of railroad line, regardless of the number of tracks.

A single railroad track is somewhat analogous to a highway lane. For safety, trains following one another must be separated by a distance that permits stopping clear of the train ahead. The larger the separation required, the lower will be the track capacity in trains per day. The stopping distance varies with the square of the train speed; higher speeds require greater separation than slow speeds.

In capacity analysis, the combining of vehicles into trains is a key difference between rail operations and highway operations. Operating individually, each rail vehicle must be separated by the stopping distance. However, combining vehicles into a train does not significantly increase this distance, while eliminating the headways between the individual vehicles in the train. This yields a higher density of track utilization and, thus, a greater carrying capacity.

The preceding statements consider that all trains operate at the same speed. This is often not the case on a rail line, as, for instance, fast passenger or intermodal trains mix with slower bulk freight trains. A train's speed must be reduced when it encroaches upon the headway of a preceding train. Signal systems increase line capacity by providing crews with better knowledge about train spacing, thus allowing higher overall speeds and less conservative operation. Still, fast trains can be delayed behind slow trains moving in the same direction.

Unlike most individual highway lanes, single track railroads almost always handle bi-directional flows. When trains operate in both directions over a single track, the track occupancy must be given first to a train or trains in one direction, then to traffic in the opposite direction. Obviously, a single track may not be subject to simultaneous operation in both directions. Trains must wait at a passing point for opposing traffic to clear the next single track segment. The waiting associated with such meets significantly reduces the capacity of a single track operated in both directions. Maximum capacities are obtained when meet locations are closely spaced and the meet operation can be performed quickly.

Double track is similar in concept to a two-lane road. Each track handles traffic in a single direction, thus eliminating meet delays and allowing for a much higher capacity than bi-directional single track. Multiple tracks in each direction may be needed to handle trains of different operational characteristics (e.g. local passenger or freight versus express). Even better are signaling or operational controls that allow for bi-directional operation on each track. Such an arrangement increases operational flexibility and, in turn, capacity. Multiple tracks do not necessarily reduce pass related delays unless dispatcher controlled crossovers or sidings are provided to facilitate passing operations.

Performance in railroad capacity evaluation for line segments is generally measured in terms of travel time. Delay, the difference between travel (processing) time actually experienced and the travel (processing) time under ideal conditions, is also commonly used.

The travel time for trains over a given line segment is a function of fixed conditions (line geometric characteristics, signal and control system characteristics, speed restrictions, train weight and power, etc.) and operational conditions (interference from opposing rail traffic, waits for rail traffic to clear at-grade crossings, dispatching delays, breakdowns, etc.).

The best possible travel time which a train can achieve over a line segment occurs when only fixed conditions affect the time. The contribution of fixed conditions to travel time is quantitatively predictable using basic kinematic relationships, and, neglecting equipment reliability, is essentially deterministic. Such a travel time, in which a train is assumed to remain continuously in motion (unless forced to stop by normal operating practice), is called the free running time. The equivalent speed, called the free running speed, is determined by dividing the segment length by the free running time. Track speed is the maximum operating speed allowed within a subsection of a track segment, with the average track speed being the weighted average of the track speeds in the overall segment. Because of the time required to accelerate and decelerate, the free running speed may not equal the average track speed.

Operational conditions impart a travel time component which varies as a function of traffic conditions. As traffic levels increase, the operational component of travel time increases. This component is probabilistic, since each train will encounter a different and random set of events which affect its travel time. The train speed computed by dividing segment length by the overall travel time, including operational effects, is called the overall travel speed.

The effects of conflicting traffic depend upon the track configuration. On single track lines, trains traveling in the opposite directions must take turns using the track between passing points. One train must, therefore, wait for opposing traffic to clear. This waiting period, called meet delay, is not part of the running time, since the train is not in motion. Obviously, multiple track line segments reduce or eliminate meet delay, since trains may pass on adjacent tracks without stopping.

3.1.2 Terminals

Railroad terminals (e.g. classification yards, stations) are typically associated with the sorting of railcars, the construction of trains from railcars, or with loading and unloading cargo or passengers. Depending upon its function, therefore, terminal capacity could be measured in terms of trains handled per unit of time or in cars handled per unit time. The former might be appropriate for a passenger terminal such as Penn Station in New York City; the latter is more representative of a hump type freight classification yard.

Unlike a typical line segment, terminals are not geographically extensive. In analysis, the terminal is frequently represented as a point. However, terminals are significant capacity chokepoints at many locations in the railroad network. Indeed, there is significant evidence that many network capacity issues result not from inadequate line capacity, but from terminals. The capacity constraints in terminals result from many causes, including operating speeds, train visibility and control, train storage capacity, conflicts between various types of movements, and inadequate processing rates. Terminal capacity problems can be vexing to address, in that most terminals are in congested urban areas and that each terminal is unique, making there no ready fix to congestion. Where line capacity is an issue, the terminal often underlies the problem. Congested terminals frequently force trains to occupy sidings or sections of double track while waiting clearance into the terminal, with a resulting reduction of line capacity.

Railroad freight terminal performance is typically measured in terms of car processing time–a function of numerous factors, including terminal configuration, method of classification (flat switching, gravity, etc.), train arrival and departure rate, and the number of switch engines employed. Because terminal configuration is extremely site specific, general relationships are difficult to predict. Like line segments, terminal processing time will have a fixed component and an operational component. Therefore, the concepts of an ideal free flow processing time and an average processing time reflecting traffic congestion effects are still valid.

3.1.3 Intersections

The intersection, defined herein as either an at-grade crossing of tracks or a junction between tracks (perhaps also including a crossing or crossings), is a third element of the railroad network that has a major effect on capacity. Like a terminal, an intersection is not geographically extensive and typically is represented as a point in many analyses, belying its critical nature in capacity analysis.

Trains must wait for opposing movements to clear before entering a junction or crossing a track. In a manner analogous to a highway intersection, movement may not take place until a gap opens in the opposing traffic stream. Thus, these elements may be the source of significant delays, resulting in a reduction in capacity. In addition, operations through junctions or across crossings, even without opposing traffic, may require a reduction in speed or even a stop. This increases operational delay.

Intersection capacity is normally measured in trains per unit of time. Although there are a few representative configurations for which simple capacity relationships may be developed, the intersections that have the largest impact on capacity tend to be highly individualistic, making capacity analysis complex. As with line segments, travel times will have a fixed component and an operational component.

Intersections, especially in urban areas such as Chicago and Kansas City, have become significant capacity constraints, especially when combined with close proximity to terminals. Some major recent railroad projects have grade separated tracks, as in Kansas City. The opportunities for such projects nationally are significant, but the railroad industry lacks the capital to implement but the most critical. Public/private initiatives, such as CREATE in the Chicago area, have been proposed to address these problems.

3.2 Pragmatic Issues

At the core of capacity discussions is a need to maintain safe separation between vehicles. Respecting this need has immediately understandable implications for railroad network design and operations. For example, given a single mainline track and no additional infrastructure, more than one train can be operated only if all trains are moving in the same direction during a particular time period. In most settings, this would be impractical. Fortunately, there are many ways that this conundrum can be overcome. Each of these methods, however, to have a different cost of implementation and each method is also result in differing levels of network capacity.

Continuing the example, the simplest response to the single track issue is to build a second track that can be used to simultaneously operate trains in the opposite direction. This is, in fact, often done. Still, constructing a second mainline track is a fairly expensive response. An alternative response would be to build sidings where trains can wait while they are met by opposing trains or overtaken by faster trains moving in the same direction. However, the decision to use sidings to keep trains separated even though they are operating in opposing directions simply brings up a number of new questions with answers that also have differing cost implications.

How many sidings should be constructed and how long should each siding be? The answers depend on the characteristics of the trains that will operate over the network and the magnitude of desired network capacity. All else equal longer sidings are better than shorter ones, but long sidings are also more expensive and they may not be necessary, depending on the planned length the trains that will be operated. Identifying the best number of sidings for a particular route link is no less challenging. More frequent sidings imply greater costs, but less frequent sidings mean that trains placed in a siding are likely to wait longer than they would otherwise and that reduces network capacity. Even selecting the method through which sidings are accessed affects both costs and capacity. The cheapest device for directing a train from a mainline into a siding is a hand-thrown switch, but using such switches can consume a great deal of time, thereby, reducing the efficiency of the network.

Vehicle separation is also important where two rail lines intersect. The most effective way to maintain separation is to grade-separate the lines so that one passes over the other. This is also, the most expensive way to keep trains from running into each other when lines cross. Alternatively, at-grade rail crossings very often require signals to govern train movements and, even then require one or more trains to wait while a train with authority uses the crossing. Signals are expensive and idle trains imply substantial losses in capacity.

If trains operate at differing speeds, maintaining separation may be difficult even if all trains are operating in the same direction. As noted above, sidings can be used to allow a faster train to safely overtake a slower train, but the simple existence of an available siding of appropriate length does not guarantee this outcome. The crew of the slower train must know that they are to enter the siding and the trailing train crew must know that the slower train is safely in the siding and that any switches have been relined for their safe passage. In short, railroad trains must be dispatched over the rail network.

As with the other aspects discussed, there are a number of effective methods for dispatching trains and, otherwise, assuring their safe separation. Within the current analysis we consider three of these. First, trains can be dispatched without any sort of signal system. Most rail lines are divided into blocks. Even without signals a dispatcher can control train operations by conveying or withholding permission for a train to occupy a block. Historically, this permission was conveyed through the use of paper train orders.

Now, it is mostly done by radio. More recently, those with responsibility for dispatching have learned that trains can be safely controlled and more efficiently operated if the boundaries of the track blocks can be varied based on a linear referencing system. Authorities granted under such a system are referred to as "track warrants".

While trains can be safely dispatched without signals, signaling systems can improve capacity. In the case of fixed block systems, signals can inform crews regarding the conditions on the railroad in front of them. These signals are referred to as Automatic Block Signals (ABS) and, as their name implies, the signal aspects change automatically as trains move in and out of track blocks.

Finally, the greatest amount of capacity can be obtained when the dispatcher has direct electronic control of both the signals and the switches that direct train movement. Such capabilities allow railroad traffic control to be handled by a central dispatcher, although some junctions and crossings are handled by local operators. Not surprisingly, then, the systems for establishing this control are referred to as Centralized Traffic Control (CTC) systems. Unfortunately, but not unexpectedly, the most effective systems for dispatching are also the most expensive to build and maintain.

Within the current context, considerations like those described within this section guide study team judgments regarding the adequacy of capacity. For example two of the BNSF route segments considered here are home to large numbers of intermodal trains.[10] Intermodal trains are operated at greater speeds that are difficult to achieve when slower bulk trains are using the same network segments. Accordingly, we would consider this when evaluating routing options that use these links.

As another example, consider the BNSF link between Galesburg, IL and Bushnell, IL (29 track miles). This route is comprised of single track railroad, but there are two relatively long (10,000 and 11,000 feet) sidings between Galesburg and Bushnell and the segment is controlled by a CTC system. The maximum speed for most freight trains on this line is 60 miles per hour. The traffic data indicate that there are between 50 and 100 million tons of traffic on this line segment each year. If we pick the mid-point of that traffic range, it equates to 20 trains per day. It is our judgment that this line segment is sufficient to accommodate current traffic volumes based on its characteristics, but we would not conclude that there is boundless reserve capacity.

We conclude by pointing out that service reliability is another important consideration in evaluating railroad capacity. The number and duration of delays are actually independent random variables following some statistical distribution and having a mean and variance. Any measure of vehicle performance at a given traffic flow level is, therefore, a stochastic value. Reliability reflects the measure of variance associated with the facility performance distribution. In many cases, a shipper will accept the generally higher transit time associated with rail provided that service is consistent. As traffic volumes increase (and capacity is used up), so do opportunities for incidents which will disrupt traffic flows and cause service failures. These considerations imply several things. First, a railroad must consider variability in travel time in addition to average vehicle

[10] Intermodal trains are trains that carry containers or truck trailers, generally, in specialized equipment, in movements that do not contain other types of railroad equipment. Motor carriers deliver the containers and trailers to the railroad connection and also dray the containers and trailers from the rail terminus to their final destinations.

performance when establishing capacity thresholds. Second, the variance of the performance distribution may differ at different discrete levels of flow. In many cases, service reliability deteriorates at traffic volumes approaching the physical capacity of the facility, even while average delay is still at acceptable levels. Traffic is still moving, but the flow is unstable, and incidents can cause lengthy and severe service disruptions.

4. Regionally-Specific Network Analyses

The analysis that follows considers the capacities of the four rail carrier sub-networks outlined in Section 1. Absent a defensible quantifiable method, these analyses are the product of the qualitative judgments of the study team. Assessments are based on five factors. These include:

- The number and extent of mainline tracks;
- The number, length and spacing of available sidings;
- Mainline operating speeds;
- The nature of dispatching and signaling procedures and facilities; and
- The specific characteristics of terminal facilities within the region.

Each of the four carrier discussions is organized in the following manner. The initial page contains a tonnage map indicating the estimated annual gross tonnages for the relevant route segments. The tonnage map is followed by a narrative summary of current traffic volumes on each of the route segments and a segment-by-segment evaluation of the relationship between current traffic, potential traffic growth, and route capacity. The appendices include raw, link-specific data.

The final part of this section focuses on railroads in the St. Louis area. St. Louis is important both as the point of demarcation between the Upper and Lower Mississippi River system and as a major connection point between railroad companies. In addition, the St. Louis area has a number of major rail-barge terminals for various commodities. Given St. Louis' influence on the rail systems discussed in this report, separate coverage of the urban area is appropriate.

4.1 Union Pacific Railroad, Chicago–New Orleans

Union Pacific (UP) is the largest of North America's railroad carriers, operating some 32,400 route-miles of track in 23 states, mostly in the western two-thirds of the U.S. The railroad handles a diversified mixture of commodities, including coal, chemicals, forest products, automobiles and automobile parts, food and food products, metal products, and minerals. UP is the largest railroad carrier of chemicals, annually moves over 250 million tons of coal, and is also a major carrier of intermodal shipments.

This study considers UP's operations in the corridor between Chicago and New Orleans. Within this corridor, which roughly parallels the Mississippi River, UP operates a number of key routes and terminals. The cities of Chicago, St. Louis, Memphis, and New Orleans are key gateways with eastern railroads. Figure 4-1 shows the UP track network within the corridor. The thicker lines denote routes that would likely handle traffic between

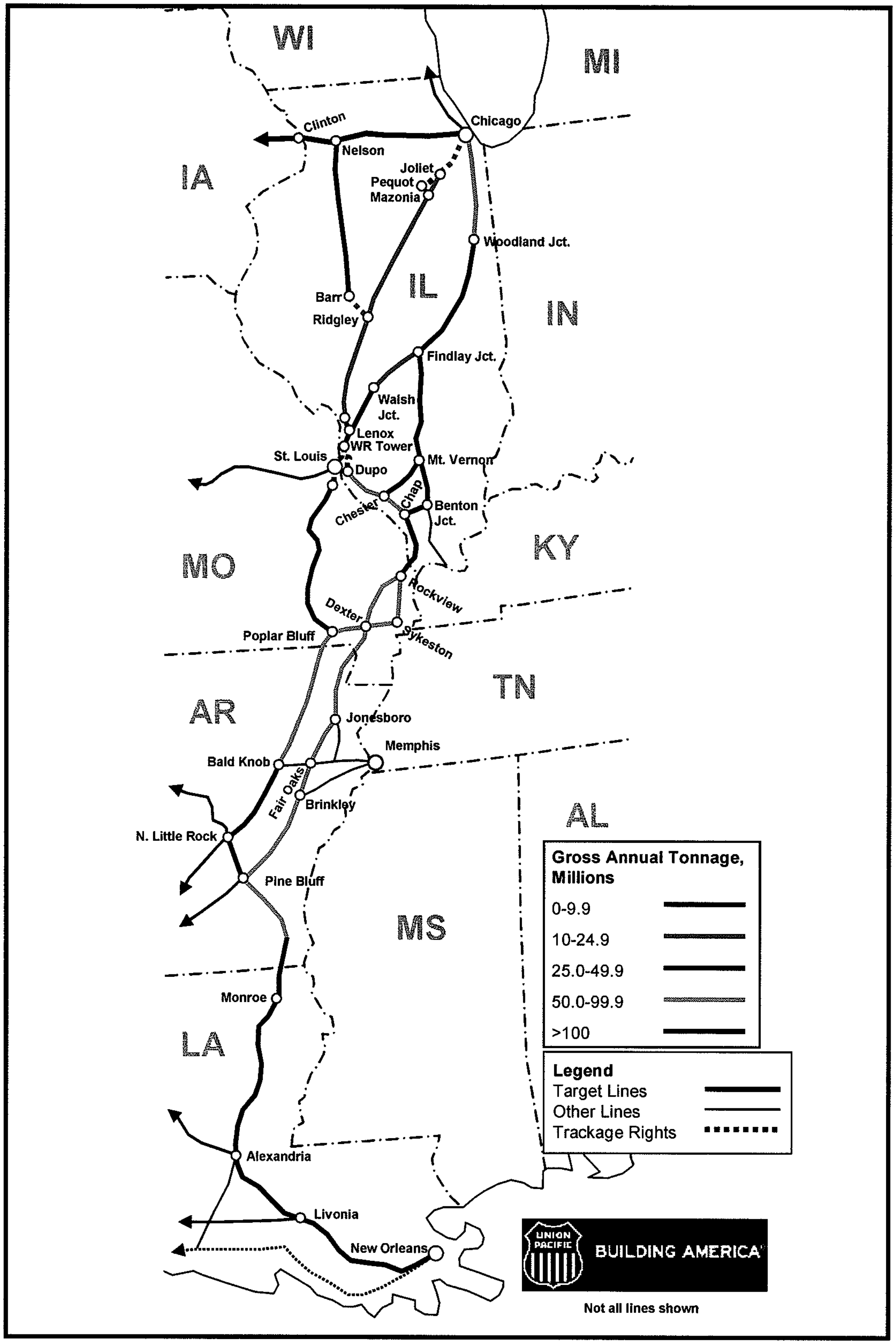

Figure 4-1. Union Pacific Railroad Routes Evaluated

Chicago and New Orleans. Appendix A contains descriptive information on each line segment.

We assume that traffic from eastern Iowa points along the Mississippi will be funneled to the UP Geneva Subdivision, which extends east from Iowa to Chicago. For traffic destined from eastern Iowa towards the lower Mississippi Valley, the most direct routing via UP's network is through Illinois via Chicago. UP has two routes extending south from the Chicago area. These are described below.

The primary UP freight route extends from a freight yard complex in the south Chicago suburb of Dolton south via Woodland Jct. to Chap, IL. Between Dolton and Woodland Jct., this route, the Chicago Subdivision, is shared with CSX Transportation, forming a key link in that railroad's Chicago-Florida route. This portion of the line is double tracked; south of Woodland Jct., the line is predominantly single track. Branch routes from the main trunk extend in Illinois between Finlay Jct. and East St. Louis and between Mt. Vernon and Chester.

The second UP line extending south from Chicago, termed the SPCSL, or Wilmington Line, extends to East St. Louis via Springfield. UP ownership of this line actually begins at Joliet, IL. The company operates into Chicago via trackage rights on the Canadian National Railroad. The state of Illinois has designated this line as the preferred route for high-speed passenger trains in the St. Louis-Chicago corridor. Work is presently underway to upgrade the track and signaling systems to permit eventual 110 mph operation. While the line may continue to handle freight trains, UP has diverted much Chicago-St. Louis freight traffic on this route to its other lines. The portion of the route south of Springfield still handles trains en-route to/from St. Louis and the Illinois & Midland Railroad connection at Ridgley (Springfield). From Wood River (Alton, IL) to WR Tower in East St. Louis, UP and Kansas City Southern (KCS) operate their paralleling mainlines as joint double track. South of WR Tower, KCS uses trackage rights over the UP line to reach its terminal facilities near Valley Junction.

UP's lines do not directly connect in Chicago. Instead, traffic must be transferred across another carrier's tracks. Chicago is a notoriously congested railroad hub, and such transfers can be time consuming. In addition, UP freight trains in the Chicago area must compete with heavy Metra commuter traffic on the Geneva Subdivision, and with both Amtrak intercity and Metra commuter trains on the SPCSL. The Indiana Harbor Belt Railroad (IHB), a Chicago area switching and terminal railroad, is perhaps the best direct connection between the Geneva Subdivision, the SPCSL, and the Chicago Subdivision. The IHB has the advantage of a double track line, though the company handles its own trains and trains of other Chicago area railroads and still must contend with delays from the numerous crossings and connections with other lines.

UP's route extending from the Geneva Subdivision at Nelson, IL to a connection with the SPCSL at Ridgley (Springfield) provides a by-pass around the congested Chicago area. This secondary line sees some coal trains destined for the Peoria area, along with intermodal traffic coming off the BNSF Transcon line at Edelstein. The degree to which this line could carry additional traffic depends upon interference with Amtrak schedules between Ridgley and East St. Louis. Additionally, East St. Louis has congestion issues, though UP is arguably the best positioned railroad to move traffic through the area.

St. Louis is a major point in the UP network. In the study corridor, routes though East St. Louis handle most of the UP traffic. The SPCSL and Pana Subdivision (from Findlay Jct.) feed traffic in from the north. To the south, UP traffic follows the Chester Subdivision from Dupo Yard in East St. Louis south along the east bank of the Mississippi. UP connects its lines on the east side of the Mississippi using the Alton & Southern Railroad, a wholly owned terminal and switching railroad. Connections with the UP routes on the west side of the Mississippi takes place over the Terminal Railroad Association of St. Louis (TRRA), owner of both major rail bridges spanning the Mississippi in the greater St. Louis area.

On the east side of the Mississippi south of St. Louis, the Chicago, Pinkneyville (Mt. Vernon to Chester), and Chester subdivisions eventually join to funnel UP traffic south through what the company terms its North-South Corridor. This route handles in excess of 100 million gross tons on the section between Chap, IL across the Mississippi River bridge near Thebes to Rockview, MO. South of Rockview, the UP distributes traffic across two parallel lines through Arkansas and on into Texas. The eastern line through Pine Bluff handles primarily southbound trains, with northbound trains taking the western line via Little Rock. UP has employed this directional running scheme to efficiently handle traffic increases of the past few years.

UP's sole route extending south along the west side of the Mississippi River from St. Louis connects at Poplar Bluff with the main North-South Corridor line to Little Rock. This single track line, the route of Amtrak's *Texas Eagle*, does not figure prominently in UP's freight operations. There are several possible reasons for this, including short sidings, poor connectivity with UP's other lines into St. Louis (involving trackage rights over other carriers), a less favorable profile for handling long, heavy trains, and difficulty in integrating this line into the directional running scheme.

UP's most direct route to New Orleans from the North-South Corridor lines extends from Little Rock through Pine Bluff, Monroe, and Alexandria. This route is predominantly single track having reasonably frequent and long sidings and equipped with centralized traffic control. At current traffic volumes, the route has capacity reserves.

While UP's generally modern and well maintained lines could probably handle some additional traffic in the Chicago-New Orleans corridor, portions of the corridor have some of the highest traffic densities in the company's network–in particular, those portions that comprise UP's North-South Corridor lines. UP has been successfully increasing the North-South Corridor business base. Schemes like the directional running system have, thus far, kept the corridor fluid. However, it must be considered that continued traffic growth will erode capacity reserves, especially in the critical bottleneck between Rockview and Chap, some of which is single track. On the other hand, lines north of St. Louis and south of Pine Bluff seem to have substantial reserve capacity.

4.2 Norfolk Southern Railway, Chicago – St Louis

Norfolk Southern (NS) is one of the four major U.S. Class I railroads, with a network of 21,200 route-miles of track, primarily in the states east of the Mississippi River. NS carries a wide variety of commodities, with coal, forest products, automobiles and automobile parts, food and food products, metal products, and minerals being major portions of its business.

This study considers NS operations in the corridor between Chicago and St. Louis. While NS serves the major gateway cities of Chicago, St. Louis, Memphis, and New Orleans in the Mississippi River valley, its primary route orientation is east-west in this region. NS north-south routes between these points are generally circuitous. However, the NS route between Chicago and St. Louis, shown in Figure 4-2 is reasonably direct. Appendix B contains descriptive information on the line segments that make up this route.

NS does not serve eastern Iowa, though it reaches the Des Moines area in central Iowa via haulage rights over BNSF Railway from St. Louis.

While NS operates several main lines into Chicago from the east, the company no longer operates south from Chicago on its own line. NS abandoned its mainline between the Chicago suburb of Manhattan and Gibson City, IL in favor of traffic rights over the Canadian National (CN) railroad from Chicago to Gibson City. NS trains proceed from

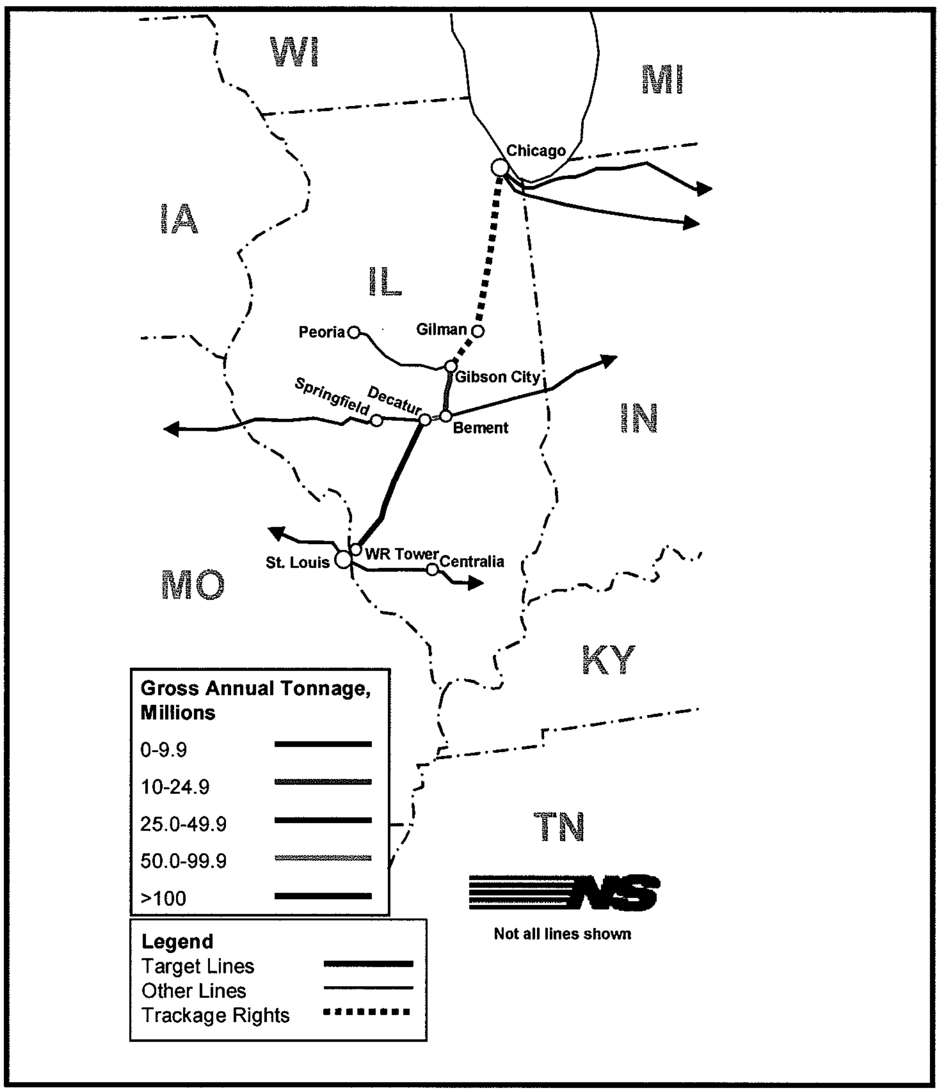

Figure 4-2. Norfolk Southern Routes Evaluated

Chicago over the CN mainline 67 miles to Gilman, IL, then travel the CN Gilman District 29 miles to Gibson City to rejoin NS rails.

The single track NS line from Gibson City extends 40 miles to a junction at Bement, IL. There, trains en-route to St. Louis would travel 20 miles via a double track mainline to Decatur, IL. This line, part of a major NS route to Kansas City, and carries a high volume of time sensitive intermodal and automobile traffic, as well as interchange traffic for western carriers.

From Decatur, an NS train leaves the Kansas City mainline for the 124.1 trip to East St. Louis. The railroad refers to this route as the Brooklyn District. From East St. Louis, NS trains operate across the Mississippi River using TRRA tracks.

Were NS to have seen Chicago-St. Louis traffic as a growth area, the company likely would not have abandoned its line from Manhattan to Gibson City. NS operations between Chicago and St. Louis are now constrained by a number of factors. Operations over the CN track south of Chicago are not under the company's control, and CN infrastructure and operating restrictions will affect the volume of traffic that can use the NS routing. The CN track between Gilman and Gibson City is a secondary line, although it does have block signals. The NS routes between Gibson City and Bement and between Decatur and East St. Louis are equipped with Centralized Traffic Control and maintained for 50 mph freight speeds. However, passing sidings might be needed to provide additional capacity. Siding spacing on the Brooklyn District ranges from 20 to 23 miles.

4.3 Canadian National Railway

The Canadian National Railway (CN) operates 20,264 route-miles of track in Canada and the United States. CN is the only true transcontinental railroad in North America, with a mainline extending from Halifax, Nova Scotia to Vancouver, British Columbia. The company operates a considerable network within the U.S., including properties of the former Illinois Central (IC), Grand Trunk, and Wisconsin Central Railroads. Some 54% of CN revenue presently derives from U.S. domestic and cross-border traffic.

The current analysis considers the CN route between Eastern Iowa and New Orleans using the former IC line between Dubuque, Iowa and Chicago and the former IC corridor from Chicago to New Orleans. The latter consists of several mainline segments that collectively represent the most direct railroad route between these two cities. Unique among the major railroads, CN has route through Chicago, so that trains may travel from the Iowa line to the New Orleans mainline without using other connecting railroads–potentially a very great advantage given the congestion in the Chicago rail network. Figure 4-3 shows the CN lines, while Appendix C provides line specific information.

The CN line between Dubuque and Chicago is largely a single-track railroad. There are nine sidings, all but one over a mile in length, but these sidings tend to be concentrated on the western end of the route. Indeed in the first 80 miles west from Chicago, there are only two sidings. Train movements over the majority of the route are controlled by track warrants with automatic block signal protection. There is, however, roughly 50 miles of CTC, again toward the western end of the section under study. In addition to multiple connections in Chicago, this CN route connects with the BNSF and Illinois Chicago and Eastern (ICE) at both Dubuque, IA and Rockford, IL. Between Portage

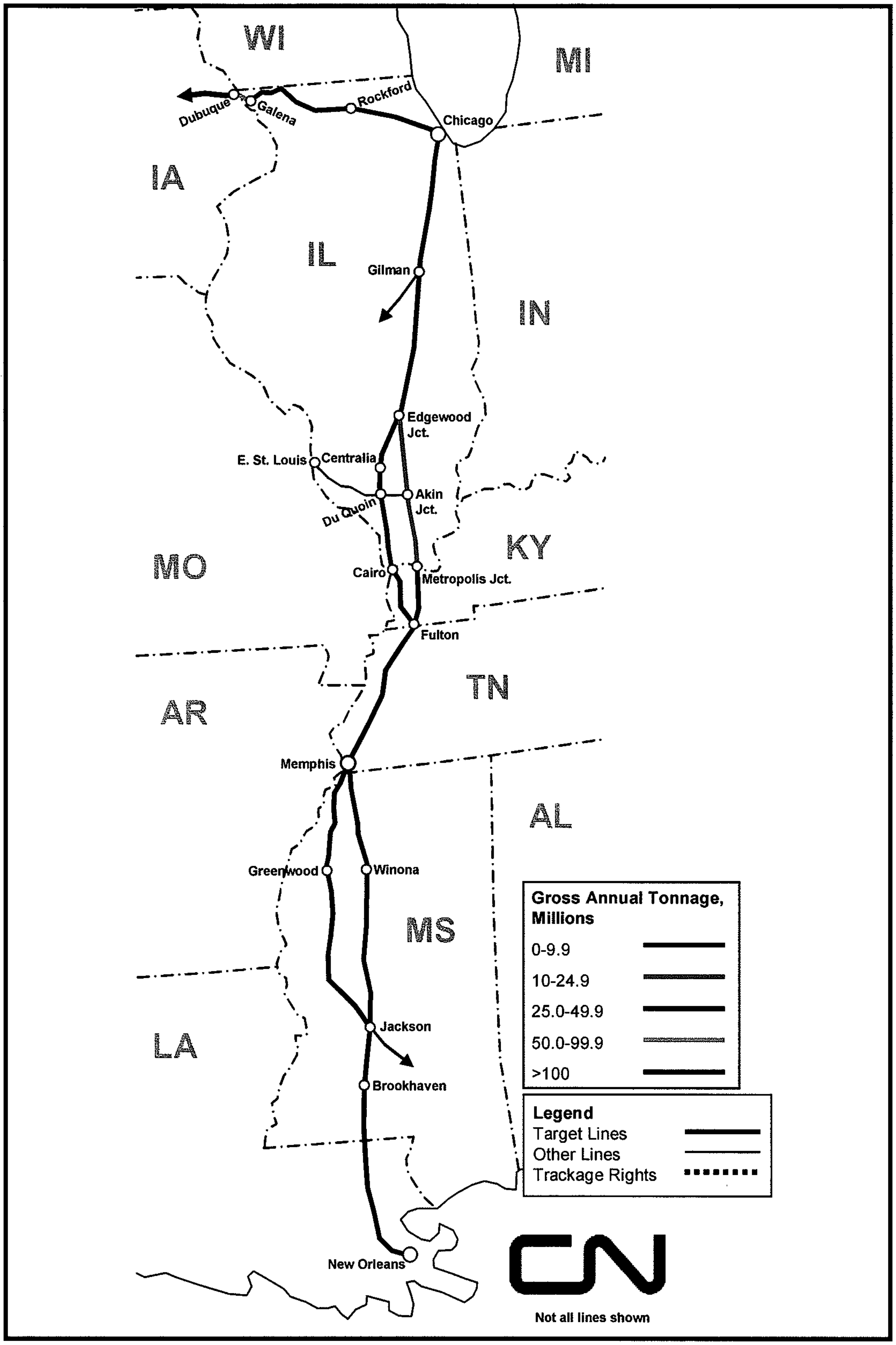

Figure 4-3. Canadian NationalRoutes Evaluated

and East Dubuque, IL, BNSF and CN operate as joint track. This section carries BNSF's substantial traffic headed to and from Galesburg/Chicago and the Twin Cities. Currently, CN handles less than 10 million tons per year (8-10 daily trains) over this line, so that the relatively Spartan infrastructure is more than adequate. It would, however, be difficult to substantially increase traffic volumes without corresponding investments.

CN's north-south corridor begins with the Chicago district extending southward from Chicago for a distance of roughly 120 miles to Leverett Junction, followed by the Champaign district extending southward 128 miles to Centralia, IL. CN shares its track with Metra commuter trains in the Chicago area, Amtrak passenger trains between Chicago and Centralia, and Norfolk Southern freight trains between Kensington and Gilman. South of Centralia, CN trains operate over the Centralia district 109 miles to Cairo, IL, then over the Cairo district 45 miles to Fulton, KY. BNSF freight trains and Amtrak passenger trains also operate over the Centralia and Cairo districts.

Above Centralia, sidings are frequent; below Centralia they are less so. However, all sidings are relatively long, averaging between 10,000 and 20,000 feet. These siding lengths likely reflect the fact that, at one time, this route was largely double-tracked. Track structures on all Districts will support freight train movements of 60 miles per hour (70 miles per hour for intermodal). With the exception of the Bluford District, traffic totals on this routing sum to between 25 and 50 million annually.

At Edgewood Junction, south of Champaign, the Bluford District diverges from the Champaign District, providing a parallel 168.5 alternative route to Fulton, KY, where it rejoins the mainline. A single track line controlled with CTC, the Bluford district serves as a low grade alternative route for CN trains.

The Fulton District covers the roughly 125 miles between Fulton and Memphis, TN. A mix of single and double track, this section has five sidings that are each over 10,000 feet in length. Unfortunately, these are the remnants of double track, which the district once featured over its entire length. Train movements are primarily controlled by CTC, although the remaining double track has automatic block signals. As with the trackage north of Fulton, the track supports relatively high train speeds. Amtrak and BNSF also operate over the Fulton District.

In summary, the CN routing between Chicago and Memphis is a robust, single track railroad (though the Bluford district effectively serves as a second main track between Fulton and Edgewood Jct.) that probably has substantial capacity reserves. Certainly, this would be the case if the carrier elected to restore double track to locations where the second track has been removed. In addition, the profile and the alignment of the route are well suited to handling heavy tonnage trains at high speeds.

While CN trackage through the metro Memphis area is mostly CTC controlled double-track, the carrier does operate over trackage rights on CSXT between Leewood and A Yard Junction, a distance of roughly nine miles.[11] Normally, operations over trackage controlled by a different carrier are a source of concern. However, we find no evidence of operational conflicts between CSXT and the CN in this particular case. CSX and CN appear to have a cooperative relationship in Memphis, sharing the same intermodal terminal.

Between Memphis and Jackson, MS, CN again operates two parallel routes. The two alternative routes converge at North Jackson.

The Yazoo district is currently the primary route for through freight trains and Amtrak. This single track mainline features frequent and long sidings, CTC dispatching, and relatively high freight train speeds.

The Grenada district, a secondary route parallels the Yazoo district to the east. This line, also single track, has a less favorable profile for heavy freight trains. It does have frequent sidings, but they are generally less than 5,000 feet in length. Track conditions presently limit train speeds to 40 miles per hour and loaded freight cars to 263,000 pounds gross weight, an amount substantially below the 286,000 pounds typically used in bulk commodity movements.

South from Jackson to New Orleans, the CN mainline is a mix of CTC controlled single track and ABS equipped double-track. This line was completely double tracked in the past, but much of the second track was removed when the CTC system was installed. CN speed limits over the line are as high as 60 mph for traditional freight trains, 70 mph for intermodal trains, and 79 mph for Amtrak passenger trains.

Of the routes considered within the current analysis the CN route between Chicago and New Orleans probably has the greatest reserve capacity. Over much of the route, the curvature and profile are favorable for operating long trains at relatively high speeds. While the previous owner eliminated a substantial amount of double track, the single track that remains is generally supplemented by long and relatively frequent sidings, so that current traffic volumes are easily accommodated. Moreover, assuming that rights-of-way have been preserved, the restoration of double track at specific locations could likely be accomplished at manageable costs. CN has actively marketed its extra capacity to other railroads, as indicated by the relatively recent agreements allowing NS and BNSF to operate over portions of the route.

4.4 BNSF Railway, Upper Eastern Iowa–St Louis

Operating over 32,000 route miles of track, largely in states west of the Mississippi River, BNSF Railway has the second largest network of the North American railroad companies. BNSF is a major carrier of grain and other farm products, foodstuffs, lumber and wood products, coal, chemicals, ores, and metal products. Both Chicago and St. Louis are major operating hubs for the railway.

The study team examined BNSF Railway routings that connect southern Minnesota and eastern Iowa with potential transload locations to the south (primarily St Louis). Figure 4-4 shows the corridor; Appendix D provides data on each line segment. While the company serves New Orleans, its route between St. Louis and New Orleans is highly circuitous compared to others discussed in this report.

The north end of the study corridor is anchored by that portion of the BNSF Chicago-Twin Cities mainline between La Crosse, WI and Savannah, IL and the connecting mainline between Savannah and Galesburg, IL. South of Galesburg, BNSF has several options to route traffic into the St. Louis area. The railroad has routes from Galesburg into both East St. Louis, IL and St. Louis, MO.

[11] This allows the carrier to bypass its original routing through the center of Memphis.

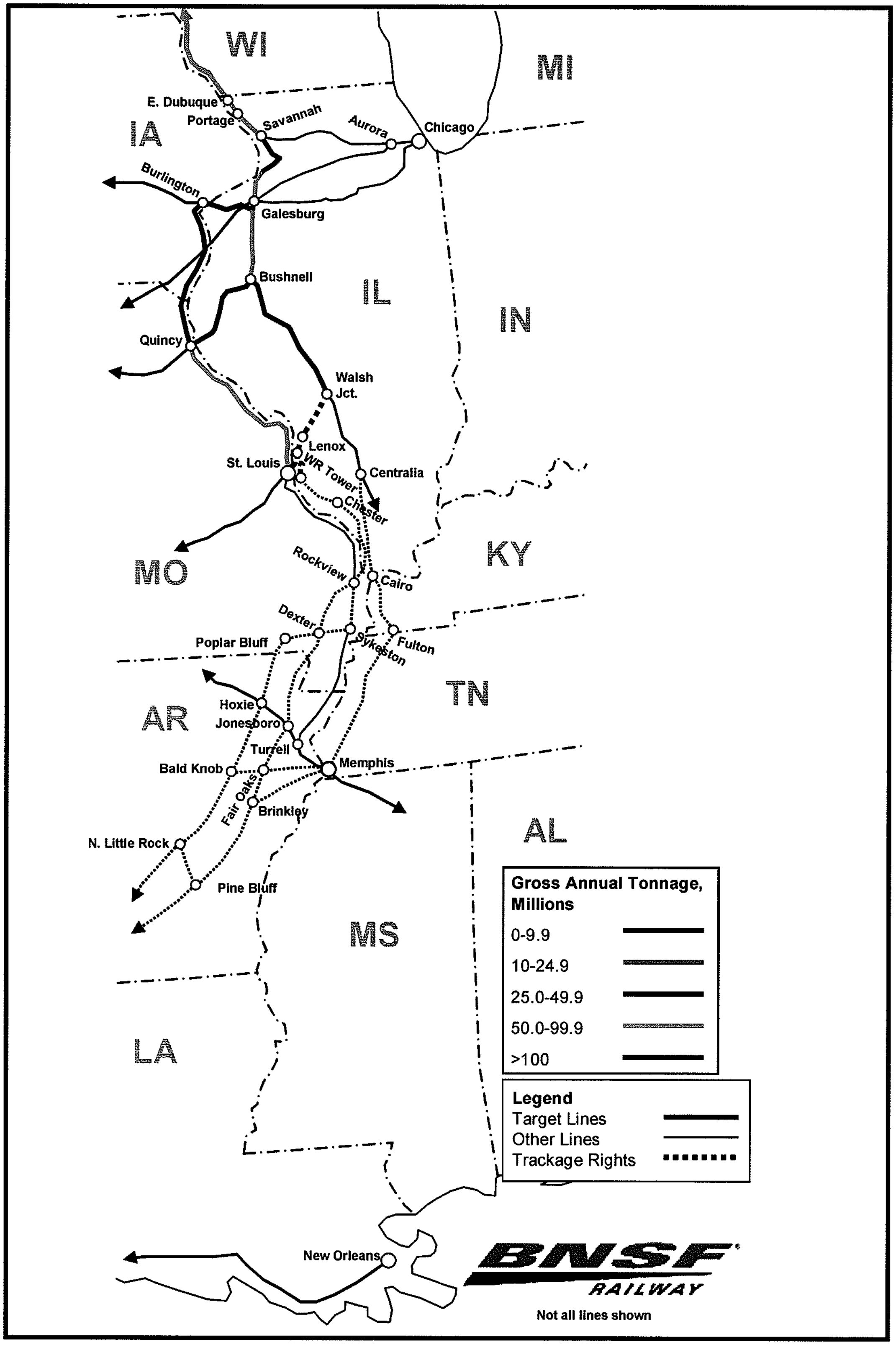

Figure 4-4. BNSF Railway Routes Evaluated

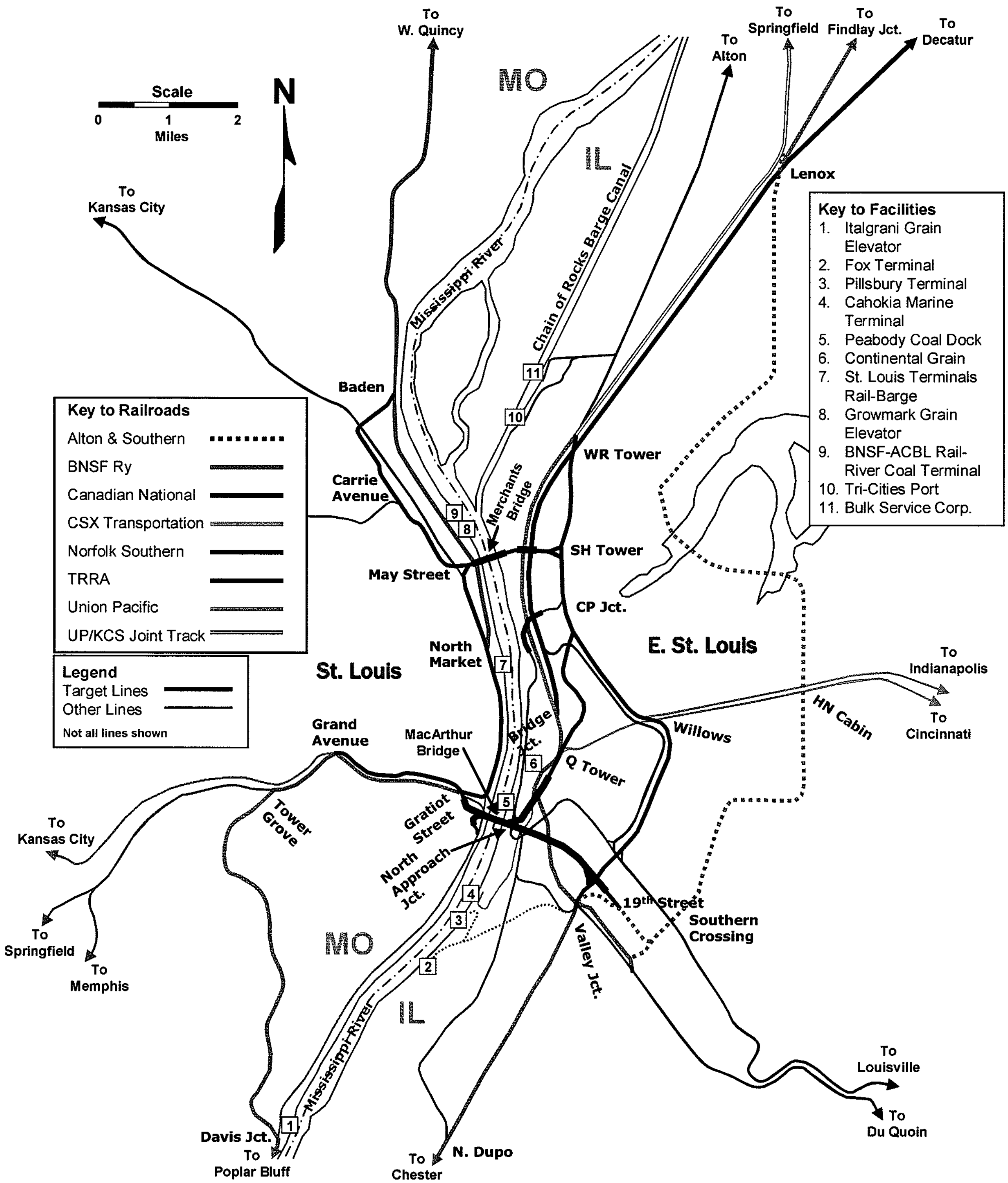

Figure 4-5. St. Louis Area Railway Network

serving the St. Louis area. The map also shows some of the key facilities having rail-water transfer capabilities.

4.5.1 Terminal Railroad Association

TRRA is a switching carrier jointly owned by Union Pacific, BNSF Railway, Canadian National, CSX Transportation, and Norfolk Southern. The railroad provides classification, switching, and transfer services on both sides of the Mississippi River in the greater St. Louis area.

The TRRA has the critical function of connecting the railroads on either side of the Mississippi River. TRRA owns both of the St. Louis area railroad bridges across the Mississippi. These bridges are the Merchants Bridge, just north side of downtown St. Louis, and the MacArthur Bridge, in the heart of downtown St. Louis.

The Merchants Bridge is a half-mile long railroad-only bridge dating from 1890. It is double tracked. As a concession to its age, the Merchants bridge has a number of operating restrictions. Loaded short wheelbase ore cars ("jennies") are prohibited from the Bridge. In addition, trains having six-axle locomotives or cars in excess of 286,000 lb may not meet or pass on the bridge.

The MacArthur Bridge is part of a 6.2 mile long elevated track that comprises the second-longest elevated steel structure across the Mississippi River. Originally built with a road deck over the rail deck; the bridge now carries railroad traffic only. A much newer structure than the Merchants Bridge, the MacArthur Bridge has no significant weight or clearance restrictions. It is also double tracked.

TRRA lines on the east and west sides of the river connect the two bridges, providing considerable flexibility in routing. The major routes include the Merchants Subdivision the MacArthur Bridge Subdivision, the Illinois Transfer Subdivision, and the Eads Subdivision. Other TRRA lines extend to connect with the railroads entering the St. Louis area and to serve rail shippers. TRRA operates the large Madison classification yard in East St. Louis, along with a number of other local support yards throughout the area. Madison Yard presently handles 30,000 cars per month.

The Merchants Subdivision extends from Grand Ave. to WR Tower via the Merchants Bridge, a distance of 9.8 miles. This route is largely controlled by CTC, with double track extending 4.8 miles from North Market to WR Tower. The maximum train speed is 30 mph, with speeds over the Merchants Bridge limited to 20 mph. The Merchants Subdivision is an important link for trains of NS, BNSF, and UP, as it connects their networks on the east and west sides of the Mississippi. It also connects BNSF Railway's lines on the west bank of the Mississippi. Amtrak operates over the Merchants Subdivision en-route to/from its station in downtown St. Louis.

The MacArthur Bridge Subdivision connects Gratiot Street and 19th Street via the MacArthur Bridge. The 4.0 mile line is double track controlled by CTC. The maximum train speed permitted is 20 mph. This line provides a direct link between the UP routes on the east and west sides of the Mississippi. BNSF and Amtrak trains may use the line, and it frequently serves transfer movements between railroads serving St. Louis.

The Illinois Transfer Subdivision extends 7.0 miles between SH Tower and Valley Junction. Its primary role is to handle the movement of railcars between the TRRA

The primary BNSF route between the Pacific Northwest and Chicago also provides rail service to southeastern Minnesota and western Wisconsin. Between La Crosse and Savannah, there is very probably adequate reserve capacity. This trackage currently hosts traffic of between 50 million and 100 million tons annually, but its double track configuration and ABS signaling suggest that this total could be readily increased. The only area of concern is the relatively large number of intermodal trains that BNSF operates along this routing. As noted earlier, mixing fast-moving intermodal trains with slower-moving bulk commodity operations can severely tax track capacity.

From Savannah, much BNSF traffic, especially intermodal trains, moves eastward toward Chicago. However, southbound traffic moves to the Galesburg terminal via the 96 mile Barstow Subdivision. This line is single track with train movements controlled by CTC. Over this distance there are seven passing sidings, with all but one being 8,000 feet in length or greater. Maximum freight train speed is the same 60 miles per hour observed on the La Cross–Savannah segment. Above Barstow, IL (East Moline), current traffic volumes are between 25 and 50 million tons annually. Below Barstow, annual volumes are between 50 and 100 million. This difference likely reflects existing grain traffic destined to the Quad Cities.

At Galesburg, several separate former Burlington Northern routes converge and are crossed by the former Santa Fe Chicago-Kansas City mainline (the "Transcon"). Consequently, terminal activities at Galesburg are substantial and maintaining fluidity there is critical to BNSF operations throughout the region.

From Galesburg, BNSF has several possible ways to move traffic into St Louis. First, traffic can move southbound from Galesburg over the Brookfield Subdivision to West Quincy, MO, then to St Louis on the Hannibal Subdivision. Alternatively, BNSF can route trains west on the Ottumwa Subdivision to Burlington, IA, then south through West Quincy and on to St Louis via the Hannibal Subdivision. The Hannibal Subdivision already funnels substantial quantities of coal and grain into the St. Louis area.

BNSF can also route trains south from Bushnell over the Beardstown Subdivision, south easterly to Walsh Junction, IL, then westward to East St. Louis via trackage rights on the Union Pacific Pana Subdivison. BNSF St. Louis area terminals are on the Missouri side of the Mississippi River. BNSF trains must cross from IL to MO via the TRRA.

There are advantages and disadvantages to each routing. A westward movement would combine new traffic with a substantial amount of existing merchandise and coal traffic on a route segment that handles more than 100 million tons annually. Consequently, from a capacity management standpoint, such movements might be undesirable. It would, however, get the traffic to the west side of the Mississippi River. Between Burlington and West Quincy, the Hannibal Subdivision is largely unsignaled single track railroad. There are, however, four sidings in this 72 mile link. Current traffic volumes are between 25 and 50 million tons per year, so that the current track configuration is appropriate for the traffic that is there, but reserve capacity is minimal.

At 101 miles, the southbound route between Galesburg and West Quincy is roughly the same length as the routing through Iowa. With one very small exception, it is 60 mile per hour single track where train movements are controlled by CTC. Current traffic volumes between Galesburg and Bushnell, IL range between 50 and 100 million tons per year. There are, however, two substantial (10,000 feet) sidings in the roughly 30 miles that separate the two locations. At Bushnell, diverging traffic reduces observed traffic to the 25–50 million ton annual range.

Regardless of whether traffic moves west or south from Galesburg over these alternatives, the movement from West Quincy to St. Louis is the same. As in the case of the trackage between Galesburg to West Quincy, the link between West Quincy is single track, 60 mile per hour railroad where train movements are generally controlled by CTC. There are ten sidings in the approximately 130 mile long link, eight of which are over 8,000 feet in length. Current traffic appears to be between 50 and 100 million tons annually, so that once again, the structure of the railroad appears appropriate to current traffic volumes, but reserve capacity is likely to be small.

The final alternative routing for Galesburg–St. Louis traffic uses the routing already described between Galesburg and Bushnell. However, from Bushnell, traffic would travel over the BNSF's Beardstown Subdivision to the Union Pacific connection at Walsh Junction. Nearly half of this single track routing is CTC equipped, with the remainder unsignaled and subject to a maximum freight train speed of 49 miles per hour. Sidings on both the CTC and unsignaled segments are both plentiful and long. Current figures suggest that this line segment handles between 25 and 50 million tons a year. Thus, the CTC signaled portion is likely to have a non-trivial amount of reserve capacity. The final UP leg is approximately 30 miles over CTC controlled single track.

It is worth noting that none of the three routing options allow BNSF to connect directly to the former Frisco trackage that also reaches the St. Louis area. Both traffic arriving in St Louis from the north and traffic arriving in East St. Louis on the UP must use the TRRA to reach the former Frisco's Lindenwood Yard.

To summarize, for the BNSF routes north of Galesburg, capacity does not likely to be an issue even in the face of measurable new traffic. At Galesburg and south, accommodating additional traffic could well require capacity improving investments, particularly on those route segments that are currently unsignaled.

4.5 The St. Louis Area Railroad Network

St. Louis is a major gateway between railroad systems in the U.S. The Mississippi River serves as a rough dividing line between the eastern and western railroad carriers. Thus, St. Louis, along with Chicago, Memphis, and New Orleans, is a major exchange point between eastern and western rail carriers. In addition, St. Louis is a major rail-barge transloading center.

For three of the four carrier routes described in the preceding sections, St. Louis is either a terminus or an intermediate point. Thus, the arrangement and characteristics of the St. Louis area railroad network will affect these routes. This information in this section should the reader understand how rail traffic flows within the greater St. Louis area.

Figure 4-5 depicts the St. Louis area railroad network, with track of each of the carriers having routes discussed in this report identified, along with the lines of the two St. Louis area terminal railroads, the Alton & Southern and the Terminal Railroad Association. The map includes all principle rail lines entering the metropolitan area, regardless of carrier. The terminal railroads are the "glue" that connects the various railroad lines

Madison Yard and various yards of the connecting railroads. However, the line can also handle through trains, providing a north-south route through East St. Louis for railroads east of the Mississippi River. About half the route is double track, and train movements are governed by CTC. The maximum train speed is 25 mph.

The Eads Subdivision lies between CP Junction and North Approach Junction, a distance of 3.9 mi. The line connects the east end of the Merchants Subdivision (and Madison Yard) with the MacArthur Bridge Subdivision, providing a second option for routing traffic across the Mississippi River. The southerly 1.5 miles of the line is double tracked. Admittance to the line is controlled by signalized interlocking, but the track itself is not signaled. Train speed is restricted to 20 mph.

4.5.2 Alton & Southern

The Alton & Southern (A&S), a Union Pacific subsidiary, provides a by-pass around the East St. Louis area. While UP lines entering East St. Louis from the north connect directly with the carrier's line to the south along the east bank of the Mississippi, the A&S offers a relatively uncongested alternative. Perhaps as important, the A&S route is independent of the costs and operating control of the TRRA.

The A&S mainline runs 18.8 miles from Valley Junction, south of East St. Louis, to Lenox. South of Valley Junction, the A&S extends an additional 2.2 miles further to Fox Terminal on the Mississippi's east bank. Trains on the mainline operate under radio issued block permits. The southern 9.6 miles of the mainline are double tracked. Train speeds are limited to 30 mph. A&S also has trackage rights over TRRA's MacArthur Bridge Subdivision between 19th Street and the UP connection at Gratiot Street. Appendix A contains additional information on the A&S mainline.

A&S operates Gateway Yard, a large hump classification facility just east of Valley Jct. Gateway Yard originates and terminates nearly 50 trains and classifies some 3,500 cars each day. This modern and high capacity facility provides an alternate to railroad owned yards and to the TRRA Madison Yard for classifying railcars in the St. Louis area.

5. The Cost of Incremental Rail Infrastructure Improvements

Highway engineers are fond of saying that, if given enough money and equipment, they can build anything. The same is largely true in the railroad industry. Moreover, each dollar invested in railroad infrastructure yields substantially greater freight hauling capacity that a similar highway investment. This said, the cost of adding additional railroad capacity is not trivial. Indeed, the lack of capital in the railroad industry is the greatest impediment to capacity expansion.

5.1 Line Segments

Line segment capacity can be expanded in a number of ways. Typical approaches to physical capacity improvements include

- Adding or improving passing sidings;

- Adding additional main tracks; and
- Adding or upgrading signals.

These options are often preceded by such "soft" capacity improvement measures as fleeting trains and making trains longer and faster. In fleeting, trains heading in the same direction are grouped and dispatched serially across a single track segment without conflict from opposing movements. The direction of operation is periodically reversed to handle accumulated traffic in the opposing direction. Where parallel lines exist between two points, a railroad or railroads may also operate these lines as double track, with each line handling traffic in one predominant direction.

5.1.1 Track Upgrade Costs

As a part of the 1998 study noted earlier, the study team developed a set of generic track improvement costs. These generic costs have been updated to reflect prices changes and the results are provided here as Table 5-1.

Essentially these parameters consider four types of track projects in three types of terrain with two categories of right-of-way ownership and the option of improving signals or not. In the case of signal improvements, the progression would be from unsignaled to ABS

Table 5-1. Generic Railroad Track Improvement Costs

2007	Base Case			
	Track $/Mile	Track $/Foot	Turnout Cost	Control Point
Siding Case	$535,287	$101	$137,777	$156,847
Light Density Main	$573,650	$109	$129,407	$156,847
Medium Density Main	$637,514	$121	$137,777	$156,847
Heavy Haul Main	$683,307	$129	$166,964	$156,847

2007	Terrain Adjustment	
Terrain	Existing ROW	New ROW
Flat Terrain		$144,681
Rolling Terrain	$198,484	$953,820
Mountainous Terrain	$663,019	$4,604,972

2007	Signal Upgrade
	Per Mile
Signal Upgrade	$733,949

or ABS to CTC. These are raw construction costs only that do not include the cost of capital. In order to calculate the cost of capital, an annual rate of return of roughly 12% should be incorporated into cost calculations.

There are two important points associated with these costing parameters–one is immediately obvious, the other is considerably more subtle. First, the costs of mainline infrastructure projects vary tremendously depending on the characteristics of the project. Table 5-2 provides cost estimates for three distinct improvements. These projects, while appearing somewhat similar in scale, range between $1.4 million and $48.7 million.

Table 5-2. Comparative Improvement Cost Estimates

Project Description	Project Cost
8,000' siding to be built on existing right-of-way in rolling terrain with no centrally controlled control point	$1,387,329
A signal upgrade to ABS or CTC over a 21 mile long track segment	$15,412,930
Eight miles of a second signaled main track to be built in mountainous terrain on new right-of-way	$48,668,605

The second point relates the cost of a potential project to the incremental capacity it will yield. Very simply put, track that is at the low end of capacity is typically cheaper to improve than railroad that is already upgraded to high capacity. In other words, the capacity of a lightly trafficked, non-signaled single track line can be increased substantially with the addition of some reasonably inexpensive sidings. Conversely, a railroad with two heavy-haul main tracks that is CTC signaled for bi-directional operations with an ample number of cross-overs can only see its capacity increased through hugely expensive measures. At one point in time, secondary mainline trackage was abundant. However, many such properties (and even a number of high capacity mainlines) have been downgraded, abandoned, sold as short-lines, or brought to current mainline standards. The result is that creating additional capacity through the modification of existing routings is increasingly expensive.

5.1.2 Bridges

The current discussion does not provide cost estimates for bridge replacements or expansions. Because bridges are highly specific to local conditions, making generalized estimates of modification costs is very difficult.

Table 5-3 lists railroad crossings of the upper Mississippi River south of La Cross, WI. The number and characteristics of the bridges from St. Louis north lead us to believe that they do not represent a capacity constraint for the routes examined in this report. Below St. Louis, as the river widens, the number of railroad crossing points declines

Table 5-3. Upper Mississippi Railroad Bridges, Mile 0.0 to Mile 700.0

River Mile	Name	Location	Railroad	Type	Tracks
699.9	La Crosse RR Bridge	La Crosse, WI	CP	Swing	1
579.9	Canadian National RR Bridge	Dubuque, IA E. Dubuque, IL	CN	Swing	1
535.0	Sabula RR Bridge	Sabula, IA	ICE	Swing	1
518.0	Clinton RR Bridge	Clinton, IA Fulton, IL	UP	Swing	2
482.9	Government Bridge	Davenport, IA Rock Island, IL	IAIS	Swing	1 (built for 2)
481.4	Crescent Bridge	Davenport, IA Rock Island, IL	BNSF, ICE	Swing	1
403.1	BNSF RR Bridge	Burlington, IA	BNSF, UP	Swing	2
383.9	Ft. Madison RR/Hwy Bridge	Ft. Madison, IA	BNSF, UP	Swing	2
363.9	Keokuk & Hamilton Bridge	Keokuk, IA Hamilton, IL	KJRY	Swing	1
328.0	BNSF RR Bridge	Quincy, IL W. Quincy, IA	BNSF	Fixed	1
309.9	Wabash Bridge	Hannibal, MO	NS	Fixed	1
282.0	Louisiana RR Bridge	Louisiana, MO	KCS	Swing	1
183.2	Merchants Bridge	St. Louis, MO E. St. Louis, IL	TRRA	Fixed	2
179.0	MacArthur Bridge	St. Louis, MO E. St. Louis, IL	TRRA	Fixed	2
43.7	Thebes Bridge	Thebes, IL	UP, BNSF	Fixed	2

substantially. The situation is especially critical on the lower Mississippi, which has but five railroad crossings, two of which are at Memphis. These are summarized in Table 5-4.

From a capacity standpoint, the Thebes Bridge is undoubtedly the most critical crossing of the Mississippi south of St. Louis. Were this structure to be removed from service, Union Pacific and BNSF traffic along UP's busy North-South corridor would be severely disrupted, with likely increases in congestion at St. Louis and other gateway cities with Mississippi crossings.

Table 5-4. Lower Mississippi Railroad Bridges

River Mile	Name	Location	Railroad	Type	Tracks
734.7	BNSF RR Bridge	Memphis, TN	BNSF, UP	Fixed	1
734.7	Harahan RR Bridge	Memphis, TN	UP, BNSF	Fixed	2
437.8	Vicksburg RR/Hwy Bridge	Vicksburg, MS	KCS	Fixed	1
233.9	Huey P. Long RR/Hwy Bridge	Baton Rouge, LA	KCS	Fixed	1
106.1	Huey P. Long RR/Hwy Bridge	New Orleans, LA	UP, BNSF	Fixed	2

5.2 Terminals

Terminal capacity issues tend to be more complex to analyze and solve than does line capacity. One complication is the need to consider both train movements and car processing rates in terminal capacity. Train related congestion in terminal areas requires one set of approaches, while classification related congestion requires a different set.

Typical approaches to physical capacity improvements include

- Adding tracks to allow through trains to bypass terminals;
- Adding additional storage for trains;
- Adding or upgrading signals; and
- Upgrading classification yards.

Many terminals require a combination of these techniques to increase capacity. Costs for adding tracks or signals are similar to those provided for line capacity expansion.

The typically urban surroundings of terminals limit options and increase their costs. It may be easier to relocate a terminal to an undeveloped location and rebuild it to suit. This approach has found favor in the Chicago area, where the railroads have recently constructed new intermodal terminals in surrounding suburban cities (up to 80 miles from Chicago), rather than attempt to correct deficiencies in existing facilities in the urban center.

The costs of terminal improvements are difficult to calculate for general cases. However, as one example, consider Union Pacific's Livonia, LA hump classification yard, completed in 1996 to replace a flat-switched facility. Livonia includes 31 classification tracks, six receiving tracks, six departure tracks, a turning wye, a car running repair facility, and a locomotive fueling facility. The computer controlled yard has a throughput exceeding 1,800 cars per day, with an average dwell time of 16 to 18 hours, down from 24 to 26 hours at the old yard. The cost of this facility was $58 million.

UP opened the Global III intermodal terminal near Rochelle, IL in 2004 at a cost of $181 million. This state-of-the-art facility is one of the largest and most advanced in the nation, with a build-out capacity of 720,000 containers annually. The project required nearly 700,000 tons of asphalt, 156,000 tons of crushed rock, 80,000 cubic yards of concrete, and 1,200 acres of land. It contains over 38 mi. of track in its current phase.

5.3 Intersections

Rail junctions and crossings have a more limited set of options for capacity improvements. At junctions, the addition or improvement of connecting tracks (e.g. increasing speed, automating switches) are common options that have prices similar to line segment upgrades. As train volumes increase, however, conflicts at junction and crossings may increase to the point where only costly grade separations will provide the needed capacity. Historically, railroads have not generally had the capital to invest in such projects. One exception was the wealthy Pennsylvania Railroad, which made liberal use of flyover junctions on its busy and high speed multi-track mainline between New York City and Washington, DC.

In recent years, capacity at urban junctions has become a major issue with increases in rail traffic. Much of the work proposed by the CREATE project in Chicago is associated with rail junction separation and improvements. Several congested crossings in the Kansas City area have already been grade separated in recent years. The two-mile Argentine Connection, completed in 2004 at a cost of $60 million, carries 135 daily BNSF Railway trains over Union Pacific and BNSF tracks. The three-mile Sheffield Flyover was completed in 2000 at a cost of $74 million. The flyover reduces delays to over 250 daily trains using a complex series of junctions in Kansas City, allowing train speeds to increase from 15 mph to a maximum of 50 mph.

6. Short-Run Considerations

To this point, the current analysis has focused on the capacity of line-haul trackage and terminal facilities – the long-run assets that determine long-run capacities. However, if traffic diversions are both large in magnitude and unanticipated, simply getting to the long-run could be hugely challenging for the affected carriers. Under such a scenario both labor and equipment availability could seriously constrain the industry's ability to absorb additional traffic.

6.1 Rail Labor

In 1980, the year of Staggers passage, there were nearly 500 thousand Class I railroad workers. In 2005, even though railroad ton-miles had grown substantially, there were fewer than 175 thousand workers industry-wide. Consequently, productivity, measured on a per-worker basis improved radically. These productivity gains had two main forces. First, regulatory reform substantially reduced organized labor's ability to retain outmoded labor-intensive operating practices. Second, improved computation and communications capacity also contributed significantly to the productivity increases.

In 2002, as the US economy rebounded from a minor recession, railroad industry experts began to suggest that potential productivity gains had been largely tapped and that further traffic growth would require renewed investment in the training of additional workers. Of the four largest Class I carriers, two (BNSF and NS) responded quickly with programs aimed at hiring and training train crews. The UP and CSXT did not respond as quickly or to the same extent. As a consequence, both carriers suffered serious crew shortages during 2005 and 2006. While the most severe shortages have largely been corrected, the industry as a whole is still working to attract, train, and retain additional labor. The Association of American Railroads (AAR) estimates that Class I carriers will need to hire 80,000 workers over the coming six years. [12]

Importantly, within the current context, rail labor in general and train crews in particular, are not necessarily mobile. Mobility is often hampered by seniority systems with specific geographic bounds and by a need for geographically specific skills. As a consequence, any disruption in the upper Midwest that diverts unanticipated traffic to the region's railroads could very easily generate additional labor shortages that could take as much as two years to resolve. During the period when corrections would be made, the quality of service would likely decline, particularly for bulk shippers.

6.2 Railroad Equipment

Unlike rail labor, railroad equipment is reasonably mobile, so that a scenario that increases the demand for railroad services in the upper Midwest could result in a migration of additional equipment to the region. However, this supposes that there is idle equipment to be placed in service within the region and that is currently a troublesome assumption.

At the current time, locomotives, in particular, are in short supply. The carriers continue to place additional new orders for locomotives, but manufactures are at capacity, so that delivery times for newly ordered equipment is measure in years and the same is true for certain types of freight cars. Moreover, manufactures of both cars and locomotives are very hesitant to add capacity in industries that are renowned for cyclical demands.

Much depends on whether the railroads perceive any increased demand as transient or permanent. Railroad cars can easily last 20 years and many of today's locomotives were placed in service during the 1970's. Consequently, regardless of supplier capabilities, the region's railroads would be hesitant to make diversion-related investments if there is any chance that the increased demand is transient. In such a case they would more than likely attempt to shift any associated risk to the shippers by insisting on the use of shipper-owned equipment. Finally, in the case of both locomotives and freight cars it would be possible for owners to keep equipment in service that would, otherwise, be retired. However, doing so would imply measurably higher maintenance costs, particularly for locomotives that must meet increasingly strict emission guidelines.

Ultimately, the sizes of labor forces and equipment fleets can be adjusted. Nearly any labor constraint can be affectively addressed within two years and equipment issues resolved within five years.

[12] As a point of interest, the average railroad worker makes just under $62,000 per year, while the average locomotive engineer earns just over $75,000.

7. Concluding Remarks

In order to evaluate potential investment decisions regarding waterway infrastructure policy-makers must consider the cost of freight transportation alternatives, including rail. Typical guidance includes the assumption that rail freight providers have the capacity to absorb any traffic that might be diverted from the waterways. However, growing congestion across all surface modes has made this assumption suspect.

In the late 1990's TVA investigated the validity of the rail capacity assumption and found that, where capacity might be lacking, it could be added in ways that would not adversely impact railroad rates. During the interim years, however, the freight transportation environment has continued to change at a breathtaking pace. The direction of flows continues to change and flow volumes are ever increasing. As a consequence, decision-makers are again questioning whether or not the nation's rail providers have the capacity to absorb traffic regardless of the source of that additional traffic.

Given available resources, it was not possible to replicate the earlier TVA work. Consequently, it was decided to revisit the topic via a qualitative examination of four railroad sub-networks located in the Mississippi and Illinois River basins. Network characteristics and current traffic volumes were evaluated and observable trends considered.

In most cases, and over most network links, the rail systems currently in place appear adequate to handle current traffic volumes. However, system wide, reserve capacity appears to be minimal. Rail traffic has exhibited strong growth over the last 20 years so that any excess capacity has been absorbed. At very least, this validates the decision to once again revisit the issue.

Unfortunately, there are two nagging questions that remain unanswered, at least to some degree. The first question revolves around the magnitude of future rail traffic growth independent of any waterway traffic diversions. Again, rail traffic has exhibited strong growth for at least two decades, with much of the new traffic reflecting increased global trade and the use of international containers. The networks examined are adequately accommodating current demands and could probably absorb at least some portion of incremental new without disruption, but will this be the case in five years? There is no immediate reason to expect any dampening of railroad traffic growth.

The second, and very much related, question is how much more can be done to expand railroad capacity and how might additional capacity expansions affect costs. The railroad network that accommodated the 2005 traffic volumes noted in Section 2 is very different than the rail network in place a generation ago. Each year each Class I carrier invests hundreds of millions of dollars in their networks to address capacity constraints. To date, these investments have proved to be an adequate response to increased demands and there has been no adverse impact on rail rates. Can this pattern continue and would the railroads invest even greater amounts if commercial navigation becomes a less feasible transportation alternative?

Interestingly, the 1998 TVA analysis found that it is much less costly to add capacity to rail lines that are in relatively poor conditions. As the nation's rail network is made better and better, opportunities to rehabilitate neglected route segments become fewer. Will we reach a point where adding additional capacity requires rail rate increases or will new technologies make additional rate-neutral capacity expansions possible?

These are not easily answered questions. Currently, the community of transportation experts is less than optimistic. Across modes and across geographic boundaries, there is the prevailing sentiment that every conceivable resource will be needed if we are to meet projected freight transport demands. It is, therefore, our conclusion that any policy course that diminishes the scope of these resources would be potentially harmful.

Appendix A
Line Segments Comprising Union Pacific Routes

Chicago Subdivision

Chicago, IL to Chap, IL

330.1 mi

Two main tracks 81st Street to Woodland Jct.

Max. gross carload weight: 286,000 lb

Max speed 60 mph freight

CTC governs 81st Street to Thornton Jct., Ben to Chap

ABS in effect Thornton Jct. to Ben

Joint operations with CSXT Chicago-Woodland Jct.

Trackage rights via CSXT West St. Elmo to Mt. Vernon

Station	MP	Sidings	Trk	Oper
81st Street, IL	9.0		2MT	CTC
Oakdale, IL	10.1			
Dolton Jct., IL	16.7			
Kensington, IL	14.5			
Yard Center, IL	18.0			
Thornton Jct., IL	20.1			
Chicago Heights, IL	27.8		DT	ABS
Momence, IL	49.9			
St. Anne, IL	60.1			
Ben, IL	73.7		2MT	CTC
Watseka, IL	77.5			
Woodland Jct., IL	82.4			
Goodwine, IL	92.9	10,136		CTC
Ellis, IL	106.7	9,308		
Glover, IL	125.9	8,174		
Block, IL	134.2	12,111		
Villa Grove, IL	144.6	10,537		
Tuscola, IL	153.8	9,587		
Cadwell, IL	169.1	9,989		
Sullivan, IL	176.1			
Findlay, IL	183.1	11,361		
Findlay Jct., IL	185.5			
Clarksburg, IL	197.8	10,184		
Altamont, IL	216.0	9,691		
East St.Elmo, IL	220.8			
Via CSXT East St. Elmo-West St. Elmo (3.6 mi)				
West St. Elmo, IL	224.4			CTC
St. Peter, IL	233.4	10,359		
Kinmundy, IL	242.7			
Salem, IL	251.3	14,882		
Kell, IL	261.5	9,093		
Mt. Vernon, IL	274.1	7,143		
CSX-NS Xing	276.2			
Ina, IL	287.3	8,107		
Benton Jct., IL	298.2			
Benton, IL	301.8	10,727		
BN Xing	306.1			
Bush, IL	314.6	6,506		
Grimsby, IL	335.5	5,772		
Chap, IL	339.1			

Pana Subdivision

Findlay Jct., IL to Lenox, IL
90.2 mi
Max. gross carload weight: 286,000 lb
Max speed 60 mph freight
BNSF trackage rights Walsh Jct. to Lenox

Station	MP	Sidings	Trk	Oper
Findlay Jct., IL	185.5			
Pana, IL	205.7	7,734		
Ohlman, IL	212.9	10,442		
Hillsboro, IL	231.4	11,736		
Walsh Jct, IL	243.7			CTC
Joan, IL	247.5	9,809		
Gard, IL	263.5	10,462		
Vierling Jct, IL	273.7			
Lenox, IL	275.7			
UP-CSX joint track between Lenox and WR Tower				
TRRA between WR Tower and Grand Avenue				

Pinkneyville Subdivision

Chester, IL to Mt. Vernon, IL
60.8 mi
Max. gross carload weight: 286,000 lb
Max speed 40 mph freight

Station	MP	Sidings	Trk	Oper
Chester, IL	64.0			
Steeleville, IL	77.3	9,007		
Percy, IL	79.4			
Pinkneyville, IL	91.6	8,448		
CN Xing	92.5			
Tamaroa, IL	102.7			TWC
Scheller, IL	111.1			
CN Xing	111.6			
Waltonville, IL	115.0			
JSW Jct., IL	121.8			
Via JSW Industrial Lead (3.0 mi)				
Mt. Vernon, IL	276.9			

Wilmington Line

Bridgeport (Chicago), IL to Valley Jct., IL (E. St. Louis)

280.1 mi

Two main tracks Joliet to S. Joliet, KC Jct. to Hazel Dell, Wann and WR Tower (joint line), Q Tower and Valley Jct.

Max. gross carload weight: 286,000 lb

Max speed 79 mph passenger, 60 mph freight

CTC governs Mazonia to Wann

ABS in effect Joliet to Mazonia

Amtrak operates Bridgeport-St. Louis

Metra operates Bridgeport-Joliet

CN trackage rights Iles to Wann

KCS trackage rights Godfrey to Wann

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Bridgeport, IL</td><td>3.5</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Via CN Bridgeport to Joliet (33.2 mi)</td></tr>
<tr><td>Joliet, IL</td><td>36.7</td><td></td><td rowspan="3">DT</td><td rowspan="6">ABS
DTC</td></tr>
<tr><td>UD Tower, IL</td><td>37.3</td><td></td></tr>
<tr><td>South Joliet, IL</td><td>38.5</td><td></td></tr>
<tr><td>Elwood, IL</td><td>45.8</td><td></td><td rowspan="22"></td></tr>
<tr><td>Wilmington, IL</td><td>52.5</td><td></td></tr>
<tr><td>Hitt, IL</td><td>54.5</td><td></td></tr>
<tr><td>Mazonia, IL</td><td>62.6</td><td></td><td rowspan="31">CTC</td></tr>
<tr><td>Dwight, IL (I)</td><td>73.6</td><td>12,375</td></tr>
<tr><td>Odell, IL</td><td>81.7</td><td>12,760</td></tr>
<tr><td>Pontiac, IL</td><td>91.9</td><td>11,770</td></tr>
<tr><td>Chenoa, IL (I)</td><td>102.3</td><td></td></tr>
<tr><td>Ballard, IL</td><td>106.6</td><td>11,440</td></tr>
<tr><td>Normal, IL</td><td>124.1</td><td>17,952</td></tr>
<tr><td>Bloomington, IL (I)</td><td>126.0</td><td>12,672</td></tr>
<tr><td>McLean, IL</td><td>140.9</td><td>12,672</td></tr>
<tr><td>Atlanta, IL</td><td>145.8</td><td></td></tr>
<tr><td>Lawndale, IL</td><td>150.0</td><td></td></tr>
<tr><td>Athol, IL (I)</td><td>155.7</td><td>10,010</td></tr>
<tr><td>Lincoln, IL</td><td>156.4</td><td></td></tr>
<tr><td>Broadwell, IL</td><td>163.4</td><td></td></tr>
<tr><td>Elkhart, IL</td><td>167.3</td><td>9,625</td></tr>
<tr><td>Sherman, IL</td><td>178.0</td><td></td></tr>
<tr><td>Ridgley, IL (I)</td><td>182.9</td><td>10,175</td></tr>
<tr><td>Springfield, IL</td><td>185.1</td><td></td></tr>
<tr><td>Iles, IL (I)</td><td>187.3</td><td></td></tr>
<tr><td>KC Jct., IL</td><td>187.8</td><td></td><td rowspan="2">2MT</td></tr>
<tr><td>Hazel Dell, IL</td><td>189.5</td><td></td></tr>
<tr><td>Auburn, IL</td><td>200.6</td><td>10,505</td><td rowspan="10"></td></tr>
<tr><td>Virden, IL</td><td>207.0</td><td></td></tr>
<tr><td>Girard, IL (I)</td><td>210.8</td><td>9,625</td></tr>
<tr><td>Nilwood, IL</td><td>214.5</td><td></td></tr>
<tr><td>Carlinville, IL</td><td>238.3</td><td>17,490</td></tr>
<tr><td>Shipman, IL</td><td>238.3</td><td>11,165</td></tr>
<tr><td>Brighton, IL</td><td>246.0</td><td></td></tr>
<tr><td>Godfrey, IL</td><td>252.1</td><td>13,420</td></tr>
<tr><td>Alton, IL</td><td>257.2</td><td></td></tr>
<tr><td>Wann, IL</td><td>262.1</td><td></td></tr>
<tr><td colspan="5">UP-KCS joint track Wann-WR Tower (12.8 mi)</td></tr>
<tr><td>WR Tower, IL</td><td>274.9</td><td></td><td rowspan="5">2MT</td><td></td></tr>
<tr><td>Venice, IL</td><td>278.0</td><td></td><td></td></tr>
<tr><td>Q Tower, IL</td><td>281.0</td><td></td><td rowspan="3">DTC</td></tr>
<tr><td>Hole-in-the-Wall, IL</td><td>281.7</td><td></td></tr>
<tr><td>Valley Jct., IL</td><td>283.6</td><td></td></tr>
</table>

UP Pequot Line

Joliet, IL to Mazonia, IL

25.8 mi (19.6 via BNSF)

Two main tracks Joliet to Pequot (via BNSF), Pequot to Coal City

Max. gross carload weight: 286,000 lb

Max speed 79 mph passenger, 60 mph intermodal, 50 mph freight

CTC governs Pequot to Mazonia

ABS in effect Joliet to Pequot

Trackage rights via BNSF Joliet to Pequot

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Joliet, IL</td><td>36.7</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Via BNSF Joliet to Pequot (19.6 mi)</td></tr>
<tr><td>Pequot, IL</td><td>57.1</td><td></td><td rowspan="2">2MT</td><td rowspan="3">CTC</td></tr>
<tr><td>Coal City, IL</td><td>58.5</td><td></td></tr>
<tr><td>Mazonia, IL</td><td>63.3</td><td></td><td></td></tr>
</table>

CN Joliet District

Bridgeport, IL to Joliet, IL

33.2 mi

Two main tracks Bridgeport to Joliet

Max. gross carload weight: 286,000 lb

Max speed 79 mph passenger, 60 mph freight

CTC governs Bridgeport to Panhandle

ABS in effect Panhandle to Joliet

Amtrak, UP, Metra trackage rights Bridgeport-Joliet

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Bridgeport, IL</td><td>3.5</td><td></td><td rowspan="2">2MT</td><td rowspan="2">CTC</td></tr>
<tr><td>Panhandle, IL (I)</td><td>5.1</td><td></td></tr>
<tr><td>Corwith, IL (I)</td><td>6.6</td><td></td><td rowspan="9">DT</td><td rowspan="4">ABS
YL</td></tr>
<tr><td>Lemoyne (I)</td><td>7.9</td><td></td></tr>
<tr><td>Glenn, IL</td><td>10.3</td><td></td></tr>
<tr><td>Summit, IL</td><td>11.9</td><td></td></tr>
<tr><td>Argo, IL (I)</td><td>13.1</td><td></td><td rowspan="5">ABS
TWC</td></tr>
<tr><td>Willow Springs, IL</td><td>17.5</td><td></td></tr>
<tr><td>Lemont, IL</td><td>25.3</td><td></td></tr>
<tr><td>Lockport, IL</td><td>32.9</td><td></td></tr>
<tr><td>Joliet, IL (I)</td><td>36.7</td><td></td></tr>
</table>

Geneva Subdivision

Chicago, IL to Clinton, IA

138.9 mi

Max. gross carload weight: 315,000 lb

Max speed 70 mph intermodal, 60 mph freight

CTC governs Chicago to Clinton

Station	MP	Sidings	Trk	Oper
Chicago, IL	0.0		4MT	ABS YL
Western Ave., IL	2.6			
Kedzie, IL	3.6			
Keeler, IL	4.8		2MT	CTC
Oak Park, IL	8.5			
River Forest, IL	9.7			
Maywood, IL	10.5			
Melrose Park, IL	11.3			
JN, IL	11.8			
Provo Jct., IL	12.1			
Bellwood, IL	12.7			
Berkeley, IL	14.3			
Elmhurst, IL	15.7			
Villa Park, IL	17.8			
Lombard, IL	19.9			
Glen Ellyn, IL	22.4			
Wheaton, IL	25.0			
Winfield, IL	27.5			
West Chicago, IL	30.0			
EJE Xing	30.3			
Geneva, IL	35.5			
Elburn, IL	44.0			
Meredith, IL	48.0			
Maple Park, IL	50.6			
Cortland, IL	55.4			
De Kalb, IL	58.3			
Malta, IL	64.3			
Creston, IL	69.7			
Rochelle, IL	74.8			
BN Xing	75.3			
Flagg, IL	79.0			
Ashton, IL	83.7			
Franklin Grove, IL	88.0			
Nachusa, IL	92.9			
Dixon, IL	97.9			
Nelson, IL	104.3			
Sterling, IL	109.5			
Galt, IL	113.0			
Agnew, IL	114.8			
Round Grove, IL	118.6			
Morrison, IL	123.8			
Union Grove, IL	127.6			
East Clinton, IL	136.7			
Clinton, IA	W2.1			

St. Louis Subdivision
Harvard, IL to Ridgely, IL
141.2 mi
Max. gross carload weight: 286,000 lb
Max speed 49 mph freight
ABS in effect Pioneer to Peoria Jct.
2 main tracks MP 71.6 to MP 77.1

Station	MP	Sidings	Trk	Oper
Nelson, IL	0.0	11,084		
Van Petten, IL	6.9			
Hahnaman, IL	11.7			
Normandy, IL	16.8			
Manlius, IL	24.0	12,684		
Buda, IL	34.4			
Morse, IL	41.4			TWC
Storage, IL	44.9	9,999		
Broadmoor, IL	46.7			
Camp Grove, IL	51.3			
Speer, IL	57.8			
Akron, IL	63.8			
Pioneer, IL	72.1		DT	
Pottstown, IL	77.1			
Limestone, IL	78.2			ABS TWC
Molitor Jct., IL	80.0			
Peoria Jct., IL	80.3=0.0			
P&PU Jct., IL	4.0			
Sommer, IL	5.7	6,248		
Il River Bridge, IL	8.8			
South Pekin, IL	13.2	13,976		
Allen, IL	26.3	7,162		TWC
Luther, IL	33.8			
Sweetwater, IL	44.0			
Culver, IL	47.1			
Barr, IL	51.4	10,603		
Via I&M RR Barr to Ridgley (9.5 mi)				
Ridgley, IL	182.9			

De Soto Subdivision

St. Louis, MO to Poplar Bluff, MO

162.3 mi

Max. gross carload weight: 286,000 lb

Max speed 60 mph passenger, 50 mph freight

CTC governs Barracks to Poplar Bluff

ABS in effect Iron Mtn. Jct. to Barracks

AMTK trackage rights St. Louis to Poplar Bluff

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>St. Louis, MO</td><td>0.5</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Via TRRA (1.8 mi)</td></tr>
<tr><td>Grand Avenue, MO</td><td>2.3</td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Via BNSF (1.5 mi)</td></tr>
<tr><td>Iron Mt. Jct., MO</td><td>0.0</td><td></td><td rowspan="16"></td><td rowspan="3">ABS
TWC</td></tr>
<tr><td>Broadway Jct., MO</td><td>6.4</td><td></td></tr>
<tr><td>Davis Jct., MO</td><td>6.8</td><td></td></tr>
<tr><td>Barracks, MO</td><td>9.8</td><td></td><td rowspan="15">CTC</td></tr>
<tr><td>Wickes, MO</td><td>18.7</td><td>4,836</td></tr>
<tr><td>Riverside, MO</td><td>26.3</td><td>4,912</td></tr>
<tr><td>De Soto, MO</td><td>41.5</td><td>6,359</td></tr>
<tr><td>Blackwell, MO</td><td>50.7</td><td>4,390</td></tr>
<tr><td>Cadet, MO</td><td>56.7</td><td>4,602</td></tr>
<tr><td>Mineral Point, MO</td><td>60.4</td><td>4,349</td></tr>
<tr><td>Bismarck, MO</td><td>74.9</td><td>4,992</td></tr>
<tr><td>Tip Top, MO</td><td>91.4</td><td>4,243</td></tr>
<tr><td>Annapolis, MO</td><td>107.9</td><td>4,538</td></tr>
<tr><td>Gads Hill, MO</td><td>117.2</td><td>4,334</td></tr>
<tr><td>Piedmont, MO</td><td>126.5</td><td>6,560</td></tr>
<tr><td>Williamsville, MO</td><td>144.2</td><td>4,418</td></tr>
<tr><td>Black River Jct., MO</td><td>164.9</td><td></td><td rowspan="2">2MT</td></tr>
<tr><td>Poplar Bluff, MO</td><td>165.5</td><td></td></tr>
</table>

Alton & Southern Ry. (Owned by UP)

Lenox, IL to Valley Jct., IL

18.8 mi

Max. gross carload weight: 286,000 lb

Max speed 30 mph freight

Two main tracks Gateway Yard to Double Track Jct.

Station	MP	Sidings	Trk	Oper
Lenox, IL	21.0			DTC
Mitchell Yard, IL	20.7			
AA Siding, IL	16.7	5,510		
NS Xing (A)	14.7			
Double Track Jct., IL	13.6		DT	
HN Cabin, IL (I)	9.8			YL
NS Xing (A)	4.5			
Gateway Yard, IL	4.0			
Valley Jct., IL	2.2			

Chester Subdivision

Valley Jct., MO to Poplar Bluff, MO

196.5 mi

Max. gross carload weight: 286,000 lb

Max speed 60 mph freight

CTC governs Valley Jct. to Poplar Bluff

Two main tracks Valley Jct. to Menard Jct., Rockwood Jct. to Cora Jct., Raddle Jct. to Howardton Jct., Halsey Jct. to Simbco, MO Jct. to Charleston Jct.

BNSF trackage rights Valley Jct. to Poplar Bluff

Station	MP	Sidings	Trk	Oper
Valley Jct., IL	0.2			
Airport, IL	1.4			
Parks, IL	1.9			
North Dupo, IL	4.4			
Dupo, IL	6.2			
South Dupo, IL	7.5			
ICG, IL	9.4		2MT	
Val, IL	20.7			
Fults, IL	33.8			
Kidd, IL	47.7			
Flinton, IL	49.5			
Gage Jct., IL	52.0			
Reily, IL	55.8			
Menard Jct., IL	61.0			
Chester, IL	62.9	7,663		CTC
Ford, IL	65.7	6,459		
Rockwood Jct., IL	70.3			
Cora, IL	72.4		2MT	
Cora Jct., IL	73.0			
Raddle Jct., IL	76.4			
Jacob, IL	81.4			
Gorham, IL	84.6		2MT	
Chap, IL	84.8			
Howardton Jct., IL	90.5			
Halsey Jct., IL	95.0			
Potts, IL	108.1		2MT	
Nile, IL	115.7			
Simbco, IL	119.4			
Capedeau Jct., IL	122.7			
Illmo, MO	123.7			
Via Illmo District 45.6 mi				
MO Jct., MO	192.6		2MT	
Charleston Jct, MO	190.3			
Dexter, MO	189.9	6,474		CTC
Ives, MO	179.4	9,275		
Junland, MO	173.1	9,878		
Poplar Bluff, MO	165.7			

Illmo Line

Illmo, MO to Jonesboro, AR

131.3 mi

Max. gross carload weight: 286,000 lb

Max speed 60 mph freight

CTC governs Illmo to MP 123.9

ABS in effect MP 123.9 to Jonesboro

Two main tracks Illmo to Ancel, Paront to MO Jct., EM Jct. to WM Jct.

BNSF trackage rights Illmo to Jonesboro

Station	MP	Sidings	Trk	Oper
Illmo, MO	3.3		2MT	CTC
Ancell, MO	5.2			
Quarry, MO	9.6	10,280		
Rockview Jct., MO	10.5			
Delta, MO	16.1	12,762		
Randles, MO	21.4	12,384		
Mesler, MO	26.4	7,315		
Ardeola, MO	32.2	6,365		
Avert, MO	37.0	11,405		
Paront, MO	48.9		2MT	
MO Jct., MO	48.9			
Dexter Jct., MO	50.1			
Dexter, MO	50.9			
Bernie, MO	59.5	7,249		
EM Jct., MO	65.2		2MT	
Malden, MO	67.7=57.9			
WM Jct., MO	59.6			
St. Francis, AR	69.9	7,570		
Greenway, AR	78.8	8,277		
Jay, AR	90.7	6,996		
Paragould, AR	103.5	11,480		
Paragould Jct., AR	106.0			
Brookland, AR	115.7	7,263		
Jonesboro Jct., AR	119.7			
BNSF Xing	122.6			
Jonesboro, AR	124.8			ABS

Sikeston Branch/Former BNSF River Line

Dexter Jct., MO to Sikeston, MO to Rockview, MO

43.5 mi

Max. gross carload weight: 286,000 lb

Max speed 50 mph freight

CTC governs Sykeston North to Rockview

BNSF trackage rights Sykeston North to Rockview

Station	MP	Sidings	Trk	Oper
Dexter Jct., MO	191.3			TWC
Hunterville, MO	198.7			
Essex, MO	195.6			
Morehouse, MO	205.4			
Sykeston West, MO	209.8			
Via connection track (1.8 mi)				
Sykeston North, MO	164.9			CTC
Brooks, MO	154.8	7,600		
Oran, MO	150.0			
Chaffee, MO	143.3	9,150		
Rockview, MO	141.7			

Hoxie Subdivision

Poplar Bluff, MO to North Little Rock, AR

178.1 mi

Max. gross carload weight: 286,000 lb

Max speed 75 mph passenger, 60 mph freight

CTC governs Poplar Bluff to North Little Rock

2 main tracks Poplar Bluff to Harviell Jct., Murta Jct. to Minturn Jct., Campbell Jct. to North Bridge Jct., South Bridge Jct. to Glaise Jct., Russell Jct. to North Little Rock

AMTK, BNSF trackage rights Poplar Bluff to North Little Rock

Station	MP	Sidings	Trk	Oper
Poplar Bluff, MO	165.5		2MT	CTC
Harviell Jct., MO	172.9			
Neeleyville, MO	179.6	8,418		
Corning, AR	190.5	8,355		
Knobel, AR	198.0	9,779		
Peach Orchard, AR	202.2	8,061		
O'Kean, AR	212.7	8,171		
Murta Jct., AR	224.9		2MT	
Walnut Ridge, AR	224.9			
BN Xing	226.3			
Minturn Jct., AR	228.6			
Alicia, AR	238.3	8,456		
Tuckerman, AR	250.1	8,421		
Campbell Jct., AR	258.1		2MT	
North Bridge Jct., AR	263.9			
South Bridge Jct., AR	264.6		2MT	
Glaise Jct., AR	274.3			
Bradford, AR	277.2	9,969		
Russell Jct., AR	286.7		2MT	
Bald Knob, AR	287.9			
Kensett, AR	296.4			
Jacksonville, AR	333.0			
North Little Rock, AR	343.6			

Jonesboro Line

Jonesboro, AR to Pine Bluff, AR
142.6 mi
Max. gross carload weight: 286,000 lb
Max speed 70 mph freight
CTC governs MP 127.6 to MP 263.2
ABS in effect MP 266.4 to MP 267.4
Two main tracks MP 266.4 to MP 267.4
BNSF trackage rights Jonesboro to Pine Bluff

Station	MP	Sidings	Trk	Oper
Jonesboro, AR	124.8			
Otwell, AR	137.4	7,269		
Weiner, AR	145.4			
Waldenburg, AR	149.6	7,301		
Hickory Ridge, AR	161.5	7,837		
Fair Oaks, AR (I)	172.7	8,678		
Hunter, AR	186.9	8,593		
East Brinkley, AR	198.0	9,401		CTC
Brinkley, AR	199.0			
Clarendon, AR	214.0	8,400		
Roe, AR	220.6	8,832		
Stuttgart, AR	232.7			
Humphrey, AR	244.8	8,797		
Altheimer, AR	256.1	8,556		
Pine Bluff Yard., AR	264.2			
S. SSW Conn.	267.4		DT	ABS

Alexandria-North Little Rock Line

North Little Rock, AR to Alexandria, LA

309.8 mi

Max. gross carload weight: 286,000 lb

Max speed 50 mph freight North Little Rock to Pine Bluff, 60 mph freight Pine Bluff to Alexandria

CTC governs North Little Rock to Texmo, Jct.

Two main tracks North Little Rock to LR Jct., MP 387.7 to MP 388.6, Texmo Jct. to Alexandria

BNSF trackage rights North Little Rock to S. SSW Conn.

Station	MP	Sidings	Trk	Oper
North Little Rock, AR	343.6	Yard	2MT	CTC
LR Jct., AR	343.9			
East Little Rock, AR	349.3			
Higgins, AR	353.0	8,912		
Hensley, AR	363.8	8,257		
White Bluff, AR	370.5			
N. SSW Conn., AR	387.7		2MT	
S. SSW Conn., AR	388.6			
Pine Bluff, AR	390.6	10,289		
Grady, AR	407.6	9,779		
Dumas, AR	427.9			
Pickens, AR	431.1	9,397		
McGehee, AR	447.7=408.1	Yard		
Dermott, AR	415.6			
Hudspeth, AR	421.4	8,947		
Sunshine, AR	439.7	8,980		
Bonita, LA	460.7	9,019		
Collinston, LA	479.2	9,137		
Swartz, LA	490.6	8,884		
Monroe, LA (I)	501.1	Yard		
Bosco, LA	516.4	9,328		
Grayson, LA	534.5	9,166		
Olla, LA	548.2	7,941		
Georgetown, LA	560.3	8,009		
Antonia, LA	575.8	9,534		
Tioga, LA	591.5	7,370		
KCS Xing (I)	593.1			
Mallin, LA (I)	595.2			
Red River Jct., LA	596.6			
Texmo Jct., LA	597.7=195.7		2MT	
Alexandria, LA	192.1	Yard		

Alexandria-Algiers, LA

Alexandria, LA to Algiers (New Orleans), LA

191.1 mi

Max. gross carload weight: 286,000 lb

Max speed 60 mph freight

CTC governs Willow Glen to Wills

Two main tracks Alexandria to Willow Glen, Ama Jct. to West Bridge Jct.

Station	MP	Sidings	Trk	Oper
Alexandria, LA	192.1		DT	YL
Willow Glen, LA	190.4			CTC
Meeker, LA	178.8	10,954		
Bunkie, LA	164.1	10,691		
Morrows, LA	152.7	9,026		
Palmetto, LA	141.6	11,853		
Melville, LA	128.4			
Livonia, LA (I)	114.8	11,526		
Gross Tete, LA	103.9	11,526		
Morley, LA	95.0			
Addis, LA	91.3	20,277		
White Castle, LA	76.6	7,251		
McCall, LA	68.6			
Donaldsonville, LA	65.1	11,068		
St. James, LA	53.9	8,480		
Johnson, LA	41.8	11,816		
Ama Jct., LA	20.9		2MT	
Cyanamid, LA (I)	16.5			
Wills, LA	13.9			
Avondale, LA	11.4	Yard		YL
W. Bridge Jct., LA	10.2			
Harvey, LA	4.3			
Gretna, LA	2.6			
Algiers, LA	1.0			

Appendix B
Line Segments Comprising Norfolk Southern Routes

CN Chicago District (via trackage rights Chicago-Gilman)

Chicago, IL to Leverett Jct., IL

78.9 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Chicago and MP 8.5, Kensington and Gilman

Two main tracks Chicago to Stuenkel

Amtrak operates Chicago to Gilman

NS trackage rights Kensington to Gilman

Station	MP	Sidings	Trk	Oper
Chicago, IL	2.2		2MT	CTC
39th Street, IL	4.6			
67th Street, IL	8.1			ABS
Kensington, IL	14.5			
Wildwood, IL	15.5			CTC
Harvey, IL	20.0			
Homewood, IL	23.5			
Stuenkel, IL	31.6			
Peotone, IL	40.5	10,519		
Manteno, IL	46.7			
Indian Oaks, IL	49.5	30,655		
NS Xing, IL	54.7			
Kankakee, IL	55.9			
Gar Creek, IL	57.5			
Otto, IL	60.3	13,224		
S. Otto, IL	61.6			
Chebanse, IL	64.3			
Ashkum, IL	73.1	11,025		
Gilman, IL (I)	81.1		2MT	

CN Gilman District (via trackage rights Gilman-Gibson City)

Gilman, IL to Gibson City, IL

29.2 mi, single track

Max. gross carload weight: 286,000 lb

Max speeds 60 mph intermodal, 40 mph freight

ABS in effect Gilman to Gibson City

NS trackage rights Gilman to Gibson City

Station	MP	Sidings	Trk	Oper
Gilman, IL	81.1			ABS TWC
Thawville, IL	90.1	10,336		
Roberts, IL	95.6			
Melvin, IL	100.2			
Gibson City, IL	110.0			
NS Connection	110.3			

Bloomington District
Gibson City, IL to Bement, IL
40.1 mi, single track
Max. gross carload weight: 286,000 lb
Max speeds 50 mph freight
CTC governs Bement to Gibson City

Station	MP	Sidings	Trk	Oper
Gibson City, IL	113.0			CTC
Foosland, IL	120.2			
Lotus, IL	123.4			
Osman, IL	125.1	8,620		
Mansfield, IL	131.2			
Galesville, IL	136.1			
Lodge, IL	140.0	8,986		
Monticello, IL	145.0			
Bement, IL	153.1			

Lafayette District
Bement, IL to Decatur, IL
19.9 mi, double track predominates
Max. gross carload weight: 286,000 lb
Max speeds 50 mph freight
CTC governs Bement to Veech, Brush to Decatur (WABIC)
ABS in effect Veech to Brush

Station	MP	Sidings	Trk	Oper
Bement, IL	355.7		2MT	CTC
Veech, IL	357.5			
Milmine, IL	359.4		DT	ABS
Cerro Gordo, IL	363.7			
Brush, IL	372.9			
Decatur, IL	375.6			CTC

Brooklyn District

Decatur, IL to WR Tower, IL (E. St. Louis, IL)
104.8 mi, single track predominates
Max. gross carload weight: 286,000 lb
Max speed 50 mph freight
CTC governs Mosser to B.D. Jct.
ABS in effect Decatur to Mosser, B.D. Jct. to WR Tower

Station	MP	Sidings	Trk	Oper
Decatur, IL	375.6		DT	ABS YL
Mosser, IL	376.6			
Knights, IL	379.2		2MT	CTC
B D Jct., IL	381.1			
Boody, IL	383.9			ABS TWC
Blue Mound, IL	389.8			
Stonington, IL	395.3			
Willeys, IL	399.2			
Taylorville, IL	401.6	16,690		
Palmer, IL	412.4			
Morrisonville, IL	416.2			
Harvel, IL	422.2			
Midway, IL	423.6	14,450		
Raymond, IL	425.5			
Litchfield, IL	434.0			
Winston, IL (A)	437.8			
Mt. Olive, IL	444.6			
Karnes, IL	447.1	12,380		
Staunton, IL	449.2			
Decamp, IL	452.1			
Worden, IL	456.2			
Carpenter, IL	460.5			
Edwardsville, IL	467.1			
Poag Jct., IL	469.1			
Mitchell, IL (I)	474.7		DT	ABS YL
25th Street, IL	478.5			
Granite City, IL	480.2			
WR Tower, IL	480.4			
TRRA operation via WR Tower and May Street				
Luther Yard, MO	5.1			

Appendix C
Line Segments Comprising Canadian National Routes

Chicago and Dubuque Subdivisions (ex-CC&P)

Hawthorne, IL to Dubuque, IA

174.3 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speed 40 mph freight

CTC governs West Jct. to Portage, East Cabin to Dubuque

Two main tracks Hawthorne to Broadview, East Jct. to West Jct., Portage to East Cabin

BNSF operates jointly over CN Portage to East Cabin

IC&E operates over CN Dubuque Jct. to Dubuque

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Hawthorne, IL</td><td>5.8</td><td></td><td rowspan="2">DT</td><td rowspan="18">ABS
TWC</td></tr>
<tr><td>Broadview, IL</td><td>14.7</td><td></td></tr>
<tr><td>South Addison, IL</td><td>13.1</td><td></td><td rowspan="14"></td></tr>
<tr><td>Carol Stream, IL</td><td>20.7</td><td></td></tr>
<tr><td>Munger, IL</td><td>35.7</td><td>6,125</td></tr>
<tr><td>Coleman, IL</td><td>39.0</td><td></td></tr>
<tr><td>Plato Center, IL</td><td>46.8</td><td></td></tr>
<tr><td>Burlington, IL</td><td>53.0</td><td>6,370</td></tr>
<tr><td>Genoa, IL</td><td>61.4</td><td></td></tr>
<tr><td>Colvin Park, IL</td><td>67.0</td><td></td></tr>
<tr><td>Irene, IL</td><td>73.7</td><td></td></tr>
<tr><td>Perryville, IL</td><td>79.1</td><td></td></tr>
<tr><td>Buckbee, IL</td><td>84.6</td><td>6,786</td></tr>
<tr><td>Rockford, IL</td><td>86.6</td><td>Yard</td></tr>
<tr><td>Alworth, IL</td><td>94.4</td><td></td></tr>
<tr><td>Seward, IL</td><td>100.1</td><td>7,744</td></tr>
<tr><td>East Jct., IL</td><td>113.4</td><td></td><td rowspan="3">DT</td></tr>
<tr><td>Wallace, IL</td><td>115.6</td><td></td></tr>
<tr><td>West Jct., IL</td><td>116.8</td><td></td><td rowspan="5">CTC</td></tr>
<tr><td>Lena, IL</td><td>127.1</td><td>7,216</td><td rowspan="4"></td></tr>
<tr><td>Warren, IL</td><td>138.5</td><td>7,247</td></tr>
<tr><td>Scales Mound, IL</td><td>152.7</td><td>7,249</td></tr>
<tr><td>Grant, IL</td><td>164.3</td><td>5,463</td></tr>
<tr><td>Portage, IL</td><td>168.8</td><td></td><td rowspan="2">DT</td><td rowspan="2">ABS
TWC</td></tr>
<tr><td>East Cabin, IL</td><td>181.4</td><td>6,157</td></tr>
<tr><td>Dubuque Jct., IA</td><td>182.9</td><td></td><td rowspan="2"></td><td rowspan="2">CTC</td></tr>
<tr><td>Dubuque, IA</td><td>183.2</td><td>Yard</td></tr>
</table>

Chicago District

Chicago, IL to Leverett Jct., IL

121.9 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Chicago and MP 8.5, Kensington and Leverett Jct.

Two main tracks Chicago to Stuenkel, Gillman to Delray

Amtrak operates Chicago to Leverett Jct.

NS trackage rights Kensington to Gilman

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Chicago, IL</td><td>2.2</td><td></td><td rowspan="8">2MT</td><td rowspan="2">CTC</td></tr>
<tr><td>39th Street, IL</td><td>4.6</td><td></td></tr>
<tr><td>67th Street, IL</td><td>8.1</td><td></td><td rowspan="2">ABS</td></tr>
<tr><td>Kensington, IL</td><td>14.5</td><td></td></tr>
<tr><td>Wildwood, IL</td><td>15.5</td><td></td><td rowspan="18">CTC</td></tr>
<tr><td>Harvey, IL</td><td>20.0</td><td></td></tr>
<tr><td>Homewood, IL</td><td>23.5</td><td></td></tr>
<tr><td>Stuenkel, IL</td><td>31.6</td><td></td></tr>
<tr><td>Peotone, IL</td><td>40.5</td><td>10,519</td><td rowspan="9"></td></tr>
<tr><td>Manteno, IL</td><td>46.7</td><td></td></tr>
<tr><td>Indian Oaks, IL</td><td>49.5</td><td>30,655</td></tr>
<tr><td>NS Xing, IL</td><td>54.7</td><td></td></tr>
<tr><td>Kankakee, IL</td><td>55.9</td><td></td></tr>
<tr><td>Gar Creek, IL</td><td>57.5</td><td></td></tr>
<tr><td>Otto, IL</td><td>60.3</td><td>13,224</td></tr>
<tr><td>S. Otto, IL</td><td>61.6</td><td></td></tr>
<tr><td>Chebanse, IL</td><td>64.3</td><td></td></tr>
<tr><td>Ashkum, IL</td><td>73.1</td><td>11,025</td><td rowspan="1"></td></tr>
<tr><td>Gilman, IL (I)</td><td>81.1</td><td></td><td rowspan="2">2MT</td></tr>
<tr><td>Delrey, IL</td><td>87.6</td><td></td></tr>
<tr><td>Paxton, IL</td><td>102.8</td><td>14,518</td><td rowspan="3"></td></tr>
<tr><td>Rantoul, IL</td><td>113.8</td><td>14,208</td></tr>
<tr><td>Leverett Jct., IL</td><td>124.1</td><td></td></tr>
</table>

Champaign District

Leverett Jct., IL to Centralia, IL

128.3 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Leverett Jct. to MP 148.3, MP 148.3 to MP 152.6 (#1 track), MP 152.6 to MP 169.6, MP 174.7 to MP 247.2

ABS in effect MP 148.3 to MP 152.6 (#2 track), MP 169.6 to MP 174.7, MP 247.2 to MP 252.4

Amtrak operates Leverett Jct. to Centralia

Station	MP	Sidings	Trk	Oper
Leverett Jct., IL	124.1	15,928		
NS Xing (I)	127.5			
Champaign, IL	127.8			CTC
Tolono, IL (I)	137.1	11,155		
Pesotum, IL	141.9			
N.E.D.T.	148.3			
Tuscola, IL (I)	149.8		2 MT	#1: CTC #2: ABS
S.E.D.T.	152.6			
Arcola, IL	157.9			CTC
Humboldt, IL	163.6	12,080		
N.E.D.T.	169.6			
Mattoon, IL	172.4		DT	ABS
S.E.D.T.	174.7			
Neoga, IL	184.3	12,207		
Effingham, IL (I)	199.2	18,734		
Watson, IL	205.7			
Edgewood Jct., IL	214.6			
Laclede, IL	218.5	18,917		CTC
Farina, IL	223.1			
Kinmundy, IL (A)	228.9			
Tonti, IL	239.0	15,959		
Odin, IL (A)	244.2			
Sandoval Jct., IL	247.2		DT	ABS
Centralia, IL	252.4			

Centralia District

Centralia, IL to Cairo, IL

109.0 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs MP 258.6 to MP 355.7

ABS in effect Centralia to MP 258.6, MP 355.7 to Cairo

Amtrak operates Centralia to Cairo

BNSF trackage rights Centralia to Cairo

Station	MP	Sidings	Trk	Oper
Centralia, IL	252.4		DT	ABS
NS/BNSF Xing	252.5			
S.E.D.T.	258.6			
Irvington, IL	258.8			CTC
Ashley, IL (A)	266.3			
Bois, IL	273.8	17,263		
Tamaroa, IL	279.8			
St. Johns, IL	285.4		2MT	
DuQuoin, IL	287.8			
Dowell Jct., IL	290.4			
Elkville, IL	295.5			
N.E.D.T.	305.7			
Carbondale, IL	308.1			
S.E.D.T.	308.9			
Cobden, IL	323.4			
Anna, IL	328.7	10,564		
Wetaug, IL	340.8	13,664		
Ullin, IL	344.6			
N.E.D.T.	355.7		DT	ABS
Mounds Jct., IL	356.3			
Cairo, IL	361.4			

Cairo District

Cairo, IL to Fulton Jct., KY

44.7 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Illinois to Buda

ABS in effect Cairo to Illinois, Buda to MP 406.1

Amtrak operates Cairo to Fulton Jct.

BNSF trackage rights Cairo to Fulton Jct.

Station	MP	Sidings	Trk	Oper
Cairo, IL	361.4		DT	ABS
Illinois, IL	363.1			
Ballard, KY	364.5		2MT	CTC
Fillmore, KY	368.5			
Wickliffe, KY	369.9			
Westvaco, KY	372.5			
Bardwell, KY	378.1	10,564		
Clinton, KY	392.1	10,527		
Buda, KY	402.6		DT	ABS
Fulton, KY	404.6			
Fulton Jct., KY	406.1			

Bluford District

Edgewood Jct., IL to Fulton, KY

168.5 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speed 60 mph freight

CTC governs Edgewood Jct. to MP 2.4, Foster to North Siding

ABS in effect MP 2.4 to Foster

Two main tracks MP 40.0 to Foster

Station	MP	Sidings	Trk	Oper
Edgewood Jct., IL	0.0			CTC
Edgewood, IL	1.5	11,316		
Greendale, IL	19.3	14,369		ABS TWC
N.E.D.T.	40.0		DT	
Bluford, IL	41.6			
Foster, IL	44.3			
Diana, IL	56.3	10,525		CTC
Akin Jct., IL	62.9			
Rust Jct., IL	63.3			
Keagley, IL	69.0	9,642		
Ferber, IL	70.0			
Creek, IL	78.0			
Amax, IL	80.0			
Sahara, IL	83.9			
Saline, IL	87.4	10,610		
Reevesville, IL	110.5	11,650		
Sedgwick, IL	119.6	10,555		
Metropolis Jct., IL	122.9			
Via Paducah and Indiana Railroad (3.1 mi)				
Chiles, KY	0.0			
Maxon, KY	2.2			
Lowes, KY	14.5	9,920		
Watts, KY	32.1	7,222		
North Siding, KY	41.5	6,390		
Fulton, KY	42.5			

Fulton District

Fulton (Oaks), KY to Memphis, TN

126.0 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Oaks to MP 310.0, MP 310.0 to MP 314.8 (#1 track), MP 314.8 to Woodstock, Leewood to Aulon

ABS in effect MP 310.0 to MP 314.8 (#2 track), Woodstock to Leewood, Aulon to MP 395.2

AMTK operates Oaks to Woodstock

CSX operates Leewood to "A" Yard Jct.

BNSF trackage rights Oaks to "E" Yard

<table>
<tr><th>Station</th><th>MP</th><th>Sidings</th><th>Trk</th><th>Oper</th></tr>
<tr><td>Oaks, TN</td><td>270.8</td><td></td><td rowspan="2">2MT</td><td rowspan="5">CTC</td></tr>
<tr><td>S. Oaks, TN</td><td>272.6</td><td></td></tr>
<tr><td>Rives, TN</td><td>283.5</td><td>16,287</td><td rowspan="3"></td></tr>
<tr><td>Trimble, TN</td><td>298.0</td><td>13,767</td></tr>
<tr><td>Newbern, TN</td><td>305.2</td><td></td></tr>
<tr><td>N.E.D.T.</td><td>310.0</td><td></td><td rowspan="3">2 MT</td><td rowspan="3">#1: CTC
#2: ABS</td></tr>
<tr><td>Dyersburg, TN</td><td>314.2</td><td></td></tr>
<tr><td>S.E.D.T.</td><td>314.8</td><td></td></tr>
<tr><td>Curve, TN</td><td>330.0</td><td>11,174</td><td rowspan="5"></td><td rowspan="5">CTC</td></tr>
<tr><td>Rialto, TN</td><td>347.5</td><td>11,456</td></tr>
<tr><td>Tipton, TN</td><td>367.1</td><td>10,241</td></tr>
<tr><td>Millington, TN</td><td>374.0</td><td></td></tr>
<tr><td>Lucy Jct., TN</td><td>378.6</td><td></td></tr>
<tr><td>Woodstock, TN</td><td>380.4</td><td></td><td rowspan="4">DT</td><td rowspan="4">ABS</td></tr>
<tr><td>Dennie, TN</td><td>384.0</td><td></td></tr>
<tr><td>Hollywood Yard, TN</td><td>387.4</td><td></td></tr>
<tr><td>Leewood, TN</td><td>387.9</td><td></td></tr>
<tr><td colspan="3">CSXT controls Leewood to Aulon (2.1 mi)</td><td>2MT</td><td>CTC</td></tr>
<tr><td>Aulon, TN</td><td>390.0</td><td></td><td rowspan="3">DT</td><td rowspan="2">ABS</td></tr>
<tr><td>"E" Yard, TN</td><td>395.6</td><td></td></tr>
<tr><td>"A" Yard Jct., TN</td><td>396.8</td><td></td><td></td></tr>
</table>

Yazoo District

Memphis, TN to North Jackson, MS

213.1 mi, single track

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

CTC governs Lakeview to Hunter, South Greenwood to North Jackson

ABS in effect West Jct. to Lakeview (#1 track), Hulet to Lakeview (#2 track), Hunter to South Greenwood

Amtrak operates West Jct. to N. Jackson

Station	MP	Sidings	Trk	Oper
West Jct., TN	5.4		DT	ABS
Hulet, MS	7.1			
S.E.D.T.	12.9			
Lakeview, MS	13.1			
Lake Comorant, MS	20.5	9,553		CTC
Rials, MS	30.2	9,940		
Savage, MS	39.4	2,051		
Crenshaw, MS	48.8	9,860		
Marks, MS	66.4			
Lambert, MS	71.2	9,600		
Brazil, MS	83.3	10,000		
Swan Lake, MS	93.7	10,475		
Philipp, MS	105.0			
Money, MS	112.8	9,542		
Hunter, MS	120.6			
Yalobusha, MS	121.9			ABS
Greenwood, MS (I)	122.7	6,089		
South Greenwood, MS	125.1			
Sidon, MS	131.0	10,481		CTC
Cruger, MS	137.8	11,250		
Gwin, MS	148.3	9,184		
Delta, MS	169.2	10,600		
Yazoo City, MS	175.2			
Valley, MS	180.2	12,085		
Anding, MS	189.7	9,350		
Ragin, MS	197.6	3,191		
Flora, MS	205.0	9,816		
Cynthia, MS	211.3	9,330		
Halston, MS	214.5			
North Jackson, MS	218.5			

Grenada District

Memphis, TN to Jackson, MS

203.9 mi, single track

Max. gross carload weight: 263,000 lb

Max speeds 40 mph passenger, 40 mph intermodal, 40 mph freight

ABS in effect Grenada Wye to Jackson

Station	MP	Sidings	Trk	Oper
Grenada Wye, TN	397.5			ABS TWC
Hernando, MS	415.4	3,190		
Fannie May, MS	428.1	3,195		
Sardis, MS	442.9	1,925		
Batesville, MS	452.1	4,675		
Pope, MS	459.6	2,310		
Blanche, MS	473.6	3,190		
W.V. Jct., MS	486.8=614.4			
Grenada, MS	617.7	6,113		
Duck Hill, MS	629.5	2,429		
C&G Xing (A)	640.2			
Winona, MS	640.5			
Carroll, MS	648.5	2,423		
West, MS	661.1	2,759		
Durant, MS	670.6	4,961		
Aberdeen Jct., MS	673.5			
Pickens, MS	685.5	2,435		
Canton, MS	705.7			
Madison, MS	716.9			
North Jackson, MS	727.2			
Jackson, MS	729.0			

McComb District

North Jackson, MS to New Orleans, LA

187.8 mi, single track predominates

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 70 mph intermodal, 60 mph freight

Two main tracks MP 729.2 to MP 736.0, Wesson Jct. to MP 787.6, MP 801.7 to Fernwood Jct., Skip to Mays Yard

CTC governs MP 736.0 to MP 775.4, MP 787.6 to MP 801.7, Fernwood Jct. to Southport Jct.

ABS in effect MP 729.3 to MP 736.0, MP 775.4 to MP 787.4, MP 801.7 to Fernwood Jct.

Amtrak operates Jackson to New Orleans

Station	MP	Sidings	Trk	Oper
Jackson, MS	729.0		DT	ABS
Elton Jct., MS	736.0			
Crystal Springs, MS	753.4	15,003		CTC
Hazlehurst, MS	762.5			
Wesson Jct., MS	775.4			
Brookhaven, MS	783.1		DT	ABS
S.E.D.T.	787.6			
Summit Jct., MS	801.7			
McComb, MS	806.9			
South Yard, MS	808.7		DT	ABS
Fernwood Jct., MS	812.1			
Osyka, MS	823.9	9,642		
Arcola, LA	840.0	13,033		
Natalbany, LA	856.3	13,253		
Hammond, LA	859.0			
Manchac, LA	874.5	9,845		
Frenier, LA	887.7	10,835		CTC
Skip, LA	898.6			
Martin Jct., LA	900.5			
Orleans Jct., LA	900.8		2MT	
Mays Yard, LA	904.4			
East Bridge, LA	906.4			CTC
Southport Jct., LA	908.6			
Sty Docks, LA	913.5			
New Orleans, LA	916.8			

Appendix D
Line Segments Comprising BNSF Railway Routes

Chicago Division, Aurora Subdivision

Plum River, IL to North La Crosse, WI

BNSF Line Segment 3

157.9 mi

Two main tracks Plum River to Galena, Portage to Ports, Crawford to Graf

Max. gross carload weight: 286,000 lb

Max speeds 60 mph freight, 35 mph loaded ore trains

CTC governs Plum River to MP 143.3, MP 171.5 to MP 185.3, MP 235.4 to MP 239.8, MP 296.3 to MP 299.8

ABS in effect MP 143.3 to MP 171.5, MP 185.3 to MP 235.4, MP 239.8 to MP 296.3, MP 299.8 to North La Crosse

Station	MP	Sidings	Trk	Oper
Plum River, IL	142.3		2MT	CTC
Savannah, IL	143.7			
ICE Crossing, IL (A)	144.8		DT	ABS TWC
Robinson Spur, IL	156.9			
Galena, IL	171.6		2MT	CTC
Portage, IL	172.3			
Menominee, IL	175.5			
East Cabin, IL	184.9			
East Dubuque, IL (I)	185.0			
Potosi, WI	200.0		DT	ABS TWC
Cassville, WI	213.0			
Glen Haven, WI	222.8			
Bagley, WI	228.4			
Wyalusing, WI	232.0			
Ports, WI	235.6		2MT	CTC
Crawford, WI	237.0			
Prairie du Chien, WI	239.7			
Lynxville, WI	254.4		DT	ABS TWC
Ferryville, WI	262.2			
De Soto, WI	270.1			
Genoa, WI	280.7			
Stoddard, WI	286.7			
Graf, WI	296.3			CTC
Grand Crossing, WI	299.9			
North La Crosse, WI	300.2			ABS

Chicago Division, Barstow Subdivision

Plum River, IL to Galesburg, IL

BNSF Line segment 6

95.7 miles, single track

Max. gross carload weight: 286,000 lb

Max speeds 60 mph freight, 35 mph loaded ore trains

CTC governs MP 1.0 to MP 96.7

Station	MP	Sidings	Trk	Oper
Plum River, IL	96.7			
Ebner, IL	86.6	10,543		
Sam, IL	77.0			
Fenton, IL	71.7	10,544		
Denrock, IL	68.3			
Erie, IL	62.1			
Hillsdale, IL		9,008		
Joslin, IL				
Barstow, IL	43.8	5,506		
IAIS Xing (I)	40.8			
Colona, IL	40.6			CTC
Briar Bluff, IL	39.4			
Warner, IL	34.8	9,791		
Orion, IL	30.5			
Lynn, IL	26.3			
Opheim, IL	23.0			
Alpha, IL	18.6	8,561		
Rio, IL	13.0			
Henderson, IL	6.3			
Bouhan, IL	3.4	10,639		
Galesburg, IL	1.0			

Nebraska Division, Ottumwa Subdivision

Galesburg, IL to Burlington, IA

BNSF Line segment 1

43.0 miles, Double track

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 60 mph freight, 35 mph loaded ore trains

CTC governs MP 168.0 to MP 170.5, MP 202.4 to Burlington

ABS in effect MP 170.5 to MP 202.4

Amtrak operates Galesburg to Burlington

UP trackage rights Galesburg to Burlington

Station	MP	Sidings	Trk	Oper
Galesburg, IL	162.4			
A Plant, IL	162.6			
Academy, IL	163.4			
Graham, IL	168.4		DT	ABS TWC
Monmouth, IL	179.0			
Kirkwood, IL	185.0			
Gladstone, IL	196.1			
Connett, IL	202.4		2MT	CTC
Burlington, IA	205.4			

Chicago Division, Brookfield Subdivision

Galesburg, IL to West Quincy, MO

BNSF Line Segment 11

101.0 miles, single track (2 MT MP 188.9 to MP 192.4)

Max. gross carload weight: 286,000 lb

Max speeds 79 mph passenger, 60 mph freight, 35 mph loaded ore trains

CTC governs MP 167.96 to West Quincy

Station	MP	Sidings	Trk	Oper
Galesburg, IL	162.4			YL
Knox St, IL	162.9			
Thurwell, IL	164.3			
Waterman, IL	166.0			
Saluda, IL	168.1			CTC
Abingdon, IL	172.3	11,081		
Avon, IL	182.8	9,833		
Bushnell, IL	191.4		2MT	
TP&W Crossing (I)	191.5			
Macomb, IL	202.3	7,024		
Colchester, IL	209.3	6,850		
Augusta, IL	225.9	7,150		
Golden, IL	235.2	6,605		
Camp Point, IL	240.9	7,560		
Ewbanks, IL	254.2	6,626		
Quincy, IL	258.5			
Quincy Jct, IL	261.5			
West Quincy, MO	263.4	7,500		

Springfield Division, Beardstown Subdivision

Bushnell, IL to Toland, IL, Toland, IL-WR Tower, IL (E. St. Louis, IL) via UPRR, WR Tower-Grand Ave, MO via TRRA.

BNSF Line Segment 12 (Bushnell-Concord), Line Segment 13 (Concord-Toland)

132.3 miles, single track (Addn'l 32.0 mi on UP, single track + 13.7 mi. on TRRA)

Max. gross carload weight: 286,000 lb

Max speeds 49 mph freight, 35 mph loaded ore trains

CTC in effect MP 119.7 to MP 116.3, MP 114.3 to MP 102.0, MP 65.6 to MP 66.2, MP 77.7 to MP 77.9

Station	MP	Sidings	Trk	Oper
West Bushnell, IL	159.6			TWC
Adair, IL	151.3	8,770		
Vermont, IL	140.6	6,880		
Stewart, IL	129.0	6,900		
Grimes, IL	119.3	7,850		CTC
Beardstown, IL	115.9			TWC
Hagener, IL	110.2	10,037		CTC
Concord, IL	102.1=0.0	7,353		
NS Xing (I), IL	10.2			TWC
Jacksonville, IL	11.0	6,850		
Lowder, IL	35.0	8,600		
Virden, IL	42.1			
Girard-UP Xing, IL (I)	44.4			
Atwater, IL	53.1	7,328		
Litchfield, IL	64.2	7,620		
Winston, IL	77.9			
Toland, IL	74.0	11,234		
Via Union Pacific Pana Subdivision				
Walsh Jct, IL	243.7			CTC
Joan, IL	247.5	9,809		
Gard, IL	263.5	10,462		
Vierling Jct, IL	273.7			
Lenox, IL	275.7			
UP-KCS joint track between Lenox and WR Tower				
TRRA between WR Tower and Grand Avenue				

Springfield Division, Hannibal Subdivision

Burlington, IA to Lindenwood, MO

BNSF Line Segment 14 (Burlington-Baden, North St. Louis-North Market), Line Segment 1002 (Grand Avenue-Lindenwood)

224.1 miles, single track

Max. gross carload weight: 286,000 lb

Max speeds 40 mph freight, 35 mph loaded ore trains MP 220.3 to MP 136.9; 60 mph freight, 35 mph loaded ore trains MP 136.9 to MP 7.2

CTC governs MP 137.7 to MP 104.6, MP 70.0 to MP 4.3

ABS in effect MP 70.0 to MP 104.6

Station	MP	Sidings	Trk	Oper
Burlington, IA	220.3			
Kemper, IA	216.4			
Wever, IA	209.9			TWC
Sinclair Switch, IA	207.7	6,450		
Fort Madison, IA	200.0			
Montrose, IA	189.3	7,900		
Gateway, IA	185.5			
Sandusky, IA	183.3			
Keokuk, IA	177.9			
Gregory, MO	166.6	8,056		
Fenway, MO	161.4			
Canton, MO	156.2			
La Grange, MO	150.1			
Casino, MO	148.1	8,517		
West Quincy, MO	136.9	7,500		CTC
Mark, MO	134.1			
Falk, MO	131.5	7,176		
South River, MO	129.8			
NX Xing, MO (I)	120.8			
Hannibal, MO	119.7	9,300		
Ilasco, MO	116.7			
Ashburn, MO	104.3	8,360		
Louisiana, MO	94.1			TWC ABS
KCS Xing, MO (A)	93.6			
Cosgrove, MO	92.9			
Dundee, MO	86.4	5,964		
Annada, MO	75.4			
Elsberry, MO	68.2	9,606		CTC
Winfield, MO	56.1			
Old Monroe, MO	51.6	7,335		
Gibbs, MO	44.4	6,860		
Seeburger, MO	36.9			
Orchard Farm, MO	33.5			
Machens, MO	26.9	10,243		
Union Electric, MO	25.1			
West Alton, MO	20.4	10,620		
MP 16.85, MO	16.85			
Spanish Lake, MO	14.9	8,924		
Baden, MO	9.4			
North St. Louis, MO	7.2			
North Market, MO	4.2			
Via TRRA between North Market and Grand Avenue (5.1 mi)				
Grand Avenue, MO	2.1		2MT	
Knox Avenue, MO	5.3			
Lindenwood, MO	7.1			

DATE: October 19, 2007

FROM: Mark Burton and David Clarke, University of Tennessee

TO: Jack Carr, US Army Corps of Engineers

RE: UM Rail Capacity Committee Comments

With very few exceptions, we found the Committee's comments to be both fair and well-founded. It is abundantly clear that each of those who offered comments had studied our work closely. Unfortunately, it is not possible for us to respond to every comment. In some cases the necessary additional work is prohibitive. In other cases we simply don't have answers. What follows, however, are the responses we do have to offer. In an attempt to achieve as much clarity as possible, these responses are framed as candidly as possible.

The Study Scope and Structure

A number of the comments and questions were directed toward the scope and structure of the overall study. The objective of the study was to scratch into the available data as deeply as possible to go beyond "the sky is falling" fervor that is so evident in the popular press. We agree that optimally, this would have meant a well structured quantitative network analysis, but the resources for a more extensive effort were unavailable. Our thinking was that some information would be better than no information at all.

The network segments were chosen in consultation with TVA. There was an attempt to balance geography and network ownership. The Committee generally voiced a desire to know more about the traffic mix on the various network links. That information would be attainable by processing the waybill data through a routing algorithm, but once again, that would have required time and funding that were unavailable. There was also some suggestion that the document may contain text that has been cut and pasted from other documents. This is not the case. All text was prepared specifically for the current study document.

International Trade

The Committee also offered a number of comments and questions regarding international trade and its relationship to rail capacity issues. First, with regard to the influence of the Chinese on US commerce, we are not prepared to argue over what is "myth" and what is not. Our real point is that growth in trade with China has materially altered the demand for rail capacity in the United States.

There were also very good questions about the future. How will the Panama Canal expansion affect freight flows over New Orleans and what role with the CN play in that process? We do not have an answer, but it is an important question.

will be breathtaking. It's fairly clear also that, as an industry, the railroads expect the public sector to shoulder some of the investment burden.

Miscellaneous Questions and Comments and Concluding Thoughts

There were literally dozens of miscellaneous questions and comments on a wide range of topics. For example, one member wanted to know if changing fuel prices affect transport demands (as opposed to supply). Another wanted to know if trackage rights exist in perpetuity. There were specific questions regarding individual route segments, terminals, and carriers. All of these were good and useful questions and comments. However, responding to each of them individually is beyond our capability.

Quite clearly, we have settled nothing. Hopefully, however, by adding some amount of information, we have clarified the discussion to a degree. At the end of the day, there is a physical reality, an economic reality, and an institutional reality. From a physical standpoint, there are very few places where substantial new railroad capacity will be needed, but cannot be added. Whether or not this capacity will be profitable is less certain. In the event that it is not, the public sector must decide whether a public investment is appropriate or whether simply failing to accommodate some potential traffic is in the public's best interest. Finally, the railroads remain as private sector, profit maximizing firms that face only loose economic regulations. Their service offerings, pricing practices, and investment decisions will be made based on their best interest and nothing else unless they are compelled to do otherwise.