2. Strategic Assessment

2.1 Focus of the 2004 Plan Strategic Assessment and Business Plan

Planning for the MWRRS has progressed from the *concept* stage to the *feasibility* stage in the 2004 Plan. This report includes the findings resulting from additional technical study and plan refinement of major plan elements associated with further development of the 2004 Plan. These include:

- Update of ridership estimates to year 2000 socioeconomic base
- Update of revenue, capital and operating costs to year 2002 base
- Update of the operating plan
- Refinements to implementation plan phasing
- Update of the financial plan
- Update of project coordination and institutional arrangements

Starting with the 1998 Plan, the MWRRS Business Plan has been progressively refined. This Chapter presents some of the key findings of earlier stages of the MWRRS Business Plan development, and how that plan has evolved and been successively improved over the past six years.

2.2 Initial Study Approach for the 1998 Plan

As part of the 1998 Plan of the Midwest Regional Rail Initiative (MWRRI), TEMS conducted a strategic assessment of the region to determine the most beneficial and affordable service and equipment scenarios. The study focused on each scenario, and projected ridership and revenue based on travel characteristics, survey findings and demographics. In addition, TEMS evaluated the engineering, operations, financial and economic impacts of the alternative routes. The assessment of each scenario required the coordination of several key components including:

- Creation of a database comprised of base year trip tables, track conditions of the existing rail infrastructure, and current train operations data
- Conducting a stated preference survey of intercity travelers
- Utilizing the *RightTrack*© software tools to assess infrastructure, train operations, and travel demand, financial and economic returns
- Formation of three service and equipment scenarios for the MWRRS, each based on specific service and equipment attributes
- Implementation of screening criteria to be used in evaluating the performance of each scenario.

The core of the strategic assessment was an interactive analysis in which the service and equipment attributes for each scenario and the interaction between infrastructure, demand and operations were appraised simultaneously. Once the interactive analysis output was optimized for each scenario, the results were then compared using a set of screening criteria to determine the best scenario for the MWRRS.

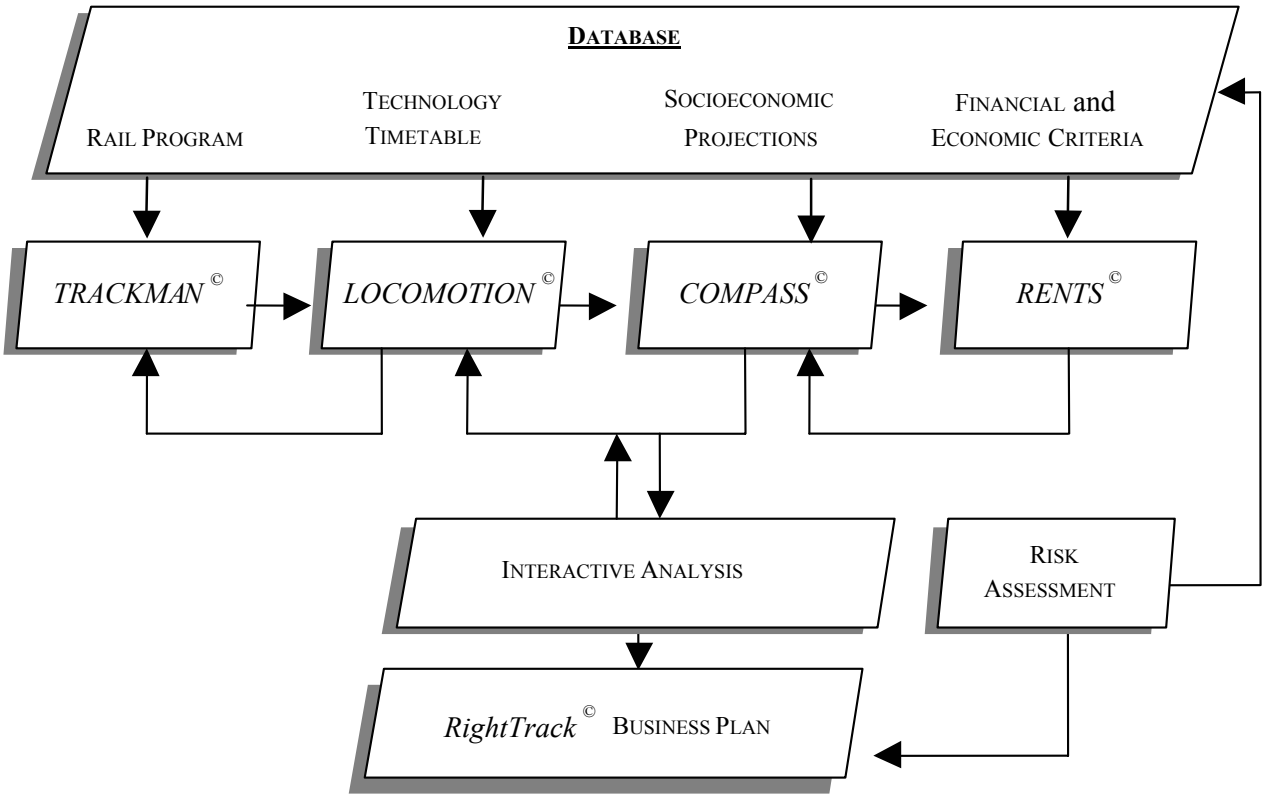
2.3 Analysis Process

The effective determination of appropriate infrastructure and timetables for different service and equipment scenarios depends on obtaining the optimal balance between costs and revenues. The analytical process applied in the five plans of the MWRRI is an interactive analysis in which the relationship between infrastructure costs, train technology, train operations, ridership demand and revenues, and operating costs were assessed simultaneously in transportation, financial, and economic terms, (Exhibit 2-1). In the interactive analysis, it was essential to evaluate the following for each scenario:

- Required infrastructure
- Performance of the proposed technology, particularly train speed
- Ridership, reliability, fares and frequency
- Key analyses were performed using several of TEMS' proprietary *RightTrack*© software components including:
  - *TRACKMAN*© Track Inventory and Estimating System to assess right-of-way conditions and determine appropriate track and infrastructure improvements and to calculate related costs
  - *LOCOMOTION*© Train Performance Calculator to assess travel times, establish operating plans and identify operating costs for each technology
  - *COMPASS*© Multimodal Demand Model to assess ridership and revenues generated by any given technology and level of service
  - *RENTS*© Financial and Economic Analysis Model to estimate the financial and economic benefits of a project

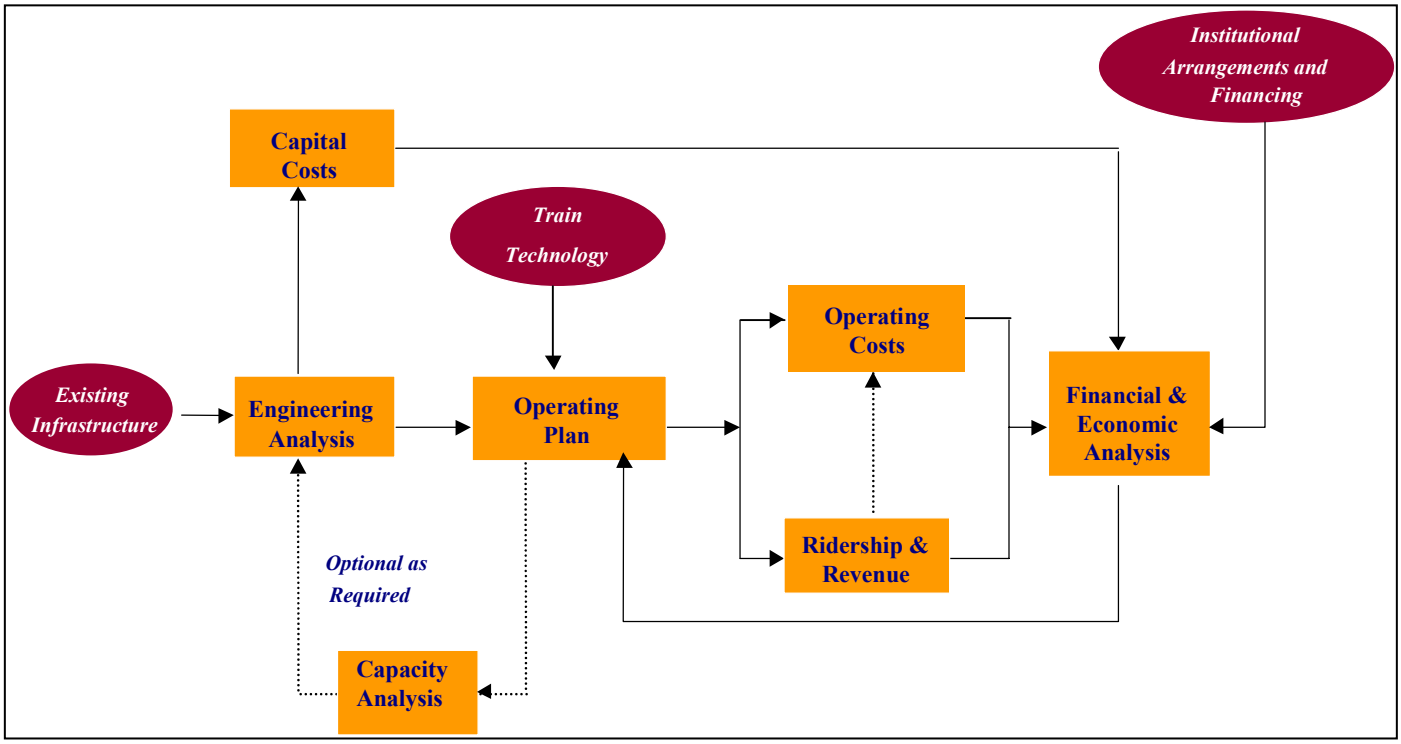
A more detailed description of each component of *RightTrack*© is given in Appendix A7.

Exhibit 2-1
The *RightTrack*© System



The interactive analysis utilized in the *RightTrack*© System is a multi-step procedure that incorporates the information on infrastructure, technology and financial strategies (Exhibit 2-2).

Exhibit 2-2
The TEMS Interactive Analysis



2.4 1998 Plan of the MWRRI - Definition of the Scenarios

Service and equipment scenarios were used as the basis for assessing an array of corridor and system-wide services. The objective was to identify scenarios that incorporated a combination of train technologies, service characteristics, amenities and financial factors to create a regional passenger rail system capable of generating high levels of ridership and recovering, at a minimum, its operating costs from fares and other revenues generated by the MWRRS.

The scenario definition task of the study was a collaborative process between the state DOT representatives, Amtrak representatives and the consultant team. A two-day workshop was convened to reach consensus on the scenarios and their definition. At the conclusion of the workshop three scenarios – Conservative, Moderate and Aggressive – were agreed upon. These scenarios formed the basis of a strategic assessment in choosing the preferred service option for the MWRRS.

In each scenario, the operating characteristics of the passenger rail service are changed to provide a different combination of capital costs, operating costs, train technology and travel times, level of infrastructure investment, frequency of service, and on-board and station amenities. Each scenario was based on a series of *drivers* that define the key attributes of the scenario. As the scenarios progressed from Conservative to Aggressive, so do the dynamics of

the scenarios in terms of the type of train technology used, the level of service provided, and the capital and operating costs. The drivers used in the strategic assessment for the Conservative, Moderate and Aggressive Scenarios and the associated range of values for each is given in Exhibit 2-3.

Exhibit 2-3
Scenario Framework

Drivers	***Equipment & Service Scenarios***		
	Conservative	***Moderate***	***Aggressive***
Increase in Train Frequencies	2, 3 or 4 round trips daily	4 or 6 round trips daily	4, 6 or 8 round trips daily
Travel Time Improvement	5% to 15%	15% to 30%	20% to 50%
Fare Policy	Current to 25% increase	Current to 50% increase	Current to 50% increase
System Access/Egress Improvements	Marginal	Marginal to significant	Significant
Station-stopping Patterns	Existing	Express and/or local	Express and/or local
Network Connectivity	Limited	Integrated	Optimized
Station Amenities	Limited	Limited or significant	Significant
On-board Amenities	Limited	Significant	Significant
Track Investment	Minimal	Moderate	Significant
Rolling Stock Investment	Limited	New rolling stock	High-speed trains
Public/Private Partnerships	5% to 15%	15% to 25%	25% to 50%

2.4.1 Increase in Train Frequencies

Existing passenger rail service in the Midwest region is extremely limited with no service or only one or two trains per day on most corridors. Only on the Chicago-St. Louis, Chicago-Detroit and Chicago-Milwaukee corridors, where there are three, three and seven trains per day respectively, does any sense of a regional passenger rail service exist. Train frequencies need to be significantly increased if the MWRRS is to provide any real degree of regional connectivity.

2.4.2 Travel Time Improvement

Currently, travel times in the Midwest region are largely a product of the speed of freight train operations, which is typically well below 79-mph. The only exception is a short segment between Chicago and Detroit where the allowable speed has been increased to 90-mph. Although a segment of track on the Chicago to St. Louis corridor has been upgraded for 110-mph, the allowable speed remains 79-mph pending the installation, testing and acceptance by the FRA of a Positive Train Control safety system. For the MWRRS to provide a competitive passenger service, operating speeds need to be significantly increased and maintained for a significant proportion of any given trip. New, attractive equipment is also needed in order to obtain the full revenue benefit envisioned in the MWRRS demand forecasts.

2.4.3 Fare Policy

Historically, passenger rail fares in the Midwest, as on much of Amtrak's service elsewhere in the country, have been set at levels that are higher than intercity bus fares, but lower than airfares. If a faster, more frequent service is provided, the MWRRS can attain a larger proportion of business users, average fares can be higher and the MWRRS can thereby recapture some of the benefit given to users of the system. This can help improve the overall financial viability of passenger rail service.

2.4.4 System Access/Egress Improvements

One of the problems associated with any public travel mode is access and egress at stations and terminals. Recognition of this by the air industry has resulted in their providing a wide range of access/egress facilities and services. These facilities include parking garages, rental car outlets, taxi stands as well as multimodal and transit connections, all making the experience of getting to and from the airport easier for the traveler. To divert travelers, particularly business travelers, from other modes of travel, the MWRRS needs to provide similar facilities and services at its stations.

2.4.5 Station Stopping Patterns

Because stopping at a station adds significantly to travel time, station-stopping patterns need to be carefully considered in order to take advantage of the faster train speeds provided by modern technology. Stopping patterns need to be developed that permit the fastest train times possible between major regional centers but, at the same time, provide reasonable service to smaller urban centers. This can be achieved by including express and skip/stop trains in the MWRRS schedules.

2.4.6 Network Connectivity

One of the greatest deficiencies of existing passenger rail service in the Midwest, even when taking into account Amtrak's long-distance trains, is the lack of connectivity between regional centers and smaller urban areas in different parts of the region. To be a competitive option to other modes of travel for regional trips, *e.g.*, Madison to Detroit or Springfield, the MWRRS needs to offer connection times of less than one hour at the Chicago hub.

2.4.7 Station Amenities

Airlines have shown that terminals must be comfortable and secure facilities. Terminals must also offer a selection of personal services including voice and data phone lines, restaurants, small shops for newspapers and gifts and, at larger terminals, specialty retail shopping. To compete effectively, the MWRRS needs to offer similar facilities.

2.4.8 On-board Amenities

Travel by regional passenger rail, just as by air, needs to offer its customers on-board amenities, including audio/video entertainment facilities, 110 volt power and modem connections, as well as a food and beverage service. The railcars used for the MWRRS need to provide a level of comfort and safety that allows passengers to work and relax comfortably while on the train.

2.4.9 Track Investment

Investment in track and signaling systems is the most critical component in permitting higher train speeds. FRA rules require progressively tighter safety standards as maximum authorized speeds increase. This can result in a requirement for significant capital investment for a relatively small improvement in speed. A new signaling technology, Positive Train Control, is presently being tested in the Chicago-St. Louis corridor. An Incremental Train Control System is in revenue service under a demonstration project, on a portion of Amtrak's Chicago-Detroit corridor within the state of Michigan. The business plan assumes that FRA will approve PTC technology for normal commercial use in time for application to the MWRRS system. The most cost-effective investment in infrastructure relative to both train speeds and revenue earnings needs to be identified to ensure a realistic financial base for the MWRRS.

2.4.10 Rolling Stock Investment

In the last twenty years, rolling stock has undergone a technological revolution that has increased performance and reliability yet lowered both maintenance and operating costs. An increased focus on customer satisfaction has also led to significant improvements in the amenities on trains. The introduction of new, modern equipment for the MWRRS is in itself likely to raise ridership and increase revenues, as was seen upon the introduction of modern equipment on the Portland-Seattle corridor.

2.4.11 Public/Private Partnerships

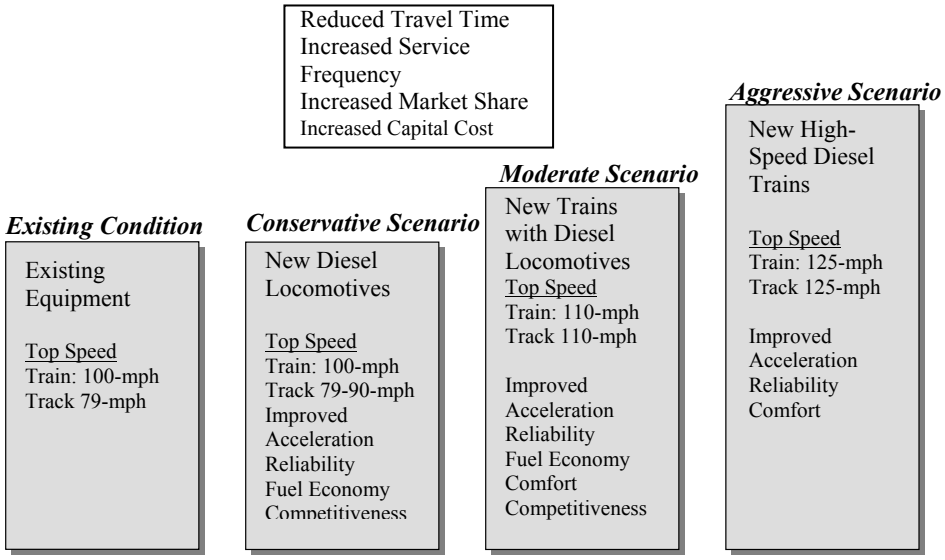
The development of an increasingly commercial attitude to providing intercity transportation systems (air, rail, and bus) is encouraging a greater degree of private sector participation in intercity transportation projects. Private sector participation projects for the MWRRS could include joint development ventures, such as that at Washington Union Station; the provision of on-board and station concessions; express parcel service; train operations and maintenance of vehicles and rights-of-way. The MWRRS needs to maximize the role of the private sector to increase its funding sources, lower its costs and thereby ensure its success. To this end, it is proposed that the MWRRS should be a contracted operation, open to the private sector as well as to Amtrak.

2.5 Scenario Analysis

While the *drivers* identified for the scenarios collectively interact to influence the level of ridership and the costs of building and operating the system, two factors – travel time and frequency of service – will have the greatest impact on the success of the MWRRS. These factors are products of the train technology selected and its operating speed. Train technology plays a significant role in developing market share, as well as improving operating performance. A train that looks new and modern is a highly visible symbol of an improved passenger rail system. Travelers typically associate such a symbol with faster travel times, more comfortable seating, improved ride quality and the provision of modern conveniences.

For the MWRRS, several different train technologies were evaluated in terms of their operating speeds, operating and maintenance costs, and capital costs. The train technologies selected as graphic examples for the three scenarios and the improvements they will generate are given in Exhibit 2-4.

Exhibit 2-4
Impact of Train Technology



2.6 The 1998 Plan of the MWRRI – Analysis of Scenarios

An interactive analysis was conducted in 1998 to measure the benefits of higher train speeds. Outputs generated were compared using a series of five screening criteria. The screening criteria reflect service and system-related factors that were identified as critical to the success of the MWRRS. Each of these factors was expressed as a ratio so that the value of each could be interpreted as a product of a specific level of investment. For example, *travel time saved* was expressed as the amount of travel time that was saved per $1 million of capital investment. This technique enabled each scenario to be compared based on specific service improvements and within the context of the level of investment required for the overall system.

The outputs from the interactive analysis and the values generated by the screening criteria were an iterative process. Values generated by the screening criteria were used as a barometer to readjust the variables used in the interactive analysis to ensure the performance of each driver and gauge the maximum overall benefit of that driver to each scenario. Once accomplished, a final comparison was made based upon the optimum results for each scenario. The screening criteria are described below.

2.6.1 Operating Cost Ratio[1] - (Expressed as Ratio of Revenues to Operating Costs)

The MWRRI has a goal for the development of a Chicago-hubbed system and related system efficiencies, whereby revenues are maximized and operating costs are minimized. This goal is designed to minimize or eliminate the requirement for state operating subsidies.

[1] The operating ratio, as defined here is revenues/costs. Note that this is the opposite of the definition typically used by freight railroads or intercity bus operators.

2.6.2 Travel Time Saved - (Expressed as Travel Time Saved per Dollar Invested or Seconds per Million Dollars)

The *travel time saved* criterion is used to assess the value of the infrastructure investment relative to the timetable improvements achieved and is used in conjunction with the *revenue generated* criteria described below to rank infrastructure improvements. The more travel time saved per dollar of capital investment for any scenario, the better the return. This criterion helps to ensure the affordability of the MWRRS.

2.6.3 Revenue Generated - (Expressed as Revenue Generated per Dollar Invested or Cents per Million Dollars)

The *revenue generated* screening criterion is similar to the *travel time saved* criterion in that it is used to prioritize infrastructure investments. It measures the response of the market to a given level of capital investment. A significant change in this criterion is an indication that a threshold in market share has been crossed or a new market has opened up to passenger rail competition. The more revenue generated per dollar of capital investment, the better the financial return is likely for the scenario. Of particular concern is that the additional infrastructure enhancement in the Aggressive Scenario generates only a minor improvement in travel time saved per dollar invested. The Moderate Scenario offers a better rate of return.

2.6.4 Connectivity through Chicago and Regional Mobility - (Expressed as Percent of Total Trips Connecting through Chicago)

A key feature of the MWRRS is the development of system connectivity through the Chicago hub. This is an important measure of the regional integration achieved and, through increased ridership, the level of payback associated with developing the Midwest hub-and-spoke network. The higher the percentage achieved for any scenario, the higher the improvement in connectivity and regional mobility.

2.6.5 Operating Cost Savings - (Expressed as Percent Reduction in Operating Costs per Train Mile)

The effects of infrastructure investment, economies of scale and improved technology are to drive down operating costs. This criterion measures the level of reduction in operating costs per train mile associated with the combination of all of the screening factors for a given scenario. The higher the percentage achieved, the better the financial return.

2.7 Results of 1998 Plan – Strategic Assessment

For the screening analysis that was performed in 1998, financial results were estimated based on Year 2010 demographics. The Moderate Scenario was selected as the most cost-effective service, infrastructure and equipment option for the MWRRS. The results of the scenario screening process are given in Exhibit 2-5 and summarized below.

Exhibit 2-5
Scenario Screening Analysis – 1998 Plan

Screening Criteria	*Scenarios*		
	Conservative	*Moderate*	*Aggressive*
Operating Ratio	0.85	1.36	0.93
Travel Time Saved per Dollar Invested (Seconds per Million Dollars)	60 seconds	9.6 seconds	1.2 seconds
Revenue Generated per Dollar Invested (Cents per Million Dollars)	31 cents	104 cents	82 cents
Percent of Total Trips Connecting through Chicago	13.5%	18.4%	17.0%
Percent Reduction over Current Amtrak Operating Costs per Train Mile	30%	36%	29%

2.7.1 Conservative Scenario

The Conservative Scenario provided a considerable improvement over the existing passenger rail service and, in fact, achieved the highest level of travel time saved per dollar invested. Because this scenario did not achieve a positive operating ratio, an annual subsidy from the states would be required to support the operation. This suggests that speeds over 79-mph are required to produce positive operating ratios. Nonetheless, because of the timetable improvements, extensive operating cost savings, and relatively modest infrastructure costs, implementation of the Conservative Scenario could serve as the initial implementation phase in the long-term development of the MWRRS.

2.7.2 Moderate Scenario

The Moderate Scenario in the 1998 Plan generated a positive operating cost ratio of 1.36, where a ratio of 1.0 was the objective. It achieved the highest level of connectivity through Chicago and the highest revenue per dollar invested – three times that of the Conservative Scenario and 25 percent greater than the Aggressive Scenario. At the same time, it generates the lowest operating costs per train mile, which represents a significant savings over the current condition and both the Conservative and Aggressive Scenarios.

2.7.3 Aggressive Scenario

Given the high cost of complete grade crossing separation for 125-mph or above speeds, this speed results in a major cost increase without enough time savings to justify the added capital expense. The analysis suggests diminishing returns associated with the level of investment required to implement the 125-mph Aggressive Scenario. Alternatives may be to drop back to a 110-mph operation that avoids the need for complete grade crossing separation, or to push towards even higher speeds of 150-mph or better. The population levels are not yet sufficient on branch lines or less-dense corridors to support the higher speed and the higher levels of frequency that are required to justify the high capital investment. However, the Chicago-St. Louis, Chicago-Detroit and Chicago-Milwaukee corridors all appear to have at least the potential to support higher-speed service.

2.8 The MWRRI 2000 Plan – Further Development of the Moderate Scenario

The most critical step in the 2000 Plan study was to further test the Moderate Scenario recommended in the 1998 study, and to develop it further by testing its feasibility. The definition of the Moderate Scenario is:

> The Moderate Scenario is based upon the use of existing train technology capable of achieving a top speed of 110-mph. The Moderate Scenario was selected because it provides the most cost-effective infrastructure and equipment option and provides the service necessary to establish and maintain a successful regional passenger rail system. The Moderate Scenario generates a strong operating ratio and provides the best value in terms of revenue generated per dollar invested.

The project areas assessed in the 2000 Plan included:

- Review of track, signaling and facilities to ensure the feasibility of the proposed plan
- Expanded definition of the operating plan to ensure maximum operating efficiency, service utility and cost efficiency
- Update and expansion of the current ridership and revenue forecasts of the nine corridors
- Analysis of multimodal connectivity and joint station development concepts
- Update to the Implementation Plan
- Additional definition of Institutional Arrangements
- Revised financial and economic results as a result of infrastructure, ridership, operations and implementation funding

A variety of additional factors were considered to guide the analyses and to assess issues that arose during the course of the overall evaluation, including:

2.8.1 Infrastructure Costs

The main goal of the infrastructure planning process was to optimize travel time saved per dollar invested. However, overriding issues sometimes arose such as the practicality of high-speed operations in urban areas, and along highly congested freight track segments. In these sections, the lowest cost infrastructure alternative that provided sufficient capacity and did not compromise safety was sought.

2.8.2 Equipment Costs

The equipment analysis included consideration of life-cycle costs for each technology. In defining the operating plan, operating costs reflective of potential MWRRS train technologies were applied in the 2000 Plan.

2.8.3 System Viability

The results of the 2000 Plan reflected the findings of earlier studies and showed that the Moderate Scenario was effective in providing the public private partnership that could support the development of the MWRRS. In economic terms, the system produced an overall cost-benefit return of 1.7 using USDOT FRA criteria. This showed that the project made a significant

contribution to the performance of the American economy overall and specifically that of the Midwest.

2.9 MWRRI 2004 Plan – Update of the 2000 Plan Results

The 2004 Plan of the MWRRI consisted of an updating of the 2000 Plan from a 1996 data base year to a 2002 base year. The MWRRI states recognized the value of utilizing the latest census data to update ridership estimates and updating costs and revenues. As a result, the 2004 Plan analysis is designed to produce an updated Business Plan. Key elements revised in the 2004 Plan include:

2.9.1 Market Update

- Updated Ridership and Revenue forecasts utilizing the latest census data
- Upgraded Feeder Bus Analysis utilizing Greyhound cost data and market research
- Upgraded Express Parcel Analysis to develop cost and revenue estimates

2.9.2 Capital Cost Update

- Upgraded Capital Costs to 2002 base, by reviewing previous estimates, including new estimates generated from the latest engineering field reviews and studies
- Upgraded Capacity Analysis costs

2.9.3 Operating Plan Update

- Revised Operating Plans in line with the latest route and engineering study findings, market research, freight railroad input, and operating speed and stopping pattern revisions
- Revised Operating Costs and specifically input from Zeta-Tech on track costs and from the vehicle procurement process for equipment costs

2.9.4 Implementation Plan

- Updated Segment Phasing, with new start dates, milestones and finish dates
- Updated Construction Management and other implementation costs

2.9.5 Financial Analysis

- Calculated new cash flows
- Revised ramp up costs and revenues
- Reviewed funding approaches

Operating ratios were reassessed and were positive for each corridor by the year 2016, with the exception of the Quincy-Omaha corridor that had an operating ratio of 0.92. Quincy-Omaha becomes positive only after year 2024. MWRRS as a system results in a positive operating ratio in year 2012, which rises to 1.17 in 2014 (the first year of full operations) and to 1.36 by 2025. All corridors, including Quincy-Omaha, have a positive operating ratio by 2025.

2.9.6 Economic Analysis

Due to funding limitations, the Economic Analysis conducted in the 2000 Plan, Chapter 11 of this report, has not been updated.