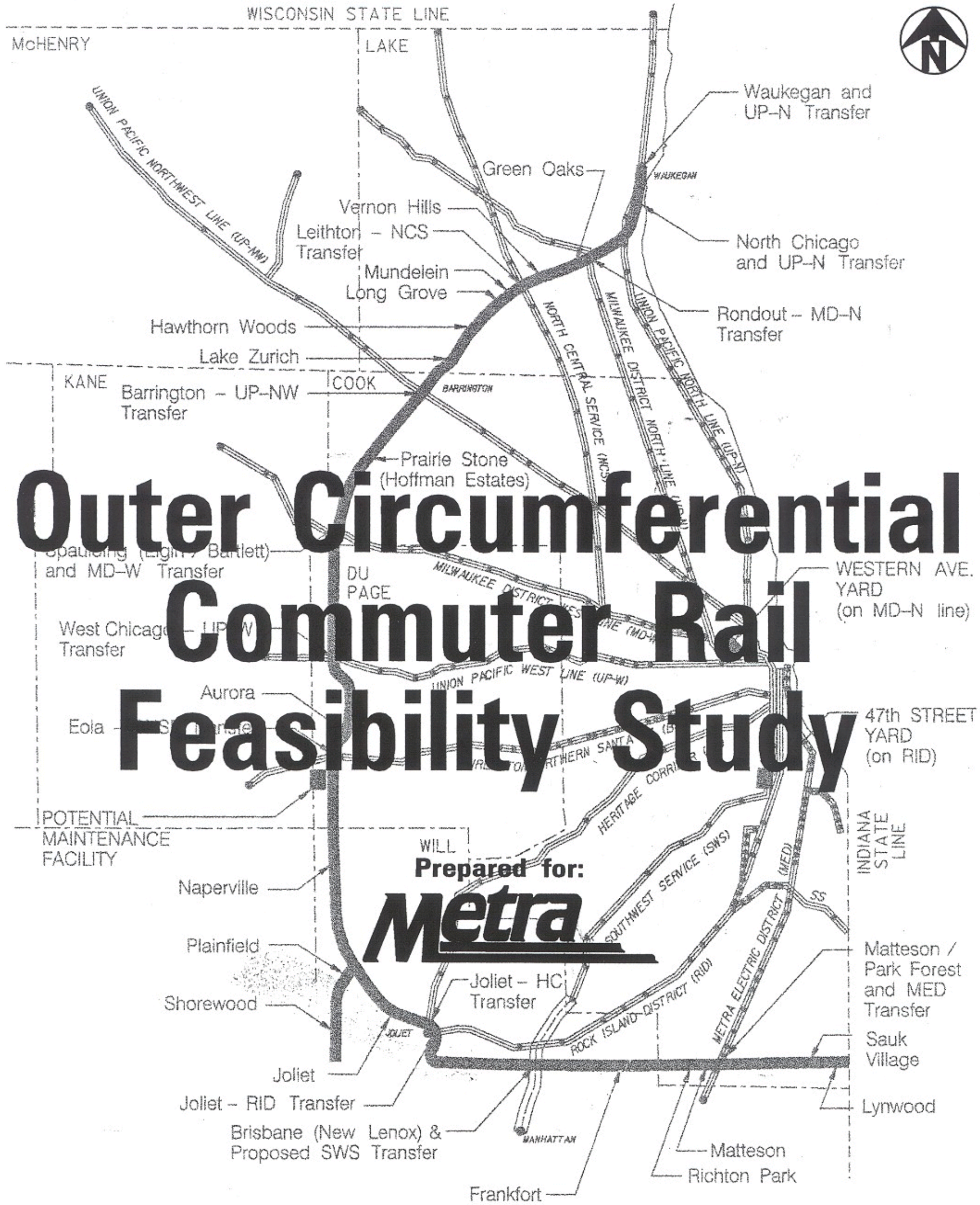
Outer Circumferential Commuter Rail Feasibility Study



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Foreword

It is very important that the reader recognize from the outset that all of the discussions, assessments and conclusions contained in this feasibility study report are based on the best information available prior to publication. This is particularly true of the capital cost estimates for railroad infrastructure improvements. These cost estimates are broad order-of-magnitude estimates of the highest level, with very little actual engineering data upon which to make more detailed estimates. All of these estimates have been created by utilizing unit costs for materials and equipment in 1997 dollars, i.e., unit costs that were current when most of the cost-estimating work for this study was done.

More precise capital cost estimates will come after the process advances to engineering and design. In fact, the costs are likely to be re-estimated several times before reaching the stage where the decision to pursue implementation could be made. Even computing probable cost increases based on current rates of inflation would be futile, given the potential for changes to the economy of the railroad industry and the lack of predictability for exactly when (presuming further feasibility studies continue to show viability) implementation of this commuter rail service might be pursued by Metra. At least three factors can impact the capital cost estimates in the future:

- Freight railroad operations and traffic volumes are subject to change at any time on any existing freight railroad. Growth of the national economy, improved competitive costs produced by the railroads, or future railroad mergers could all have a major influence on the potential cost of implementing commuter service. A case in point is the Conrail break-up, which has been divided between Norfolk Southern and CSX Transportation. Without having the ability to determine the exact amount of service Metra could provide, neither the amount of ridership which can be attracted to the service nor Metra's potential operating costs can be derived at this time.

- Since a specific service segment has not yet been selected, it is too early in the study process for Metra to initiate formal negotiations with the EJ&E Railway. Until such negotiations actually begin, it is difficult to know what capital improvements the railroad might require to provide them with a comfort level that is sufficient to allow them to approve implementation of commuter rail service on their railroad. Also, it is not possible to know what kind of trackage-rights or other form of agreement could be achieved, or at what cost.

- New track-protection regulations, developed to augment existing safety procedures, could affect the productivity of contractors implementing the necessary improvements. These regulations, combined with the potential for increasing freight traffic, could limit the amount of time available for construction work, which could also significantly impact potential costs.

Therefore, while the capital cost estimates reported herein are a good relative measure for this first phase of the overall Study, on an absolute scale they should be considered only as an order-of-magnitude indication of potential investment requirements. Further refinement of these values will be needed during succeeding phases of the project.

Operating costs can only be determined following travel demand forecasts, since the schedule of trains operated will be influenced by the demand, and conversely increased levels of service can influence the attraction of higher demand (i.e., more riders). Travel demand forecasts (often called ridership estimates) are slated for the next step in the study process. This phase will take the form of either a Major Investment Study or Phase II Feasibility Study (see Recommendations). The results of the forecasting process could render the entire concept unworkable from a cost/benefit standpoint if few riders are expected. Conversely, the level of service required to attract a sufficient level of ridership to make the service cost-effective might not be implementable due to constraints caused by a route's infrastructure or an insurmountable level of freight service. The ratio of projected revenue to projected operating costs, a key indicator of potential performance, can only be determined after ridership is forecasted. Therefore, projected operating costs will be developed later in the process.

An extremely costly but vital line capacity analysis must be performed in the Phase II Feasibility Study, in order to determine if the suggested railroad improvements are sufficient to run commuter trains efficiently (i.e., on time), or whether additional improvements (e.g., additional tracks, signals, bridges, etc.) must be provided in order to avoid potential delays from freight traffic. This computerized depiction inputs all current freight train schedules and mixes them with potential commuter train schedules in order to simulate actual running experience, and determine whether the suggested additional infrastructure is adequate to handle all of the train movements. The closer to implementation that this is performed, should the decision-making process reach that point, the better and more relevant will be the accuracy of the results.

At this point in time, the potential station locations indicate only that communities have suggested potential sites that fit with their future plans. These locations become place holders that will be carefully examined and evaluated as to site acceptability concurrent with the travel demand forecasting process, at which time the projected ridership will be used to determine requirements for depot size, platform length, number of parking spaces (with room for expansion to the year 2020), and ancillary station-related needs. There were also no detailed examinations of the environmental aspects of potential station sites.

Without ridership forecasts, from which the scope of station and parking needs are derived, specific station-related costs (including land acquisition) are indeterminable at this time. Parking requirements will dictate the necessary size of the land parcels that must be acquired (and therefore the cost, which could change dramatically over time); also the suggested sites must have adequate vacant land for acquisition and room for future expansion. Site-specific cost estimates for land and station/parking facilities will be examined in the Phase II Feasibility Study. However, in order to provide complete capital-cost estimates, a conservative estimate of potential total station costs is included. At this juncture, it is particularly important to remember that all future park-and-ride station-related costs, including land acquisition and depot/parking facility construction, will be the responsibility of and must be borne by the host community.

Metra Staff

1.0 INTRODUCTION

Metra, the Commuter Rail Division of the Regional Transportation Authority (RTA), initiated a study of the Elgin, Joliet and Eastern Railway (EJ&E) Corridor to examine the feasibility of an Outer Circumferential Commuter Rail Service (OCS) along the railway. The EJ&E runs in an arc, about 35 miles from the center of Chicago, through portions of Cook, Will, DuPage and Lake Counties. This corridor, which once defined the farthest limits of the Chicagoland region, is now surrounded by established suburbs as well as new development.

The EJ&E Railway from Waukegan to Lynwood is approximately 105 miles long, and crosses all eleven of Metra's existing commuter lines (including Metra's lease of Norfolk Southern tracks for future extension of the SouthWest Service but excluding NICTD's South Shore Line). In contrast to Metra's current suburb-to-downtown Chicago market, this rail line would most likely serve the suburb-to-suburb market, as well as some of the traditional downtown Chicago market via transfer to existing Metra lines. There are three different commuting patterns that are considered likely to occur on the EJ&E:

- travel along the EJ&E from one suburb to another;
- travel along the EJ&E to a transfer station for travel to downtown Chicago along an existing Metra commuter line; and
- travel along an existing Metra line with transfer to the EJ&E for travel to destinations along another Metra line or along the EJ&E line.

The purpose of the Study was to determine if commuter rail service is physically and operationally feasible along the rail line, and the likely cost of such service. This Study includes an examination of existing conditions (land use, railroad physical plant, and environmental considerations), assessment of future plans and conditions (railroad and community), necessary improvements in order to provide safe and efficient commuter rail service, financial analysis of the necessary upgrades to the physical plant, connections with other transit systems (Metra, Pace), and ridership potential. Coordination with the communities along the rail line was done in order to determine interest in commuter service on the EJ&E, gather information from each of them (land use and zoning maps, population and employment figures, current and projected development), as well as to ascertain each community's desired potential station site location. Finally, a determination of the general feasibility of providing commuter service is provided in the form of final recommendations.

2.0 EXISTING CONDITIONS

This section of the report documents the physical and operating characteristics of the potential route. This initial step was critical to the consideration of instituting commuter rail service, since it provides an early indication of what new capital facilities might be required to operate new commuter rail service. An inventory and assessment was made of the existing physical plant, including track (rail, ties, subgrade, and geometry), track-side signal system, interlockings, at-grade crossings, and bridges (grade separations). Current land uses, environmental features, utilities, freight operations, and public transportation services were also discussed. The inventory of existing railroad conditions was based on existing documentation available from Metra and the EJ&E freight railroad (such as track charts and timetables), as well as a field review of the rail line and surrounding environs.

The rail line was divided into three segments for purposes of discussion and data compilation. These three segments do not necessarily represent potential candidate segments (as they are defined) for implementation of commuter service, but are logical dividing points for discussion purposes. They are divided as follows:

- Segment 1: Waukegan to Spaulding (junction of the EJ&E and MD-W lines – MP 74.0 to MP 37.5, approximately 36.5 miles).
- Segment 2: Spaulding to Joliet (MP 37.5 to MP 0.0, approximately 37.5 miles), and Plainfield to Shorewood (MP 9.9 to MP 17.2, approximately 7.3 miles).
- Segment 3: Joliet to Lynwood (MP 0.0 to MP 30.9, approximately 31 miles).

Metra sought direct input from each municipality in the study area regarding interest in sponsoring a station. Narrative descriptions of these potential station sites are provided in Appendix M, along with their general locations on study-area maps. The communities in the study area have a vested interest in selecting the station sites, and have had the opportunity to review, evaluate and offer comments on this Phase I report. Transfer stations at intersections with existing Metra service are also suggested. Station-site selection is a dynamic process that will continue to evolve throughout the series of rail corridor evaluation studies. The report also provides a general overview of land use in the study area.

In general, there were no "fatal flaws" revealed which would preclude commuter service from being implemented along the EJ&E Railway. With a few exceptions, based on Metra's initial discussions with local officials, community support for commuter service was very enthusiastic. However, there are several upgrades to the existing physical plant (i.e., track, ties, turnouts, signals, and structures) which would be recommended in order to provide for safe and efficient commuter rail service. At this point in time, none of the information that was generously supplied by the EJ&E should be taken to imply sponsorship or support of the OCS concept by the EJ&E Railway. Also, the critiques provided in this section of the report are not intended to portray or imply in any way that the current EJ&E physical plant and infrastructure is in substandard condition for operating their freight service.

3.0 FUTURE PLANS

The communities provided input regarding future development plans and concepts, in particular noting any interest in transit-oriented developments and how the new service could be an important component of each community's plans for the future. This section also includes present and projected demographic and socioeconomic characteristics. Information on the municipalities in the study area was obtained from the Northeastern Illinois Planning Commission (NIPC) for population and household forecasts, the 1990 U.S. Census for employment and other socioeconomic factors, and the municipalities themselves. Ridership potential was assessed based on existing and future population and employment trends along the EJ&E Corridor (six miles in width).

Future plans of the EJ&E and other State and Regional agencies are also included in this section. The EJ&E projects an increase in freight train traffic in the near future, consistent with the fairly recent resurgence of the railroad industry. EJ&E management indicated that specific long-term levels of freight traffic are difficult or impossible to predict at this time, but they will need to retain their existing trackage and other infrastructure to conduct their future business. This situation could require Metra to create its own parallel infrastructure in order to consider implementation of any potential new commuter service.

Based on the data currently available, it would appear that there is some potential for Outer Circumferential Service to be viable. However, more detailed analyses, particularly travel demand forecasts performed using sophisticated computer modeling, remain to verify what are now only presumptions based on broad-scope regional and EJ&E Corridor projections.

4.0 POTENTIAL OPERATIONS

In order to be able to estimate potential capital costs, it was necessary to make some assumptions in general terms about how an OCS would operate. Preliminary operating plans were developed for each of the three segments. The assumed operating parameters are summarized below:

- The potential service would operate on weekdays from 6 a.m. to 12 midnight. Trains would operate hourly in each direction, except during peak periods. During the three-hour morning and evening peak periods, service would operate on 30-minute headways in each direction.

- Commuter service would utilize either conventional rolling stock (diesel locomotives with passenger coaches) or diesel multiple units (DMUs), with the number of train sets dependent upon the eventual service segment or segments and final level of service proposed for start-up implementation.

- Potential community station locations come from meetings and discussions held with officials from each community, and are subject to change in future Study phases. Potential commuter station sites (including station buildings, parking lots, and other associated site improvements) would be funded, constructed, maintained, and operated by the host communities.

- Train equipment would be stored and maintained at new layover facilities. The number and location of these layover facilities is dependent upon the eventual service segment or segments implemented. In addition, a new heavy maintenance facility would be constructed. The location of this facility also would be dependent upon the eventual service segment or segments implemented.

- Commuter service would be operated through a trackage-rights agreement. Trackage-rights would generally entail a fixed fee for Metra to operate over tracks maintained by the EJ&E, plus possible performance incentives for efficient dispatching and on-time performance. The exact nature of any service agreement would be subject to negotiation and agreement between Metra and the EJ&E.

As part of this Study, two types of potential stations (park-and-ride and transfer-only) were noted. This section of the report outlines the possibilities, including how an OCS commuter might utilize transfer stations and the associated implications of such transfers on Metra's existing rail lines. There is also a brief discussion regarding the possibility of interline operations, i.e., routing trains between the proposed OCS and existing rail lines to reach selected destinations. Detailed capacity operational analyses to examine the feasibility of commuter transfers and through-train service possibilities would occur in future Study phases.

In addition, EJ&E management stated that their track capacity would be needed for present and future operations. This would require Metra to construct one or more separate and virtually exclusive tracks for commuter train operations, thereby allowing EJ&E exclusive use of their present physical plant without interference from Metra commuter operations. However, numerous potential operating issues were raised, such as the ability of EJ&E to service industries on the "Metra side" of the right-of-way, the potential need at some locations for four parallel tracks (mains and passing sidings) within the EJ&E right-of-way, and modified Metra station designs including platforms, stations and parking available only on the "Metra side". For these reasons it was proposed that freight and commuter trains could operate together on the mostly single-track EJ&E, at least for the initial service, with Metra passing sidings separate from (i.e., interspersed between) EJ&E passing or storage sidings. However, to address the very real possibility of providing the necessary infrastructure for Metra operations that would be separated from the EJ&E's freight operations, and assuming that the potential "problems" mentioned above could be overcome, the EJ&E management's request for a second and/or third main track (single- or double-track Metra-exclusive physical plant) must be examined in subsequent phases of the overall OCS Feasibility Study.

5.0 CAPITAL IMPROVEMENTS

There are several upgrades to the existing physical plant (i.e., track, ties, turnouts, signals, and structures) which would be recommended in order to provide for safe and efficient commuter rail service. Again, keep in mind that the <u>required improvements presented in this section are considered necessary to operate commuter trains efficiently, and are not intended to portray or imply that the current EJ&E physical plant and infrastructure is in substandard condition for operating their freight service.</u> The condition of the rail itself presents the most significant problem with the existing track. The amount of existing defects, as well as older sections of rail, would require a significant amount of replacement of the existing rail. Also, a large portion of the line (approximately 36.5 miles) is currently not signalized. Installation of new signals on this segment, and signal upgrades on the remainder of the line, would be required.

Modifications would also be recommended for the Joliet Yard in order to create a new bypass track(s) for commuter trains. Another constraint on the system is the lift bridge over the Des Plaines River at the west end of the rail yard. This area is currently a bottleneck on the system, and it is recommended that the bridge be avoided by creating a new parallel bridge for OCS trains only. Layover facilities for overnight train storage would need to be constructed at each end of the OCS route, as well as a new heavy maintenance facility to service this line since existing Metra facilities are at or near capacity. Station and parking facilities would be newly constructed. Some land acquisition would likely be necessary, particularly for park-and-ride stations or right-of-way, but determination of specific locations and costs would come in later Study phases.

The potential of using diesel multiple units (DMUs) to operate the OCS was also examined. DMUs are self-propelled diesel-powered rail cars, capable of operating as single units or in train sets of up to ten cars. They are ideally suited for high-volume peak-period ridership and lower-volume off-peak ridership, due to the relative ease of reconfiguring train sets and the ability for each unit to operate independently. Several foreign manufacturers have begun development of new DMUs that have been designed to conform to FRA requirements. It is not known when production of such units would make the DMUs available, but it is estimated that their probable cost would be considerably higher than the cost of conventional train sets..

Potential capital expenditures include new or upgraded rail, roadbed and ties, new bridges for additional track(s), related signal systems including interlockings, rebuilt grade crossings, modifications to Joliet Yard, new storage and maintenance facilities, and new rolling stock. Also included are a general assumption of commuter station costs, which cannot be further defined until ridership forecasts allow more specific information on parking needs, depot sizes, and platform lengths.

Estimated capital costs for the entire potential EJ&E/OCS route vary considerably, depending upon different operating scenarios and their resultant physical plant requirements, as well as the type of rolling stock anticipated to be utilized. The cost estimate to operate with DMUs in each scenario is $33 million higher due to expected higher equipment costs. For comparison, capital costs were developed for two single-track scenarios. The first would have Metra OCS trains run jointly with EJ&E freight trains on an upgraded line with additional passing sidings. The second, per an expressed desire from EJ&E management, would provide separated operations with OCS trains on a parallel Metra-exclusive single track. Using conventional equipment, the comparative cost estimates were $605.7 million and $873.6 million, respectively. Estimated capital costs per mile over the entire length of the potential OCS route ranged between $5.4 and $7.8 million.

Finally, Metra's experience with single-track operations on portions of its system indicates that either design might not be completely reliable in terms of efficient on-time performance. For example, scheduled train meets must be timed rather precisely so that two trains operating in opposite directions on the single track will meet at the designated passing point. If there are delays for any reason to either of the trains, one train must wait on the siding until the other arrives. Consequently, a double-track Metra-exclusive scenario was also developed to estimate its comparable capital cost. The separated single-track OCS route option has an estimated capital cost of $873.6 million. If a double-track operation would be deemed necessary, the estimated capital cost could rise as high as $1,314.2 million ($11.7 million per mile). Further studies, particularly the line capacity analyses, should help to resolve Metra's potential physical plant requirements.

	Total Estimated Capital Cost / Type of Rolling Stock	
Potential Operating Scenario	**Conventional**	**DMUs**
Single Track / Joint Running with EJ&E	$605.7 million	$638.9 million
Single Track / Separated Metra Operation	$873.6 million	$906.8 million
Double Track / Separated Metra Operation	$1,314.2 million	$1,347.4 million

6.0 RECOMMENDATIONS

Based on the results of this Study, further analysis of the entire EJ&E Railway Corridor as a potential OCS route is recommended. <u>It should be understood that this conclusion and recommendation is qualified based on the findings in this Study phase alone, and does not account for any "unknowns" that may emerge from more detailed studies. Furthermore, at the present time the results of this Study phase cannot and should not be construed as indicating that the EJ&E/OCS route will be considered operationally viable or even desirable at the completion of the remaining Study phases.</u> Specific areas recommended for further study are summarized below:

Major Investment Study: In order to determine if commuter rail service along the EJ&E Railway is the best transportation investment for this corridor, it is recommended that a Major Investment Study (MIS) be undertaken. The MIS process provides a framework for informed and collaborative decision-making on major transportation improvements for a metropolitan area. [<u>Note that in TEA-21, the successor to ISTEA, the terminology has changed but the function remains similar.</u>]

Service Segments: Based on ridership projections conducted in either an MIS or Phase II Feasibility Study, an analysis of the EJ&E Corridor can be performed to determine which segment or segments are best supported by the projected ridership. It is most likely that projections would not justify implementation of the entire rail line initially, but rather a segment or segments (perhaps even two discontinuous portions) of the rail line. After service segment(s) are determined, line capacity analyses and more detailed analyses of the necessary physical plant upgrades can be performed.

Rail Facilities: Depending upon the service levels to be provided for the determined service segment(s), new rail support facilities may or may not be constructed. Construction of new layover facilities for overnight storage and light maintenance of train sets would most likely be required. However, at least initially, daily inspections and heavy maintenance could perhaps be performed at one of Metra's existing facilities. Thus, the large capital investment for a heavy maintenance facility could be deferred until the number of train sets operating on the OCS justify this expenditure.

Rolling Stock: The opportunity exists for the use of alternative rolling stock (DMUs) on this line. DMUs are ideally suited for high-volume peak-period ridership and lower-volume off-peak ridership, due to the relative ease of reconfiguring train sets and the ability for each unit to operate independently. The proposed cars have been designed, but it is not known when production of such units would make the DMUs available. When a prototype is built, it will still need to be FRA-tested to ensure compliance with existing rail car standards. At this point of the overall Feasibility Study, conventional rolling stock would probably make the most sense for the potential start-up OCS segment along the EJ&E, subject to change if subsequent Study phases point to their utility and availability.

Commuter Transfers: While the potential for transfer to every one of Metra's existing radial commuter lines is present, more detailed analyses of operations and schedules would have to be done to determine if transfers are feasible. It is recommended that two or three of the radial lines be selected initially (based on service levels and flexibility in existing schedules) as test lines for demonstration of commuter transfers. After a review of the actual operation of these transfer facilities, a decision could be made regarding continuation, elimination, or expansion of transfer stations to other radial lines.

Interline Operations: Future studies will determine if it is operationally feasible for Metra trains to be physically routed onto the EJ&E for through service to selected destinations. If the switching of trains between rail lines should become a recommended mode of operation, additional connecting tracks may need to be upgraded or newly constructed. This idea has not received the same attention that commuters transferring between existing Metra lines and the OCS has had, and would require considerable study.

Vanpool and Feeder Bus Services: Since the EJ&E would serve a unique market, when compared with the market traditionally served by Metra, ridership may be closely linked to the ability of commuters to travel conveniently from their destination train station to their place of employment. It is therefore recommended that close coordination be undertaken with Pace and major employers along the EJ&E in order to plan convenient transportation (vanpools, feeder-bus service) from the destination train stations to major employment centers.

Land Use Planning: Another component recommended for the next phase of this Study is a review of proposed land uses surrounding the potential station sites. Working with the communities, land uses surrounding each community's station site should be conceptually planned to include those types of developments that traditionally support commuter rail service. Appropriate land uses and Transit-Oriented Development (TOD) in areas surrounding commuter rail stations could generate ridership from residential areas and attract ridership to local business and commercial destinations.

Environmental Impacts: A full study of all environmental issues [at least an Environmental Assessment (EA)] would be performed during later phases of the overall OCS Feasibility Study. After locations of stations, sidings, and any other improvements are identified, a field review would be performed to delineate wetlands and floodway/floodplain elevations at or near these locations and ensure that no potential for encroachment exists. Any proposed improvements that lie within a wetland or floodway/floodplain would need to be relocated to avoid impacts and any unavoidable impacts to wetlands and floodway/floodplain would require that steps be taken to minimize or mitigate these impacts.

Ridership Projections: Future phase studies would require computer-generated travel demand forecasting. NIPC forecasts, trip-making origins and destinations, and modal-opportunities scenarios would be combined and tested by instituting hypothetical land-use concentrations, or configurations including feeder and reverse-feeder bus routes, to enhance the results. Line capacity analyses would determine financially and operationally feasible segment(s) that could be implemented with relative ease, which then could be matched with the most desirable ridership-producing segment(s). Ridership projections will also be influenced by the number of stations that have retained their community support and received concurrence from the EJ&E.

Regional Benefits: If physical and cost-effective viability continue to be demonstrated in future phases of this Feasibility Study, regional and subregional benefits would be expected to result from the implementation of new commuter rail service. Overall benefits to the region compared with other new transportation improvements would include minimal environmental impacts, a more energy-efficient mode of transportation, steps towards achieving air quality attainment measures, and enhanced mobility in the region by offering reduced travel times. By initiating new commuter service, an opportunity is also opened for many communities to limit or contain urban sprawl by encouraging Transit-Oriented Development. Possible land uses at or near the potential OCS commuter stations could include higher-density housing with new commercial, business/office, and light industrial development that would support the commuter service.

1.0 INTRODUCTION

The Elgin, Joliet and Eastern Railway (EJ&E) is an existing freight line which runs as a circumferential route through portions of Cook, Will, DuPage and Lake Counties. The route makes an arc with an approximate radius of 35 miles from the center of Chicago (see map in Section 1.3). This corridor, which once defined the farthest limits of "Chicagoland", is now surrounded by established suburbs as well as new development.

1.1 STUDY-AREA DESCRIPTION

The Outer Circumferential Service (OCS) study area encompasses the EJ&E route and surroundings, an area about 105 miles long and 10 miles wide, centered along the rail line. (Note: A six-mile-wide corridor was used for the population and employment "corridor of influence", but a ten-mile-wide corridor was used for determining and evaluating existing land uses, potential environmental concerns, etc. in order to assess any potential major influences to rail service from the fringes of the six-mile-wide corridor.) The EJ&E crosses all of Metra's eleven existing commuter lines [including Norfolk Southern (NS) tracks for the extension of the SouthWest Service but excluding the Northern Indiana Commuter Transportation District's (NICTD's) South Shore Line], as well as most of the major expressways that serve the Chicago metropolitan area. Appendix A has a map of the EJ&E's location in Chicagoland and a list of all communities along the route.

Land uses along the EJ&E Corridor include residential, industrial, commercial, office, agricultural and green space. Communities along the corridor range from largely residential to a mix of residential, commercial and office uses. Many of the still-developing communities have designated or planned industrial or office parks, concentrating numerous businesses in one area of their community. These types of concentrated densities may provide a pool of potential passengers for commuter service on the EJ&E to serve the suburb-to-suburb market, in addition to the traditional suburb-to-Chicago market via transfer to existing Metra lines. It is envisioned that there may be three different commuting patterns likely to occur on the EJ&E:

- travel along the EJ&E from one suburb to another;
- travel along the EJ&E to a transfer station for travel to downtown Chicago along an existing Metra commuter line; and
- travel along an existing Metra line with transfer to the EJ&E for travel to destinations along another Metra line or along the EJ&E line.

1.2 PURPOSE OF THE STUDY

The purpose of this feasibility study is to evaluate the potential of an OCS along the EJ&E Railway. The Study is intended to provide a broad-brush analysis of the physical and operational feasibility of providing commuter service along all, or some segments of, this rail corridor. The Study of the physical feasibility includes an examination of existing conditions, including:

- the EJ&E physical plant (rail, signal systems, capacity);
- at-grade crossings and bridges/structures (railroad overpasses and underpasses);
- land use and development (existing and proposed) adjacent to the rail line;
- environmental impacts and concerns;
- existing and proposed roadway networks and/or improvements to them; and
- connection with other transit systems (Metra, Pace, van pools, etc.).

The study of the operational feasibility examines freight movements along the EJ&E and at crossings with other freight railroads, as well as Metra commuter train movements over crossings with the EJ&E. Three segments of approximately equal length were delineated to compile all of the data on the railroad and many other factors within the study area. Order-of-magnitude cost estimates were prepared as part of this Study to provide a basis for financial evaluation of the recommended corridor service. Finally, the Study also determined adjacent communities' interest in commuter service on the EJ&E as well as asking their desires for potential station locations. At the completion of the Study, recommendations are made regarding whether or not to pursue further studies of this rail line. These further studies may include:

- Preparation of an Environmental Assessment or Major Investment Study to determine and plan mitigation for corridor-wide and site-specific impacts.
- Phase II Feasibility Study to determine and/or evaluate ridership demand estimates, environmental impacts, site studies, refined cost estimates and line capacity analyses.
- Pre-Implementation Studies to review financial feasibility, funding availability, host railroad support, and formalization of local community support.

1.3 PROJECT BACKGROUND

The EJ&E Railway was originally conceived and developed in the late 1800s as a freight railroad to serve the industries of Joliet and other satellite cities, and to provide a bypass around the busy Chicago rail yards. For a very short period (late 1880s to 1907) it offered formal passenger service between Aurora and Joliet. Since that time, the transportation patterns of the Chicago metropolitan area have evolved from a system focused solely on commuting to or within the central city core to increasing reverse-commutes from the City and continually growing suburb-to-suburb commuting patterns. This has resulted from development of the extensive highway system, multi-car families, the development of reduced-density living patterns and the relocation of many employers from the City to suburban areas. The Northeastern Illinois Planning Commission (NIPC) has forecasted continuing high levels of growth for the entire suburban region. As a result of this growth, Metra has identified the need to enhance its current system to meet the changing demands of the ever-growing Chicago metropolitan region. As the EJ&E Railway traverses nearly all of the areas of ongoing and projected growth, this rail line is a logical focal point of studies to serve this demand.

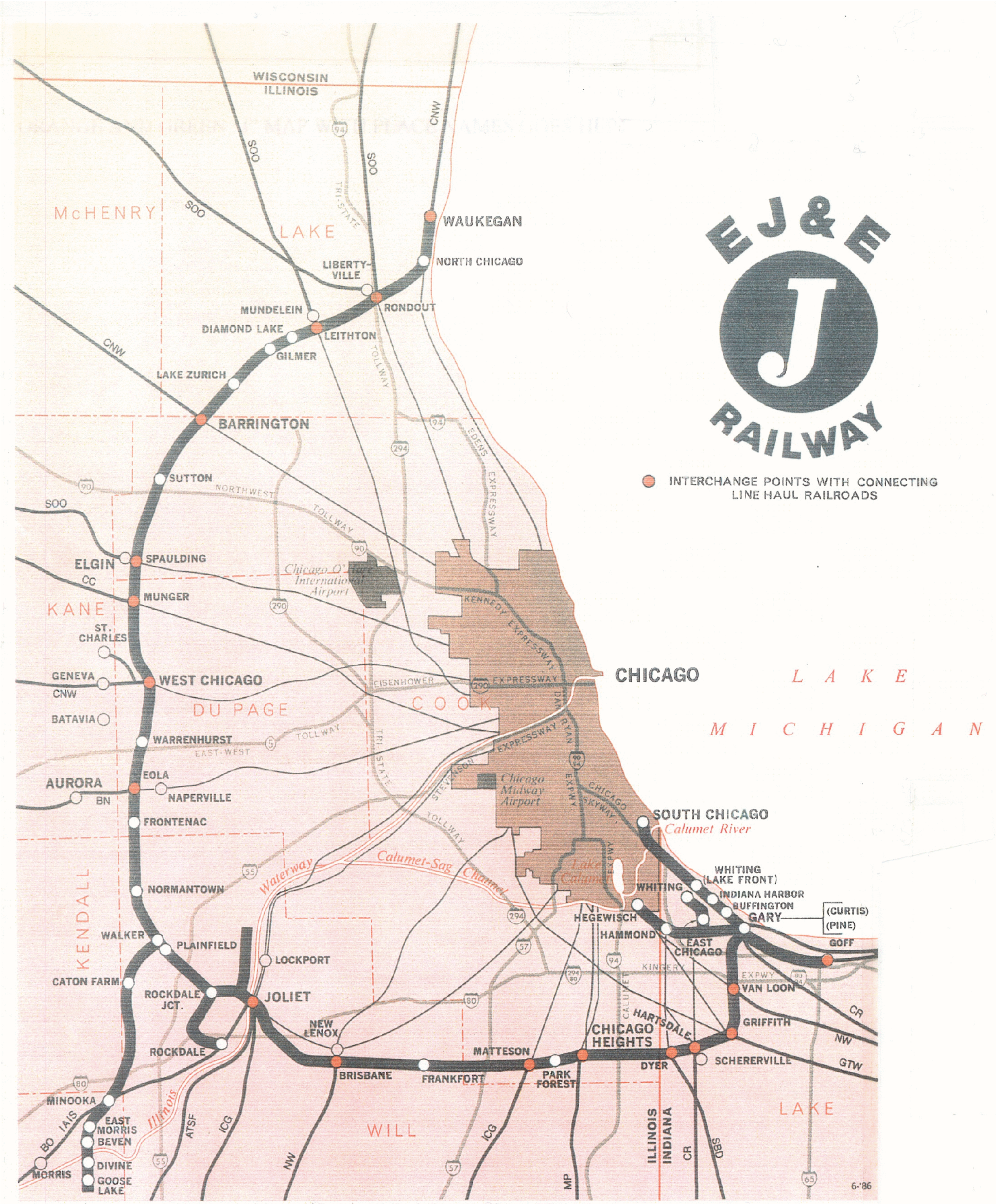
In 1987, a proposal for commuter rail service on the EJ&E Railway was included in Metra's document, A Proposal for an Expanded Planning Framework at Metra. The entire EJ&E route within Illinois, from Waukegan to the Illinois/Indiana border, was included among seventeen future corridors of opportunity. Metra also proposed the EJ&E's incorporation as a "Corridor of the Future" in the region's previous official transportation plan, the 2010 Transportation System Development Plan (2010 Plan), developed by the Northeastern Illinois Planning Commission (NIPC) and the Chicago Area Transportation Study (CATS). "Corridors of the Future" were included in the plan specifically for right-of-way preservation, as well as to provide regional and local planners with a base for use when examining area development. The 2010 Plan included the Illinois portion of the EJ&E.

In May 1990, partly in response to the announced move of the Sears Merchandising Group to Hoffman Estates, Metra undertook an investigation of the potential use of the EJ&E as an inter-suburban transit corridor. At that time, Metra issued a report called the Outer Circumferential Corridor: Project Proposal (May 1990), which suggested that the segment of the EJ&E that would serve the most commuters, and was physically implementable at reasonable cost, extended from the Burlington Northern Line (now Burlington Northern Santa Fe) in Aurora to the Chicago and NorthWestern (now Union Pacific) Northwest Line in Barrington. Evaluation included potential station sites, capital costs and operating expenses. Later, this report was updated in Project Status Report #1 (October 1990). The update added information on cost estimates, service options and consideration of self-propelled rail cars for the rolling stock. The possibility of a longer corridor, from Waukegan to Joliet, was also suggested and preliminary station locations were identified. This expanded corridor was 75 miles in length and connected with eight existing Metra lines.

In April 1992, Metra and Pace published the Future Agenda for Suburban Transportation (FAST) in which they offered an aggressive public transportation package for suburban residents. Metra's portion of that document, the Extended Transportation Agenda (EXTRA), included both the upgrading and potential extensions of existing commuter rail routes as well as the development of two new commuter rail routes. In this document, the EJ&E was presented as the first potential commuter rail line to accommodate the suburb-to-suburb travel market. This report also noted that the circumferential layout of the EJ&E line resulted in rail crossings of all eleven Metra radial (Chicago-CBD-oriented) rail lines, which would make transfer options available to commuters in several directions. Multi-route rail trips could then be possible on segments of radial lines linked by travel on the EJ&E. The report described both the 28-mile Aurora-to-Barrington route and the 75-mile Joliet-to-Waukegan route, along with potential station locations and interchange points with existing Metra commuter lines.

The initiative for this Phase I Feasibility Study of the EJ&E comes from the combined efforts of the South Suburban Mayors and Managers Association, the Will County Governmental League, the DuPage Mayors and Managers Conference, the Kane County Council of Mayors, the Lake County Council of Mayors and the Northwest Municipal Conference. This group, collectively referred to on this project as "the Mayors", is seeking transportation systems to meet the growing suburban travel demand. Representatives of this group served as the Steering Committee for this Study. A Technical Advisory Committee was comprised of representatives of the Regional Transportation Authority (RTA), Chicago Transit Authority (CTA), Pace, Chicago Area Transportation Study (CATS), Northeastern Illinois Planning Commission (NIPC), and Illinois Department of Transportation (IDOT).

The OCS route has only recently been made part of the 2020 Regional Transportation Plan (2020 RTP). In the process, an undefined 50-mile segment (no specific terminal points) was tested for potential ridership, and has now been made a component of the Region's newest long-range transportation plan. Future OCS Study phases will determine where the most viable segment(s) are located.



EJ&E
J
RAILWAY
INTERCHANGE POINTS WITH CONNECTING LINE HAUL RAILROADS
WISCONSIN
ILLINOIS
McHENRY
LAKE
KANE
DU PAGE
COOK
KENDALL
WILL
LAKE
LAKE MICHIGAN
WAUKEGAN
NORTH CHICAGO
LIBERTYVILLE
RONDOUT
MUNDELEIN
DIAMOND LAKE
LEITHTON
GILMER
LAKE ZURICH
BARRINGTON
SUTTON
ELGIN
SPAULDING
MUNGER
ST. CHARLES
GENEVA
WEST CHICAGO
BATAVIA
WARRENHURST
AURORA
EOLA
NAPERVILLE
FRONTENAC
NORMANTOWN
WALKER
PLAINFIELD
LOCKPORT
CATON FARM
ROCKDALE JCT.
JOLIET
ROCKDALE
NEW LENOX
BRISBANE
FRANKFORT
MATTESON
PARK FOREST
CHICAGO HEIGHTS
DYER
HARTSDALE
SCHERERVILLE
GRIFFITH
VAN LOON
GOFF
GARY
(CURTIS)
(PINE)
BUFFINGTON
INDIANA HARBOR
WHITING (LAKE FRONT)
WHITING
EAST CHICAGO
HAMMOND
HEGEWISCH
SOUTH CHICAGO
Calumet River
CHICAGO
Chicago O'Hare International Airport
Chicago Midway Airport
MINOOKA
EAST MORRIS
BEVEN
DIVINE
GOOSE LAKE
MORRIS
ILLINOIS
INDIANA
6-'86

2.0 EXISTING CONDITIONS

This section of the report discusses the existing conditions of the rail corridor. The rail line has been divided into three segments for data collection and discussion. These three segments do not necessarily represent potential candidate segments (as they are defined) for implementation of commuter service, but are logical dividing points for discussion purposes. Actual development of potential route options will be determined based on ridership projections and detailed fixed-facility cost estimates (based upon results of the line capacity analyses), which will occur in future studies. All railroad data, as well as land uses and demographics, are compiled by segment. Note that Segments 1 and 2, as listed below, comprise EJ&E's Western Subdivision, while Segment 3 is EJ&E's Eastern Subdivision.

- Segment 1: Waukegan to Spaulding (junction of the EJ&E and MD-W lines – MP 74.0 to MP 37.5, approximately 36.5 miles).
- Segment 2: Spaulding to Joliet (MP 37.5 to MP 0.0, approximately 37.5 miles), and Plainfield to Shorewood (MP 9.9 to MP 17.2, approximately 7.3 miles).
- Segment 3: Joliet to Lynwood (MP 0.0 to MP 30.9, approximately 31 miles).

References to direction are by timetable, i.e., the EJ&E runs "west" from Joliet even though the tracks run northwest, north, and finally northeast. The list below notes abbreviations used for railroads in this report:

Abbreviation	Railroad
BNSF	Burlington Northern Santa Fe
CA&E	Chicago, Aurora and Elgin Railway (defunct)
CCP	Chicago Central & Pacific (reacquired by IC)
CHTT	Chicago Heights Terminal Transfer (operated by UP)
CN	Canadian National (Grand Trunk)
CNW	Chicago and NorthWestern (purchased by UP)
CP	Canadian Pacific (Soo Line)
CSX	CSX Transportation
IAIS	Iowa Interstate
IC	Illinois Central (purchase by CN imminent)
NICTD	Northern Indiana Commuter Transportation District (South Shore)
NS	Norfolk Southern
UP	Union Pacific
WC	Wisconsin Central

2.1 PHYSICAL PLANT

All railroads have ongoing capital improvement programs to update and maintain their facilities in their current form. These annual programs typically include rail and tie replacements, track surfacing, structure rehabilitation or replacement, and signal and communications improvements. This Study is concerned only with those changes that could affect any potential commuter rail operation on their railroad. At this point in time, none of the information that was generously supplied by the EJ&E should be taken to imply sponsorship or support of the OCS concept by the EJ&E Railway. Also, the critiques provided in this section of the report are not intended to portray or imply in any way that the current EJ&E physical plant and infrastructure is in substandard condition for operating their freight service.

2.1.1 Track

The EJ&E track bed is generally flat, and does not have any excessive horizontal or vertical curves. The Western Subdivision (Joliet to Waukegan) has more curves and grade differentials than the Eastern Subdivision (Joliet to Gary); the latter is predominantly located on slight fill in flat terrain. The subgrade is generally in good condition; however, at several locations the fill is narrow, which results in the lack of a ballast shoulder next to the rail. Also, at various locations along the line, the ditch line has partially or completely filled in with sediment, preventing proper drainage of the area. Specific problem locations along the EJ&E are noted in the following sections.

East of Matteson, from approximately MP 20.5 to the Illinois/Indiana border, the line is double-tracked. The remainder of the line between Joliet and approximately MP 20.5 was also double-tracked in the past; the second track has since been removed, but the roadbed and structures remain in place. From approximately MP 20.5 to Joliet, and west to Waukegan, the line is single-track with numerous industry spurs and directional sidings. There are also many areas along the Western Subdivision that were double-tracked in the past, but the second track has since been removed; the roadbed and structures remain in many places.

There are a considerable variety of ballast types along the existing track, including steel mill slag, limestone and trap rock. The ballast is mixed throughout the route. There are locations where track pumping (due to poor roadbed conditions, the track moves vertically under wheel loads and causes subgrade particles to travel up into the ballast) is occurring and mud is contaminating the ballast. Also, there are areas where the track is center-bound (where the track load is not evenly distributed along the tie to the ballast due to narrow or non-existent ballast shoulders). The existing tie condition is fair. It appears that the main cause of tie failure is due to age rather than mechanical failure.

There are several styles of drive-on or spring anchors installed on the track. The original EJ&E standard called for anchoring every third tie on the continuous welded rail (CWR) sections. However, current track condition shows that the anchor patterns are not to standard. Since 1992, however, all rail laid by the EJ&E has been box anchored on every other tie, as per railroad standards. The existing tie plates are 14” in length and are under most of the track. However, there are a few areas where only a single shoulder plate has been installed under the rail. All of the plates are rail-spiked only.

The condition of the rail is the most significant problem. The existing rail shows a number of limitations and defects such as soft spots and engine burns (places where the friction of the driving wheels has deformed or flattened the rail surface). Many of the defects are too deep to grind out and will cause deviations in track geometry if left in place. Portions of the previous jointed rail have been converted to CWR. However, this conversion is not complete and is not consistent throughout any section of the line. Most of the CWR was converted by gas welding, a process with which the EJ&E has found a quality problem. Although there have been no sudden ruptures, about eight weld failures a year are found during rail inspections.

Some of the rails on the line are ‘A’ rails. ‘A’ rails are subject to piping (splitting at the web of the rail due to formation of a cavity while cooling the rail during the manufacturing process). Along the straight portions of the track, all such rails were incorporated into the CWR sections, during which any defective rail would have been detected and replaced. Thus, there is minimal concern regarding defective ‘A’ rail along the straight portions of the line. However, there are segments of the line in the Eastern Subdivision which have ‘A’ rails that are not welded, generally located in the turnouts.

The existing 131# rail (131 pounds per linear yard) on the line has been a concern since it has a tendency towards split heads (longitudinal splitting of the rail head), and the majority of it is gas-welded CWR. Some 115# 1953/57 CWR remains in the segment from Waukegan to Barrington. This rail should continue to perform adequately, unless heavier train sets (e.g., unit coal trains) become more frequent.

The turnout standard for the EJ&E is typical for most freight railroads: No. 10 turnouts with 16'-6" straight switch points and a rigid bolted frog, which permit a maximum speed of 20 mph through the turnout. The "high speed turnouts" on the line are No. 16 with 25' straight switch points and a solid frog, which permit a maximum speed of 30 mph through the turnout. However, even at these locations, the EJ&E limits turnout speeds to 20 mph. The solid frogs are not protected by binder rails which could increase the potential for failure. Also, they do not conduct the signal current very well. A detailed discussion regarding existing conditions of various track elements by rail line segment follows.

2.1.1.1 Waukegan to Spaulding

Geometry

The maximum horizontal curvature on this segment of the line is 3°, with a maximum superelevation of 3", located at MP 63.3, MP 56.3, MP 48.4, and MP 47.8. The maximum vertical grade is 1%, which exists between MP 72.0 and MP 70.4.

Subgrade

There are two areas of concern in this segment. The first area is around MP 51.0, where an apparently blocked culvert has created a backwater situation which could soften the bottom of the fill. The second area is at an old derailment site through the curve at MP 55.3. It is possible that coal and/or other unsuitable materials from the derailment may have contaminated the fill. From MP 38.6 to MP 39.0, the fill is very narrow on the east side of the track, which results in the lack of a ballast shoulder next to the rail.

Ties

The tie count along this segment indicates that an average of 15% of the ties are in poor condition and would need to be replaced. The ties east of Leithton are already showing the effects of the unit coal trains, due to the increased tonnage.

Rail

As discussed previously, areas of jointed rail, gas-welded CWR, and 131# rail exist along this segment of the line, which require replacement. Below is a summary of these areas and the associated limitations:

Milepost location	Reason for replacement
MP 72.0 to MP 73.3	Jointed rail
MP 66.8 to MP 70.0	Jointed rail and soft spots in the CWR (gas-welded)
MP 64.5 to MP 64.8	Jointed rail
MP 61.2 to MP 63.6	Jointed rail and soft spots in the CWR (gas-welded)

Milepost location (continued)	Reason for replacement
MP 56.9 to MP 57.1	Jointed rail
MP 54.41 to MP 55.2	Jointed rail and soft spots in the CWR (gas-welded)
MP 52.0 to MP 53.73	Jointed rail and soft spots in the CWR (gas-welded)
MP 50.3 to MP 50.8	Jointed rail
MP 49.7 to MP 49.9	Jointed rail
MP 42.2 to MP 46.4	Soft spots in the CWR (gas-welded)
MP 41.7 to MP 42.04	Jointed rail
MP 39.2 to MP 40.41	Jointed rail and soft spots in the CWR (gas-welded)
MP 38.4 to MP 38.7	Jointed rail and soft spots in the CWR (gas-welded)

Interlockings

Upton: The single-tracked EJ&E crosses the single-tracked Union Pacific (UP) Milwaukee Subdivision at this location. The diamond is maintained by the UP and is in poor condition. The UP operates at 30 mph and the EJ&E at 20 mph through the diamond. As this crossing is in close proximity to Rondout, the EJ&E includes this crossing in the Rondout Yard limits.

Rondout: The single-tracked EJ&E crosses the double-tracked Milwaukee District-North Line (MD-N) at this location. The diamonds are maintained by the EJ&E; they were replaced in 1993 with reversible manganese diamonds. (A reversible manganese diamond has four identical insert frogs. The castings can be interchanged or reversed to equalize wear, thus increasing the service life of the frogs.) The EJ&E operates at only 20 mph through the diamond, as the warning devices at the Waukegan (Telegraph) Road crossing restrict the speed. The MD-N operates at 79/40 mph through the diamond.

Leithton: The single-tracked EJ&E crosses the single-tracked Wisconsin Central (WC) at this location. The diamond is maintained by the EJ&E; it was replaced in 1993 with a reversible manganese diamond. The EJ&E operates at 45 mph and the Wisconsin Central operates at 60/50 mph through the diamond. The condition of the diamond could accept 60/50 mph speeds both ways.

Barrington: The single-tracked EJ&E crosses the double-tracked UP-Northwest Line. The diamonds are maintained by the EJ&E; they are Pettibone-Mulligan-style solid crossings. (A Pettibone-Mulligan diamond is a solid diamond - the castings are not interchangeable. Pettibone-Mulligan is a manufacturer of these type of diamonds.) The EJ&E operates at 40 mph and the UP operates at 50/40 mph through the diamonds. The condition of the diamonds could accept 50 mph speeds both ways, but the EJ&E speed is limited based on the curve immediately east of the diamonds.

Spaulding: The single-tracked EJ&E crosses the two main lines and siding of the Milwaukee District-West Line (MD-W) at this location. The two main line diamonds (replaced in 1993) are in fair condition, while the siding diamond is in poor condition. The EJ&E operates at 45 mph through the diamonds and the MD-W operates at 70/45 mph.

2.1.1.2 Spaulding to Joliet

Geometry

The maximum horizontal curvature on this segment of the line is 3°30', with a maximum superelevation of 3.5", located at MP 12.9. The maximum vertical grade is 0.78%, which exists between MP 1.25 and MP 0.9.

Subgrade

There are five areas of concern in this segment. The first location is the ditch line under the North Avenue bridge (approximately MP 31.8), which has partially or completely filled in with sediment, preventing proper drainage of the area. The second location is at the former Kerr McGee plant at West Chicago (approximately MP 28.3). The soil under the existing main line appears to be contaminated with hazardous material, which should be removed during the ongoing EPA cleanup of the Kerr McGee plant (this is a superfund site). The third location is just south of the Roosevelt Road bridge (approximately MP 27.9). A washout was repaired here in 1996; continued monitoring of the embankment is warranted. The fourth location is adjacent to the bridge over the Burlington Northern Santa Fe (BNSF) at Eola (approximately MP 21.3), where the fill on the east side of the track is very narrow. This results in the lack of a ballast shoulder next to the rail. Lastly, the curve between MP 1.5 and MP 1.2 runs through a cut section that may be unstable due to water pockets.

Ties

The tie count along this segment indicates that an average of 20% - 25% of the ties are in poor condition and would need to be replaced. The ties in this section are already showing the effects of the unit coal trains, due to the increased tonnage. However, tie replacement by the EJ&E in 1997 between West Chicago and Joliet reduced the amount of ties in poor condition to approximately 10% - 15%.

Rail

As discussed previously, areas of jointed rail, gas-welded CWR and 131# rail exist along this segment of the line, which require replacement. Below is a summary of these areas and the associated limitations:

Milepost location	Reason for replacement
MP 35.0 to MP 35.2	Jointed rail and soft spots in the CWR (gas-welded)
MP 33.2 to MP 34.2	Jointed rail
MP 31.0 to MP 31.8	Jointed rail on main line
MP 29.2 to MP 31.8	Jointed rail on siding
MP 29.0 to MP 30.2	Jointed rail on main line
MP 23.2 to MP 23.8	Jointed rail
MP 18.6 to MP 19.2	Soft spots and poor welds in the CWR (gas-welded)
MP 14.6 to MP 15.9	Soft spots in the CWR (gas-welded)
MP 13.2 to MP 14.6	Soft spots in the CWR (gas-welded)
MP 12.45 to MP 12.6	Soft spots in the CWR (gas-welded)
MP 9.9 to MP 10.6	Soft spots in the CWR (gas-welded)

Milepost location (continued)	Reason for replacement
MP 0.7 to MP 2.31	Soft spots in the CWR (gas-welded)
MP 2.92 to MP 4.07	Soft spots in the CWR (gas-welded)
MP 4.68 to MP 5.61	Soft spots in the CWR (gas-welded)
MP 7.82 to MP 8.7	Soft spots in the CWR (gas-welded)

Turnouts

At West Chicago, the siding switch at MP 29.2 is located in a curve, which slows maneuvering to the siding. Other than this limitation and those previously noted, no significant issues were identified by the EJ&E or during field review.

Interlockings

West Chicago: The single-tracked EJ&E crosses three main tracks of the UP-West Line. The diamonds were replaced in 1993 with reversible manganese diamonds. The EJ&E operates at 30 mph and the Union Pacific-West Line (UP-W) at 35/25 mph through the diamonds.

Bridge Junction: The bridge interlocking covers three switches and the lift span bridge over the Des Plaines River. The BNSF interchange track is located at the east end of the lift span and is within the interlocking limits. The operating speed through the interlocking is 10 mph, which is included in the Joliet Yard limits. This area is currently a bottleneck due to the amount of movements occurring on the single track through this interlocking. Although the bridge normally remains raised--and is lowered approximately fifteen times a day for train movements--river traffic periodically impedes the lowering of the bridge, thus compounding the congestion problem.

2.1.1.3 Joliet to Lynwood

Geometry

The maximum horizontal curvature on this segment of the line is 3°, with a superelevation of 1.15”, located at MP 1.3. The maximum superelevation along this segment is 2” in a 2° curve, located at MP 20.6, MP 21.2 and MP 25.9. The maximum vertical grade is 0.87%, which exists between MP 8.2 and MP 8.5.

Subgrade

There are two areas of concern in this segment. The first area is the curve between MP 1.8 and MP 3.2, which is partly in cut and side-bank fill. After retirement of the second main track through this area, the alignment of the single track was transitioned from the eastbound alignment to the westbound alignment through a curve. Therefore, part of the alignment is through the area previously between the two tracks, which has an unstable subgrade. The second area is the reverse curve between MP 11.2 and MP 11.5, where the single track was also realigned from the old eastbound alignment to the westbound alignment. The same concern exists here also.

Ties

The tie count along this segment indicates that an average of 25% - 30% of the ties are in poor condition and would need to be replaced.

Rail

As discussed previously, areas of jointed rail, gas-welded CWR and 131# rail exist along this segment of the line, which require replacement. Below is a summary of these areas and the associated limitations:

Milepost location	Reason for replacement
MP 4.7 to MP 14.9	Soft spots in the CWR (gas-welded)
MP 11.6 to MP 14.6	Soft spots in the CWR (gas-welded) - siding
MP 18.7 to MP 19.4	Soft spots in the CWR (gas-welded)
MP 20.4 to MP 24.2	WB main: Jointed rail and soft spots in the CWR (gas-welded)
MP 21.4 to MP 21.8	EB main: Jointed rail
MP 26.2 to MP 31.0	WB main: Soft spots in the CWR (gas-welded)
MP 26.8 to MP 31.0	EB main: Soft spots in the CWR (gas-welded)

Interlockings

East Joliet: The double-tracked EJ&E crosses the double-tracked Rock Island District (RID) at this location. The RID operates at 40/30 mph through the diamonds. The EJ&E operates at 10 mph through the diamonds, as the crossing is within the Joliet Yard limits. The diamonds are old-design solid manganese.

Chicago Heights: The double-tracked EJ&E crosses the double-tracked UP/Chicago Subdivision at this location. The reversible manganese diamonds are maintained by the EJ&E and are in good condition. The EJ&E operates at 10 mph through the diamonds. The UP operates at 40 mph through the diamonds.

2.1.2 Structures

Most grade-separated rail crossings consist of single- or double-span bridges. These bridges range in age from relatively new to 80+ years. The majority of these bridges were constructed prior to 1941; most are steel superstructures on concrete abutments. Cursory examination shows that their condition is usually good, with most requiring no work or only minor repairs and/or repainting. Some of these bridges show signs of marginal clearance over the roadway, based on apparent vehicle damage to the superstructure. The bridge at Eola over the BNSF tracks has cracked abutment bearings and it appears that the deck is shifting to the south and pushing against the south abutment. A complete list of structures can be found in Appendix B.

The roadway overpasses are typically reinforced concrete structures. These bridges were built between 1922 and 1987. Their condition ranges from nearly new to requiring minor repairs and/or repainting. The only two exceptions to this are the Algonquin Road (IL 62) bridge, which had permanent shoring towers installed during recent repairs, and the Roosevelt Road bridge in West Chicago, which is in fair to poor condition and requires deck and abutment rehabilitation and/or reconstruction.

The EJ&E crosses two major rivers: the Des Plaines River in both Libertyville and Joliet, and the DuPage River in Plainfield. The Des Plaines River bridge in Libertyville is a single-track, two-span steel structure built in 1911. The DuPage River bridge is also a single-track, two-span steel bridge built in 1924. Although the latter is currently single-track, the abutments were constructed to accommodate a second track.

In Joliet, a lift bridge spans the confluence of the Des Plaines River and Chicago Sanitary and Ship Canal as well as the BNSF tracks which run adjacent to the canal. The lift span was built in 1933, with other spans of the existing structure dating from 1906 and 1953. The lift span was built to accommodate a second track, while the abutments were built to accommodate both a second track and corresponding superstructure. This bridge is operated by remote control from the dispatcher in Gary. It normally remains in the raised position and is lowered for train movements approximately fifteen times per day. The EJ&E has indicated that there are occasional delays due to conflicts between railroad operations and river traffic.

The remaining structures along the EJ&E line consist of small bridges (less than 30’ spans) and box or pipe culverts for stream crossings and local drainage. The majority of the box-type and small-bridge structures are constructed of limestone block walls, reinforced concrete for the deck, and concrete wingwalls, with the occasional steel-and-timber bridge deck. Most appear to have been built in the 1920s and are in good condition with occasional concrete spalling (the breaking away of surface concrete). The various other pipes and culverts often have minor spalling or small cracks, but appear to be able to serve their intended function. Field inspection reveals that a few box structures and pipes appear to carry minimal or no flow due to changed conditions.

2.1.3 Right-Of-Way

The majority of the EJ&E right-of-way (r-o-w) is 100’ wide along the main line. All single track is offset from the centerline of the r-o-w (generally seven feet to the west of the r-o-w centerline), except for a length of track between Normantown and the Des Plaines River in Joliet, which is centered in the r-o-w (MP 13.0 to MP 2.0). Between Joliet and the Illinois/Indiana border, the centerline of the 100’ r-o-w is between the tracks where the line is double-tracked, otherwise the track is generally offset to the west of the centerline. At all diamond crossings with connections to other rail lines, the EJ&E r-o-w expands to include all or portions of the connecting track(s). In most cases, ownership of the connection is split between the EJ&E and the intersecting railroad. At all public roadway crossings, the EJ&E has right of passage across the road r-o-w. The EJ&E owns all of the private roadway and farm crossings which presently cross the rail line.

In a few locations, the right-of-way is greater than the 100’ standard, in most cases to accommodate a rail yard, as noted:

Location	Right-of-way width
Waukegan	125’ to 350’ wide
Rondout	125’ wide
Spaulding	200’ to 350’ wide
Eola	150’ wide
Chicago Heights-West	145’ wide

The West Chicago and Chicago Heights-East Yards are each built on 100’ r-o-w adjacent to UP and CHTT Yards, respectively, and are effectively combined with the adjacent railroads’ yards. At Matteson, the majority of the yard is within a 200’ r-o-w, with the exception of a small portion of the east end of the yard where the r-o-w narrows to 100'. The property at the main yard in Joliet has a maximum width of 2,500' and is slightly more than 4,000' in length for a total area of approximately 100 acres.

Narrow or restricted r-o-w also exists in a few locations. In Waukegan, from just south of the yard to the North Chicago city limits, the EJ&E track is on 60' r-o-w or City-owned property. In Lake Zurich, between Main Street (IL 22) and Paine Street, the west side of the r-o-w narrows to 26'. Between Normantown and Plainfield (MP 13.0 to 9.5), the r-o-w is 80' wide, but the line is bordered on the east by a 150' r-o-w for ComEd transmission towers and on the west by the abandoned r-o-w of the Aurora, Plainfield and Joliet Electric Railway.

The EJ&E also owns some large parcels of property which at this time do not appear to be used for day-to-day railroad operations. Those parcels in the vicinity of the EJ&E are listed below.

Location	Area (all acreages approximate)
Waukegan	19 acres between EJ&E and Lake Michigan, MP 72.4 to MP 72.7. This is former East Yard property of the EJ&E which has been under an option contract to a developer for several years.
Lake Zurich	38 acres southeast of tracks, located in industrial park at MP 54.2. This is EJ&E's LZ-4 site of 44 acres, located adjacent to the lead track into Exxon.
Crest Hill	170 acres mostly northeast of tracks, southeast of Gaylord and Stateville Roads, MP 5.0 to MP 6.0. This is Coynes, EJ&E's C-1 site of 168 acres.
Joliet	The EJ&E has recently retired nine or ten tracks at the south end of the Joliet Yard. The rail has been sold; after removal the land will be available for other uses. This is the former South Yard of EJ&E's East Joliet Yard.

2.1.4 Clearances

Based on review of the EJ&E clearance diagrams and track charts, existing track clearances are sufficient for typical freight operations and thus would be acceptable for commuter operations. However, there are a few places where clearance adjacent to the rails is limited. The steel shoring towers at the Algonquin Road (IL 62) overpass restricts railroad operations to the (existing) single track under the bridge.

2.1.5 Intersecting Rail Lines

As Chicago is a major rail hub and the EJ&E traverses the Chicago metropolitan area, there are quite a number of rail intersections. Some of these cross at grade, while others are grade-separated. The EJ&E crosses all of the eleven existing Metra commuter lines (including Metra's lease of NS tracks for the future expansion of the SouthWest Service) as well as every freight line which enters Chicago. The intersections, their physical condition, location of connecting tracks for freight interchange, and direction (quadrant) served are included in Appendix C.

2.2 SIGNALS AND INTERLOCKINGS

The current EJ&E signal system is designed for freight trains with a maximum speed of 45 mph. All signalization west of Spaulding (MP 37.5) has been removed, except at the interlockings. The rail crossings at Rondout, Leithton, Barrington, Spaulding, West Chicago, East Joliet (Metra RID) and Chicago Heights (UP/CSX) are all manual interlockings that are controlled by a control operator. The rail crossing at Upton is an automatic interlocking, with the signal controlled on a "first come - first served" basis. A discussion regarding existing conditions of various signal elements follows.

2.2.1 Waukegan to Spaulding

The track-side signal system has been retired through this segment of the line. The only signalization remaining is at the interlockings, which consists of approach signals located approximately one to two miles from the diamonds and absolute signals at the diamonds.

Upton: As the Upton and Rondout interlockings are in close proximity, the EJ&E includes both in the Rondout Yard limits. The Upton interlocking is automatically controlled (operates on a "first come - first served" basis). The UP is responsible for maintenance of the diamond and signals.

Rondout: The Rondout interlocking is manually controlled by a tower operator on duty 24 hours per day. As noted above, this interlocking is included in the yard limits. The EJ&E is responsible for maintenance of the diamonds, while the CP and Metra share responsibility for maintenance of the signals and auxiliary items (turnouts, crossovers, etc.).

Leithton: The Leithton interlocking is remote-controlled by the Wisconsin Central dispatcher at Stevens Point, Wisconsin. The EJ&E is responsible for maintenance of the diamond and their signals, while the WC is responsible for maintenance of their signals and auxiliary items (turnouts, crossovers, etc.) on their track.

Barrington: The interlocking at Barrington is manually controlled by an EJ&E operator on a part-time basis. The interlocking operates in fleet mode when the operator is off-duty. (Fleet mode means that the signals are set to automatic on the UP-Northwest Line, while the EJ&E cannot cross without the operator returning and resetting the signals.) The EJ&E is responsible for maintenance of the diamonds and signals.

Spaulding: The Spaulding interlocking is remote-controlled by the Metra operator at Tower B-17 in Bensenville. The EJ&E is responsible for maintenance of the diamonds, while the CP and Metra share responsibility for maintenance of the signals and auxiliary items (turnouts, crossovers, etc.).

2.2.2 Spaulding to Joliet

Along this segment of the line, the signal system is ABS (Automatic Block Signaling), with an average signal-block length of approximately one mile. However, the connecting tracks from the EJ&E to the BNSF at Eola (located in the northwest and southwest quadrants) are currently not signalized. At the Joliet Yard, trains entering and leaving obtain operating authority from the EJ&E dispatcher in Gary, Indiana. Also, the Illinois River Line that branches off to the south from Walker (Plainfield) is not signalized.

West Chicago: The UP interlocking is manually controlled by a full-time operator at JB Tower. The EJ&E is responsible for maintenance of the diamonds and the signals, while the UP is responsible for maintenance of the auxiliary items (turnouts, crossovers, etc.) on their tracks.

Bridge Junction: This interlocking encompasses three turnouts and the river/canal lift-span bridge. The interlocking is controlled by the EJ&E dispatcher at Gary, Indiana. The BNSF interchange track is located at the east end of the lift span; trains using the interchange track hold the interlocking. The EJ&E is responsible for maintenance of the signals and auxiliary items (turnouts, crossovers, etc.).

2.2.3 Joliet to Lynwood

The signal system along this segment of the line is ABS, with an average signal-block length of approximately one mile.

East Joliet: The interlocking at the RID intersection is manually controlled by the Metra dispatcher at Blue Island. The EJ&E is responsible for maintenance of the diamonds and auxiliary items (turnouts, crossovers, etc.), as well as maintenance of the signals.

Chicago Heights: The Chicago Heights interlocking is remote-controlled by the EJ&E dispatcher in Gary, Indiana. The EJ&E is responsible for maintenance of the diamonds and signals, while the EJ&E and UP share responsibility for maintenance of the auxiliary items (turnouts, crossovers, etc.).

2.3 AT-GRADE ROADWAY CROSSINGS

There are 130 at-grade roadway crossings along the EJ&E from Waukegan to Lynwood. They range from private single-lane roads for farms and industries to multiple-lane highways. [Note that one of these (Wilson Road) is presently closed, but remains on the list in the event that the road is reopened.] In addition, there are four at-grade pedestrian crossings. Among all of these, there are a variety of types of crossing protection along the EJ&E rail line. A complete listing of all at-grade crossings, as well as the existing protection at each crossing, can be found in Appendix D. A summary is provided in Table 1.

The crossings immediately abutting the flangeways are typically constructed of timber, rubber or concrete. Based on field observations, in general, it appears that the rubber systems and concrete crossings are found on the most heavily traveled roads or those which have been recently reconstructed. The timber crossings are usually found on private crossings and less-traveled roads. Based on field observation, it appears that the condition of these various types of crossings is a reflection of the volume of roadway traffic, and varies from good to poor.

Eighty percent of the crossing signalization is DC (direct current) circuit-operated. These signals operate when the train is at a specified distance from the crossing and are designed for typical freight traffic operations. Approximately 20% of the crossings are equipped with motion sensors which activate the protection system based on movement of the train (thus, gates will not remain down if a train is sitting on the track away from the crossing).

Table 1
At-Grade Crossing Protection

Type of Protection	Quantity Western Subdivision	Quantity Eastern Subdivision	TOTAL
None	15	4	19
Crossbucks	14	3	17
Crossbucks and Flashing Lights	2	0	2
Crossbucks, Flashing Lights, Bells	39	1	40
Crossbucks, Flashing Lights, Bells, Gates	21	31	52
Pedestrian Crossing, Crossbucks only	3	0	3
Pedestrian Crossing, Crossbucks and Bells	1	0	1
TOTAL	**95**	**39**	**134**

2.4 FREIGHT OPERATIONS

The EJ&E has provided information on current and projected levels of freight traffic, both of which could have an effect on the ability of potential OCS commuter trains to utilize existing infrastructure. If there is insufficient track capacity, for example, Metra trains might not be able to run very efficiently on the same tracks with freight trains. It must be recognized that the primary purpose and responsibility of the EJ&E or any other freight railroad is their freight traffic. In order to provide the physical plant for commuter rail service, the EJ&E would likely require upgrades or additions to infrastructure (tracks, signalization, etc.) that would generally be necessary to permit commuter trains to operate in this environment.

2.4.1 Frequency and Length of Trains

On the Eastern Subdivision, EJ&E traffic is lighter than it is on the Western Subdivision. On the Eastern Subdivision, traffic currently averages seven crews per day Monday through Saturday and five crews on Sunday. Service can be provided to any location with return to either terminal. Also, approximately three UP trains per day operate between Griffith, Indiana (CN connection) and Chicago Heights (UP connection), using trackage rights from the EJ&E.

On the Western Subdivision, the EJ&E usually runs five crews per day Monday through Friday. The service on this subdivision operates as turnaround service to the yard in Joliet and includes switching activity in the intervening yards as needed. The EJ&E also runs once per day (Monday - Saturday, both directions) on the Illinois River Line, which joins the EJ&E main line at Walker (Plainfield). In addition, coal trains operate between West Chicago and Joliet (average of two per day), as well as between West Chicago and Waukegan.

The peak service period is the 4 p.m. to 12 midnight shift, with the peak time of year predicated on utility coal requirements. Existing train lengths vary from 1,000’ to 8,000’ with an average length of 4,000’. Although the EJ&E tends to restrict trains to less than 8,000’, the railroad will sometimes handle longer trains on a case-by-case basis.

2.4.2 Operating Speeds

All freight movements are limited by EJ&E operating rules to a maximum speed of 45 mph. Other maximum speed restrictions include: turnouts at 20 mph, crossovers at 10 mph, all sidings except Frankfort and West Chicago at 10 mph, and yard tracks at 10 mph. Ore trains (three or more ore cars) have maximum operating speeds separate from normal freight operations. Locations specifically noted in the EJ&E timetable for speed restrictions on the main line are: the Des Plaines River lift bridge at 10 mph, Barrington through the interlocking limits at 40 mph, and parts of West Chicago, Frankfort and Matteson at 30 mph.

There are also speed limits across most of the interlockings/diamond crossings. Speed limits for EJ&E trains (and crossing railroad speeds) through the interlockings are summarized in Table 2.

Table 2
Operating Speeds Through Interlockings

Interlocking	EJ&E	Crossing Railroad
Waukegan to Spaulding		
Upton, UP Milwaukee Subdivision	20 mph through yard limits	30 mph
Rondout, Metra and CP	20 mph through yard limits	79/40 mph
Leithton, Metra and WC	45 mph	60/50 mph
Barrington, UP	40 mph	50/40 mph
Spaulding, Metra and CP	45 mph	70/45 mph
Spaulding to Joliet		
West Chicago, UP	30 mph	35/25 mph
Bridge Junction	10 mph over lift bridge	10 mph
Joliet to Lynwood		
East Joliet, Metra/CSX/IAIS	10 mph through yard limits	40/30 mph
Chicago Heights, UP	10 mph	40 mph

2.4.3 Capacity and Track Operation

Existing sidings are used for both train storage and passing trains. The West Chicago and Spaulding sidings are used as interchange tracks, while the Frankfort siding is used exclusively as a directional siding. Although the EJ&E typically does not store empty cars, the Rondout (Peter Baker) siding, which is currently one-ended, is used exclusively for storage. Peter Baker only requires service in the summer period. On average, most of the other industrial clients are served three days per week. The most active spur tracks are:

- Western Subdivision - Service out of Waukegan to an industry in North Chicago five days/week.
- Western Subdivision - Plainfield area has service to some clients five days per week.
- Eastern Subdivision - An industry in Chicago Heights receives service five days per week.

Along the line, single-track sections currently pose capacity limitations for EJ&E operations, and the lift bridge west of the Joliet Yard is a bottleneck on the system. The EJ&E also experiences occasional delays at non-controlled remote interlockings. At rail crossings, Metra trains have priority when crossing the EJ&E. For other freight rail crossings the priority is determined on a first come-first served basis.

The EJ&E has recently retired nine or ten tracks at the eastern (southern) end of the Joliet Yard. The rail has been sold with removal scheduled in the near future, at which time the land will be available for other uses. Currently, the westernmost track in the Joliet Yard is the designated run-through track, but they have recently designated a second adjacent track for run-throughs to allow exclusive inbound and outbound movements.

2.4.4 Existing Trackage-Rights Agreements

The EJ&E currently has a trackage-rights agreement with the UP that permits yard switching to service an industry at Ingalton three days per week. A separate trackage-rights agreement with the UP allows them to operate between Griffith, Indiana (CN interchange) and Chicago Heights (UP interchange). Utility coal to the Commonwealth Edison station at South Joliet (Plaines) is currently handled under a haulage arrangement from West Chicago to Joliet, then over the IC to Plaines.

2.5 EXISTING TRANSPORTATION SERVICES

The most prevalent Metra facilities near the EJ&E are the current station sites along existing commuter lines. However, most are some distance from the EJ&E main line. In addition to the stations, Metra has maintenance sites and yards in a few locations. Appendix E shows the locations of Metra stations nearest to the EJ&E for each Metra line. A summary of the daily train movements along the Metra commuter lines which intersect with the EJ&E is included in Appendix F.

Pace suburban bus service (Suburban Bus Division of the RTA) has a number of routes that intersect or parallel the EJ&E rail line. Most of the routes are along highly developed and high-density corridors. Few Pace routes cross the EJ&E outside of the high-density locations. Appendix G summarizes the Pace routes which intersect or parallel the EJ&E rail line.

Existing or planned vanpool services to/from area employers was discussed with each of the communities. Based on these discussions, only Hoffman Estates identified existing vanpools serving the Prairie Stone development. However, the potential exists along the EJ&E Corridor for vanpools to serve large employers and/or employment densities.

2.6 SURROUNDING LAND USES AND UTILITIES

The EJ&E route traverses several areas of forest preserve and other designated open space. However, due to the current growth trends in the outlying suburbs of Chicago, many current vacant parcels and agricultural lands in the EJ&E Corridor are anticipated for development. Therefore, present patterns of population and transportation movement will be continually adjusting to higher-density land uses. Located in the midst of this growth, the EJ&E is appropriately positioned to serve new developments. A complete listing of existing land uses in the area immediately surrounding the connections between Metra commuter lines and the EJ&E can be found in Appendix H.

2.6.1 Waukegan to Spaulding

This segment of the line lies within Lake and northwestern Cook Counties. Waukegan, North Chicago, Vernon Hills, Mundelein, and the centers of Lake Zurich and Barrington are established, built-up communities. In these communities along the EJ&E, industrial and commercial activity is prevalent, usually acting as a buffer between the railroad and residential areas. The areas around Leithton, from Butterfield Road to IL 83 (Mundelein), Bradley Road (Green Oaks), and northern Lake Zurich are all industrial districts outside of the original town centers. These are relatively new industrial parks, with the exception of Leithton. Many of the original industrial facilities in Waukegan and North Chicago are defunct and have been demolished.

Existing and developing residential areas are present in Vernon Hills, in northern Long Grove and western Hawthorn Woods, and between Rand Road and Cuba Marsh in Lake Zurich and Deer Park. Barrington and Barrington Hills have significant single-family residential developments located near the EJ&E, although the latter in particular is classified as low-density/estate. Major development centers exist or are being developed throughout this area, including Prairie Stone in Hoffman Estates, and along the EJ&E in Elgin.

The remainder of the land along the EJ&E is open space or agricultural, including Cuba Marsh and the MacArthur and Old School Forest Preserves. Farmland exists between IL 83 and Old McHenry Road, primarily on the north side of the EJ&E. The land on the south side of this section is a mix of agricultural and estate-residential. Other vacant land is found in southeastern Waukegan, between the EJ&E and Lake Michigan, which was previously industrial land that has been cleared.

A ComEd plant is located at the northern terminus of the EJ&E in Waukegan. In addition to the plant, power lines stretch along the east side of the EJ&E from the plant to the harbor. Another set of power lines adjacent to the EJ&E tracks is found between IL 45 in Mundelein and Oakwood Drive in Lake Zurich.

2.6.2 Spaulding to Joliet

This segment of the line crosses western DuPage and northern Will Counties. Bartlett, Elgin, Wayne, West Chicago, and Warrenville all have significant single-family residential developments located near the EJ&E. The other predominant land use along the line is open space. Forest preserves and Fermilab comprise the majority of the open space, but occasional farm fields or vacant parcels contribute to the undeveloped atmosphere. Interspersed between the residential areas and open spaces are industrial and commercial uses. Major development centers exist or are being developed throughout this area. Major commercial, industrial, and office developments are found between the BNSF and I-88 near Aurora, in northern West Chicago, and along the I-88 corridor perpendicular to the EJ&E. In West Chicago, significant new development is planned at and around the DuPage County Airport. Development is also planned in Naperville and Aurora between I-88 and Butterfield Road.

In southeastern Aurora, the neighboring land use is almost entirely new residential subdivisions. Through the Village of Plainfield, and unincorporated Lily Cache and Coynes, there are scattered new and developing housing areas mixed with more-predominant agricultural use. Through the center of Plainfield, however, land use is mixed commercial and residential. Between Aurora and Plainfield, the land is predominantly agricultural, with two industrial parks located near Aurora and a few industrial sites extending south along the line to Normantown. There is also significant industrial activity just north of Plainfield, with several large individual business sites and an industrial park.

A landfill exists in the northwest quadrant of the intersection of the EJ&E and 111th Street in Wheatland Township. Between Plainfield and Lily Cache, most of the former quarry sites have been flooded and converted into nature preserves. From Crest Hill to the Joliet Yard most of the adjacent properties are for industrial use. Along the west side of the Des Plaines River/Sanitary and Ship Canal in Joliet, there are large industrial sites served by several EJ&E leads. On the east side of the waterway are two rail lines (BNSF and IC) and the Illinois and Michigan Canal. Located between the Illinois and Michigan Canal and the Joliet Yard are the State Prison property and older residential properties.

ComEd lines and towers run along the west side of the EJ&E from Spaulding Road near Elgin/Bartlett, turning east along the Prairie Path (former CA&E r-o-w) just south of Army Trail Road in Wayne. Power lines also run along the west side of the EJ&E from Roosevelt Road to a substation at Eola Road (north of the BNSF). ComEd power lines continue to parallel the west side of the EJ&E r-o-w through Aurora as far as Normantown. At Normantown the lines cross over the EJ&E and parallel the r-o-w on the east side. At Plainfield, the lines cross the EJ&E and cease to parallel the main line. (From Plainfield, the power lines parallel an EJ&E branch, the Illinois River Line which extends south, passing west of Shorewood.) Power lines rejoin the EJ&E at Mink Creek (a quarter mile north of I-55) and parallel the north side of the EJ&E until they cross over and leave the EJ&E at Caton Farm Road. These ComEd lines rejoin the EJ&E a half-mile later, on the south side near Weber Road. The lines finally leave the EJ&E a half-mile west of IL 53.

The significance of these ComEd rights-of-way is that development is basically foreclosed beneath the power lines and towers. Permanent structures cannot be built in ComEd r-o-w under the lines. Therefore, future planned developments that might be coordinated with EJ&E (OCS) land-use planning must occur <u>outside</u> of any ComEd r-o-w. However, commuter parking for an adjacent Metra station could be placed beneath the power lines, under lease agreements negotiated with ComEd. [There are three stations on Metra's North Central Service (NCS) that have most of their parking on ComEd land.] It will be important, as future OCS station-area planning continues, to take their presence into account.

2.6.3 <u>Joliet to Lynwood</u>

This segment of the line crosses central Will County and far southern Cook County. Joliet, Matteson, Park Forest and Chicago Heights are built-up communities with industrial and commercial activity in the vicinity of the EJ&E. Between Joliet and Matteson, the predominant land use is agricultural, broken up by occasional residential and industrial developments near New Lenox and Frankfort. From Matteson to the state line/Lynwood, the majority of the land near the EJ&E is currently vacant; several parcels are in various stages of planning for possible future development.

ComEd lines cross the EJ&E near MP 3.8 to reach a substation and maintenance facility at the intersection of Briggs Street (MP 4.2) and the EJ&E. From the substation the lines parallel the EJ&E on the north side as far as Frankfort. East of Frankfort, at approximately MP 15.5, the lines cross over the EJ&E to the south side of the track and continue to parallel the EJ&E until they leave the track at Matteson. A significant underground gas corridor parallels the EJ&E along the southern limits of the EJ&E r-o-w, through most of the Joliet-to-Lynwood section.

2.7 ENVIRONMENTAL FEATURES

If federal funding is utilized to implement commuter service in this corridor (a likely scenario), a review of the project's impacts on the environment would be required. Although a comprehensive environmental analysis is beyond the scope of this Phase I Feasibility Study, a brief review (based on experience with the implementation of the NCS) of the areas which would require investigation in later stages of the project are included below.

A very preliminary assessment of potential wetland impacts was performed by reviewing National Wetland Inventory (NWI) maps. A similar assessment of potential floodway and/or floodplain impacts was performed based on review of floodway maps and Flood Insurance Rate Maps (FIRM). Appendix I lists all wetlands noted on the NWI maps along the EJ&E that are outside of the potential station sites and new passing siding locations. Appendix L includes portions of the wetland inventory and floodway/floodplain maps for the potential new passing-siding locations. Appendix M includes portions of the wetland inventory and floodway/floodplain maps for each of the potential station sites.

At this point of the Study, exact impacts to any wetlands identified on the NWI maps, floodways identified on the floodway maps, or floodplains identified on the FIRM maps cannot be determined, since the locations of potential station sites and passing sidings are very preliminary in nature. Also, there could be additional wetlands beyond those shown on the NWI maps. During later phases of the overall OCS Feasibility Study, after their locations and respective lengths or sizes are delineated more definitively, more-specific analyses of potential impacts can be performed. Any proposed improvements that lie within a wetland or floodway/floodplain area would include either trying to relocate the improvement to avoid impacts, attempt to minimize any impact, or mitigate any unavoidable impacts.

2.7.1 Waukegan to Spaulding

2.7.1.1 Waterways/Floodways/Floodplains

The EJ&E crosses four significant waterways in this segment: the Waukegan River in Waukegan, the Skokie River in Lake Bluff, the Des Plaines River in Libertyville, and Poplar Creek in Hoffman Estates. Other designated waterways include two branches of Spring Creek in Barrington Hills, the Railroad Tributary to Poplar Creek in Hoffman Estates, and several other minor water crossings along the line. The location of floodplains and/or floodways was determined as part of this Study through review of floodway maps. The Skokie River in Lake Bluff, the Middle Fork of the North Branch of the Chicago River near Mettawa, the Des Plaines River in Libertyville, Seavey Drainage Ditch in Vernon Hills, Diamond Lake Drain in Mundelein, Indian Creek and the West Branch of Indian Creek in Hawthorn Woods, and the Flint Creek Tributary in Barrington are all designated floodplains or floodways.

2.7.1.2 Wetlands

Based on review of the National Wetland Inventory maps, the EJ&E crosses only one designated wetland in this segment. Sylvan Drain in Long Grove (approximately MP 58.1) is designated as having high functional value under the Advance Identification (ADID) Program. However, there are a large number of wetlands which lie in close proximity to the tracks or at the base of the fill sections along the line.

2.7.1.3 Sensitive Noise Receptors

Based on field review of this segment, as well as information supplied by the communities, preliminary sensitive noise receptors have been identified (sensitive noise receptors are defined as schools, hospitals or nursing homes). There is a nursing home (Lake Knoll Health Care Center) in Lake Bluff, located in the southwest quadrant of the intersection of the EJ&E and US 41. Also, the Lake Zurich Junior High, May Whitney School and Lake Zurich High School are located in the northwest quadrant of Main Street (IL 22) and the EJ&E along Midlothian Road.

2.7.1.4 Public Spaces

The EJ&E crosses three Lake County Forest Preserves: Old School located in Mettawa, MacArthur Woods located in Libertyville, and Cuba Marsh located in Barrington. In Cook County, the EJ&E crosses the forest preserves of Spring Creek Valley and Poplar Creek. Bike paths also cross the EJ&E in three different locations: along the Green Bay Trail in North Chicago, Saint Mary's Road in Mettawa, and the North Shore Trail which passes over the EJ&E in Rondout. Additionally, the entire EJ&E r-o-w from Waukegan to Bartlett is listed as a potential greenway in the Northeastern Illinois Regional Greenways Plan, which apparently indicates that the EJ&E right-of-way has been identified for possible parallel development of a trail corridor in joint use with freight railroad operations.

2.7.1.5 Other Environmental Issues

Field inspection revealed a potential crane nesting site northwest of the intersection of Old McHenry Road and the EJ&E. Additionally, field inspection led to the discovery of rusted fuel tanks south of the EJ&E and west of structure number 51 (between IL 83 and Gilmer Road in Hawthorn Woods), near MP 57.5.

2.7.2 Spaulding to Joliet

2.7.2.1 Waterways/Floodways/Floodplains

Along this segment of the line, the EJ&E crosses the DuPage River in Plainfield and the confluence of the Des Plaines River and the Chicago Sanitary and Ship Canal in Joliet. Designated waterways along this segment of the line include: Brewster Creek, located south of Spaulding Junction in Bartlett, Kress Creek north and south of West Chicago, and two small tributaries to the DuPage River in and near Warrenville. South of Warrenville, the floodplain maps also show a few small depressional zones astride the EJ&E. Other designated waterways crossed by the EJ&E include: Waubonsie Creek, an unnamed depressional area south of Ogden Avenue, and an unnamed depressional area south of 87th Street, all in Aurora; Wolf Creek (south of 111th Street) in Wheatland Township; West Norman Drain in Plainfield; Lily Cache Creek and Mink Creek in Lily Cache; Sunnyland Drain Tributary and Sunnyland Drain in Coynes; an unnamed waterway under bridge number 195 in Crest Hill, and the Illinois and Michigan Canal. Additionally, virtually the entire Joliet Yard is in a regulatory flood zone due to flow from Spring Creek Tributary No. 1.

2.7.2.2 Wetlands

Based on review of the National Wetland Inventory maps, the EJ&E does not cross any designated wetlands in this segment. However, there are a large number of wetlands which lie in close proximity to the tracks at the base of the fill sections along the line.

2.7.2.3 Sensitive Noise Receptors

Based on field review of this segment, as well as information supplied by the communities, preliminary sensitive noise receptors have been identified (sensitive noise receptors are defined as schools, hospitals or nursing homes). Results of this review indicate that since the majority of this segment of the EJ&E is in nonresidential areas, there appear to be very few sensitive noise receptors. Those identified are Lincoln School in West Chicago, which is located on the far side of a park approximately 500' from the EJ&E main line, a nursing home and Indian Trail High School in Plainfield, about a block north of the EJ&E, and Richland School in Crest Hill, which backs directly against the EJ&E r-o-w.

2.7.2.4 Public Spaces

From north to south, the EJ&E crosses the forest preserves of Pratt Wayne Woods in Bartlett, West Chicago Prairie Forest Preserve, and Reed Park in West Chicago. Fermilab, in addition to its research aspects, is also a public preserve which is bordered by the EJ&E; the tracks run along its eastern border for three miles. Also, the EJ&E crosses routes of the Prairie Path north of I-88 and south of Diehl Road in Naperville and in Pratt Wayne Woods, south of Army Trail Road in Wayne. In West Chicago, a pedestrian bridge crosses over the EJ&E Yard, joining a segment of Prairie Path to the west of the yard. (These Prairie Paths are all segments of the defunct CA&E Electric Railway.) The EJ&E passes through the Rookery Forest Preserve as well as other nature or sport parks in the area south of Plainfield. In Aurora, there are a few local parks adjacent to the EJ&E; however, the EJ&E is on a substantial embankment through most of southern Aurora. The remainder of the open land is private property.

2.7.2.5 Other Environmental Issues

The former Kerr McGee plant in West Chicago is undergoing an EPA cleanup, tentatively scheduled to be completed in 2001. Soil under the EJ&E main line is known to be contaminated and is scheduled to be removed as part of the cleanup process. A landfill is in operation northwest of 111th Street and the EJ&E.

2.7.3 Joliet to Lynwood

2.7.3.1 Waterways/Floodways/Floodplains

The EJ&E crosses no large rivers in this segment of the line. The regulated waterways crossed by the EJ&E in Joliet include: Hickory Creek, an unnamed depressional area south of I-80, an unnamed tributary of Sugar Run Creek north of Spencer Avenue, Manhattan Road Ditch, and Sugar Run Creek. In Will County, east of Joliet the waterways include: Jackson Branch Creek in New Lenox (which also parallels the EJ&E for almost a half-mile), Jackson Branch Creek near Mokena, Hickory Creek Tributaries One and Two near Frankfort, and Hickory Creek Tributaries Three and A in Frankfort. In southern Cook County the waterways include: Hickory Creek near Richton Park, Butterfield Creek East Branch Tributary and Butterfield Creek East Branch in Matteson, an unnamed depressional area in Algonquin Park in Park Forest, Thorn Creek and Tributary A of Thorn Creek in Chicago Heights, Deer Creek and Tributary B of Deer Creek near Sauk Village, and Lansing Ditch north of Lakewood Country Club.

2.7.3.2 Wetlands

Based on review of the National Wetland Inventory maps, the EJ&E does not cross any designated wetlands in this segment. However, there are a large number of wetlands which lie in close proximity to the tracks at the base of the fill sections along the line.

2.7.3.3 Sensitive Noise Receptors

Based on field review of this segment, as well as information supplied by the communities, preliminary sensitive noise receptors have been identified (sensitive noise receptors are defined as schools, hospitals or nursing homes). Results of this review have identified the Sunny Acres Sanitarium north of Mills Road in Joliet, the Elizabeth Ludeman Developmental Center north of the EJ&E in Park Forest, and the Wildwood School south of the EJ&E in Park Forest as sensitive noise receptors along this segment of the line.

2.7.3.4 Public Spaces

In Joliet, the EJ&E passes through a corner of the Joliet Country Club. In addition, Sauk Trail Woods and Euclid Park in Chicago Heights and Winnebago Park in Park Forest are adjacent to the EJ&E.

2.8 POTENTIAL STATION LOCATIONS

Potential station locations were identified for each community along the EJ&E/OCS alignment. The project staff conducted meetings with city or village managers/administrators, planners, and other community representatives from each community in order to identify potential station sites. For some communities, the station location had already been identified in local transportation plans. In other communities, the station location was identified as the site where the station was historically located along the railroad route. The sites noted here as <u>potential</u> sites are those identified in conversation during the site visits with the communities, not all of them are included in their master plans, comprehensive plans, or transportation plans unless they are identified as such.

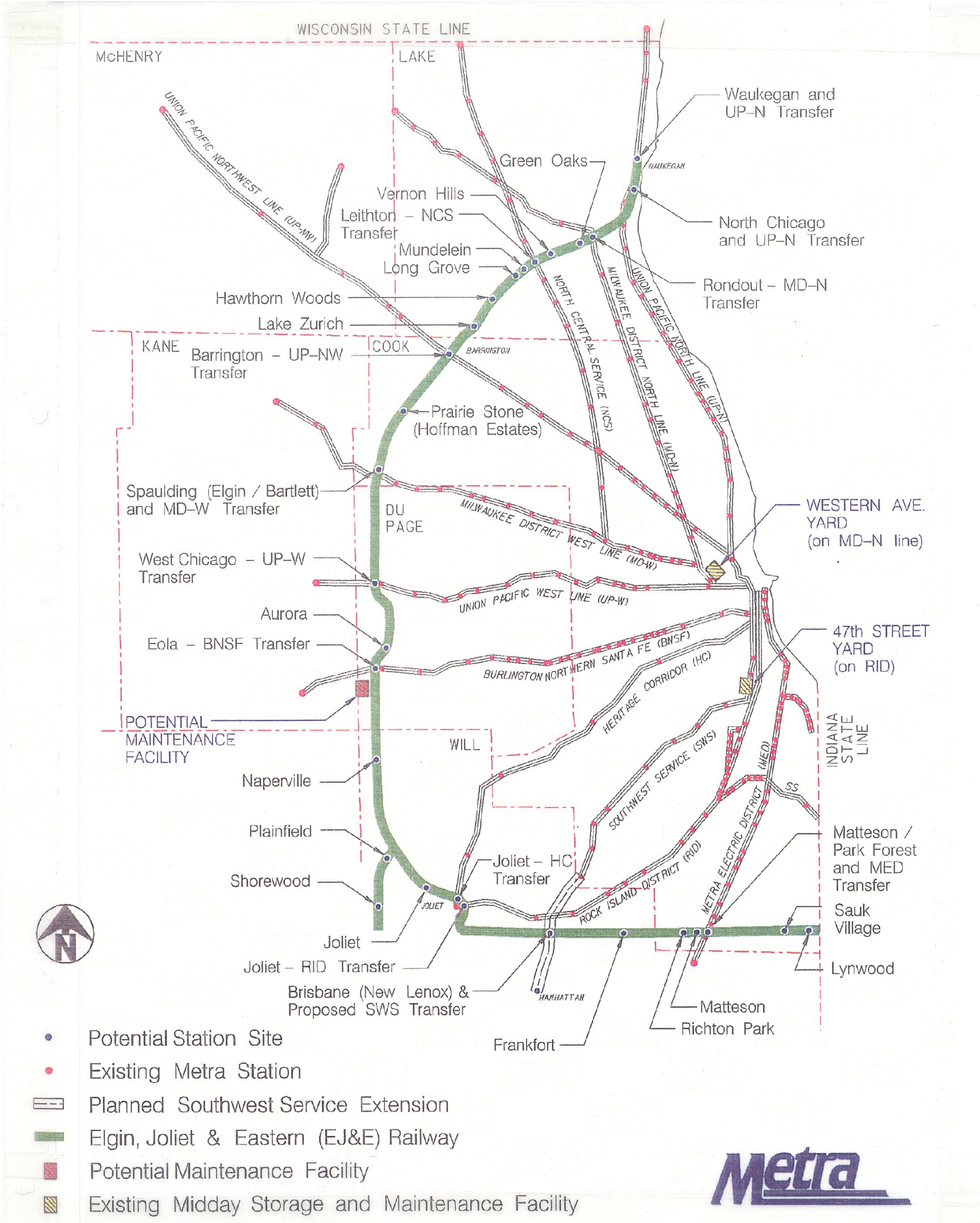
The list of potential locations in Table 3 has been developed from the suggestions and expressed interest by the respective communities. Their relative locations are displayed on the map in Figure 2. Station-site selection is a dynamic process that will continue to evolve throughout the corridor-evaluation process in future Study phases. It should be understood that any and all locations are subject to change.

General location maps and preliminary site sketches are portrayed in Appendix M. The communities in the study area have a vested interest in selecting the station sites, and have provided most of the general information about their communities and local demographics. Subsequently, they were also provided the opportunity to review, evaluate and offer comments or changes to the information and the sketch maps.

Table 3
Summary of Potential Station Locations

Station / Community	General Location	Category	County
Waukegan	Existing Metra UP-N Station	Transfer / P&R*	Lake
North Chicago	Existing Metra UP-N Station	Transfer / P&R*	Lake
Rondout Transfer	Metra MD-N	Transfer Only	Lake
Green Oaks	Bradley Road (east of I-94)	Park-and-Ride	Lake
Vernon Hills	Milwaukee Avenue	Park-and-Ride	Lake
Leithton Transfer	Metra NCS	Transfer Only	Lake
Mundelein	US 45 / IL 60	Park-and-Ride	Lake
Long Grove	Midlothian Road	Park-and-Ride	Lake
Hawthorn Woods	Old McHenry Road	Park-and-Ride	Lake
Lake Zurich	Old Rand Road	Park-and-Ride	Lake
Barrington Transfer	Metra UP-NW	Transfer Only	Lake
Prairie Stone (Hoffman Estates)	Sedge Boulevard (north of I-90)	Destination Only	NW Cook
Spaulding (Elgin / Bartlett)	Metra MD-W / Spaulding Road	Transfer / P&R*	NW Cook
West Chicago Transfer	Metra UP-W	Transfer Only	DuPage
Aurora	Ferry Road (north of I-88)	Park-and-Ride	DuPage
Eola Transfer	Metra BNSF	Transfer Only	DuPage
Naperville	95th Street	Park-and-Ride	Will
Plainfield	US 30 / IL 126	Park-and-Ride	Will
Shorewood	US 52	Park-and-Ride	Will
Joliet	Hennepin Drive (east of I-55)	Park-and-Ride	Will
West Joliet Transfer	Metra HC	Transfer Only	Will
East Joliet Transfer	Metra RID	Transfer Only	Will
Brisbane (New Lenox)	Metra SWS / Cedar Road	Transfer / P&R*	Will
Frankfort	Wolf Road	Park-and-Ride	Will
Richton Park	Central Avenue (west of I-57)	Park-and-Ride	South Cook
Matteson	Cicero Avenue	Park-and-Ride	South Cook
Matteson / Park Forest	Existing Metra MED Station	Transfer / P&R*	South Cook
Sauk Village	Torrence Avenue	Park-and-Ride	South Cook
Lynwood	US 30 / IL 83	Park-and-Ride	South Cook

* P&R=Park-and-Ride; these stations would serve a dual purpose


WISCONSIN STATE LINE
McHENRY
LAKE
KANE
COOK
DU PAGE
WILL
INDIANA STATE LINE
UNION PACIFIC NORTHWEST LINE (UP-NW)
NORTH CENTRAL SERVICE (NCS)
MILWAUKEE DISTRICT NORTH LINE (MD-N)
UNION PACIFIC NORTH LINE (UP-N)
MILWAUKEE DISTRICT WEST LINE (MD-W)
UNION PACIFIC WEST LINE (UP-W)
BURLINGTON NORTHERN SANTA FE (BNSF)
HERITAGE CORRIDOR (HC)
SOUTHWEST SERVICE (SWS)
ROCK ISLAND DISTRICT (RID)
METRA ELECTRIC DISTRICT (MED)
SS
WAUKEGAN
BARRINGTON
JOLIET
MANHATTAN
Waukegan and UP-N Transfer
Green Oaks
Vernon Hills
Leithton – NCS Transfer
Mundelein
Long Grove
North Chicago and UP-N Transfer
Rondout – MD-N Transfer
Hawthorn Woods
Lake Zurich
Barrington – UP-NW Transfer
Prairie Stone (Hoffman Estates)
Spaulding (Elgin / Bartlett) and MD-W Transfer
WESTERN AVE. YARD (on MD-N line)
West Chicago – UP-W Transfer
Aurora
Eola – BNSF Transfer
47th STREET YARD (on RID)
POTENTIAL MAINTENANCE FACILITY
Naperville
Plainfield
Shorewood
Joliet – HC Transfer
Matteson / Park Forest and MED Transfer
Sauk Village
Joliet
Joliet – RID Transfer
Lynwood
Brisbane (New Lenox) & Proposed SWS Transfer
Matteson
Richton Park
Frankfort
Potential Station Site
Existing Metra Station
Planned Southwest Service Extension
Elgin, Joliet & Eastern (EJ&E) Railway
Potential Maintenance Facility
Existing Midday Storage and Maintenance Facility
Metra

3.0 FUTURE PLANS

Examination of future plans, with development and growth projections, is intended to provide an important profile of the expected changes throughout this potential rail service corridor. The communities contain residential, commercial, industrial, and other land-use activities which could have a direct or indirect impact from or upon new commuter rail service. Other factors such as demographic and socioeconomic trends play a key role for communities in guiding various land uses. Regional economic factors might also drive both current and future land-use decisions made by either municipal or private concerns.

This section builds upon the previous section that described existing conditions in the study area; it is a collaborative effort that documents input from a variety of sources. Information on the demographics in the study area was obtained from the Northeastern Illinois Planning Commission (NIPC) for population and household forecasts, and from the 1990 U.S. Census for employment and other socioeconomic factors. The level of information provided from the municipalities varied, but at a minimum their opinion toward the potential implementation of new commuter rail service in their community was obtained. All of these inputs allow for some general observations on ridership potential for commuter rail in the EJ&E Corridor.

The EJ&E expects increases in freight train traffic in the near future, consistent with the recent resurgence of the railroad industry. They have indicated that specific long-term levels of freight traffic are difficult or impossible to predict at this time, but it appears in many cases that they will need to retain most of their existing trackage and other infrastructure to conduct their future business. This situation could require Metra to create its own parallel infrastructure in order to implement any potential commuter operations. As noted earlier, the cooperation of the railroad in providing information does not necessarily indicate, and is not meant to imply, their support for or endorsement of a potential Outer Circumferential Service.

3.1 PROJECTED FREIGHT OPERATIONS

3.1.1 Railroad Agreements

The freight railroad industry has enjoyed a resurgence in recent years. As the existing rail capacity through Chicago is becoming limited, there is interest by other railroads to bypass bottlenecks that delay freight movements in some classification yards closer to Chicago's downtown. The EJ&E has been actively pursuing railroad freight business that would utilize their right-of-way and consequently provide additional revenue from trackage-rights agreements.

Recently, the EJ&E and UP negotiated the first phase of a trackage-rights agreement from Griffith, Indiana to Chicago Heights. The next segments to be considered for a trackage-rights agreement will be from West Chicago to Waukegan and West Chicago to Joliet. The latter segment will require a new connecting track in West Chicago. The UP has performed a study of their operation and has identified that numerous trains coming to their terminal have potential to utilize the EJ&E line. However, the EJ&E has indicated that they do not have adequate capacity based on their current infrastructure to accommodate this potential demand.

In addition to negotiations with the UP, the EJ&E has given trackage rights to the CN along the segment from Griffith, Indiana (CN connection) to Eola (BNSF connection). The CN has also expressed interest in access to the IC at Matteson through a trackage-rights agreement.

3.1.2 Expansion and Future Service Levels

There are several locations where new industries have been proposed and spur tracks are being constructed. These include:

- MP 69.7, south side of Morrow Street in North Chicago
- MP 28.5, south of Ann Street in West Chicago. There will be a temporary main line relocation here due to EPA cleanup of the Kerr McGee Plant.
- MP 23.5, south of Ferry Road and on both sides of the main line in Aurora. An industrial park is currently being developed here; plans indicate a new siding adjacent to the main line and industrial leads on either side of the main line/siding tracks.
- MP 22.8, Diehl Road (General Tire)
- Sauk Village (Steel Pro)

Also, due to freight congestion, the EJ&E has completed the reconstruction of the former extension of the Rockdale siding for use as a passing siding. The siding has been extended from the former switch at MP 3.8 to Gaylord Road at MP 5.5. In addition, the designations for the main track and the siding in Plainfield between MP 10.6 and MP 12.4 have been reversed.

3.2 POPULATION AND EMPLOYMENT TRENDS

The EJ&E Corridor's location as a circumferential arc, roughly 35 miles from the center of Chicago, contains some of the fastest-growing communities in the greater Chicago area. This growth includes both residential and employment. While most of the older suburbs in the region are situated along existing radial commuter rail lines, the newer and faster-growing communities are located primarily in the in-fill areas between these radial routes, and consequently are almost entirely auto-dependent. Many communities located along the existing radial rail routes have also become more auto-dependent, as trip patterns shift from the traditional suburb-to-city pattern to new suburb-to-suburb and city-to-suburb patterns.

The following discussion of population and employment trends begins with short sections on national and Chicago-regional trends. This is followed by a discussion of population change within the EJ&E Corridor, as compared to the overall six-county Chicago region, as well as changes in population density and average household size. Specific examples are cited and the overall implications for commuter rail service in the EJ&E Corridor are discussed. The changes in households, population and employment trends between 1990 and 2020 are presented in two scenarios, with and without a South Suburban Airport. (This circumstance has been necessary due to the lack of a decision on a new airport at the time that the 2020 RTP was created; both scenarios are "official".) The data are portrayed visually in a series of household, population and employment maps in Appendix K.

3.2.1 National Trends

One of the most significant changes in national commuting trends is the proportionally greater expansion of the labor force as compared to the increases in population. Between 1950 and 1980 there was a 50% population increase in the United States, while the labor force increased 65% over that same period. This was due primarily to the baby-boom children finally reaching a working age and a greater number of women entering the labor force.

Another important national trend that is having a major effect on suburban commuting trends is the boom in suburban employment opportunities. Families did not begin moving to the suburbs in large numbers until the late 1940s. This was followed by the addition of a number of major shopping centers and other supporting retail establishments beginning in the 1960s. Finally, many larger employers began expanding their suburban facilities in the 1980s. In the twenty-year period between 1960 and 1980, the suburb-to-city commute increased a modest 25% as overall employment continued to increase. However, the suburb-to-suburb commute increased 58% during this same period, and the city-to-suburb reverse commute grew by 85%. In that same twenty-year period, vehicle availability per household increased from 1.03 to 1.61, a 56% increase.

These national shifts in modal choice, continued suburbanization of jobs and wider dispersal of job locations, as well as more-flexible work schedules all explain an ongoing increase in private-vehicle usage. This continues to create an overall trend toward an increased highway demand that exceeds even the current suburban job boom. However, these same statistics can be shown to support the eventual need for new and expanded public transportation services. The increased automobile usage is already leading to major roadway congestion in this country's largest metropolitan areas, and alternative transportation options are now being studied in many urban areas in order to improve air quality standards, as well as to maintain reasonable work-commute travel times.

Following are the specific population and employment trends currently being forecasted for the Chicago region, and specifically for the EJ&E Corridor. It is evident that these Chicago-area trends are similar, and in fact a reflection of the national trends.

3.2.2 Chicago Region Changes in Population

The total population of the six-county region that comprises the Chicago metropolitan area in Illinois grew by just 300,000 in the twenty years prior to 1990, and then grew by another 300,000 in the five years between 1990 and 1995. The six-county region is expected to grow another 25% to roughly nine million people by the year 2020. However, this growth rate is not evenly spread across the region. Not surprisingly, the City of Chicago is expected to increase by only 9.5% during this period, with the largest growth rates occurring in the more outlying areas (Kane County by 70% and Will County by 104%). DuPage County is expected to increase by 28%, but because the amount of available open space in all of DuPage County is only 13% of the county's area (down from 22% in 1990), most of this increase will have to take the form of increased density in already-developed communities.

3.2.3 Demographics in the EJ&E Corridor

For purposes of analysis of the EJ&E Corridor, demographic statistics were derived from the NIPC forecast data for a six-mile-wide corridor centered on the EJ&E rail line. As a further analysis tool, this corridor was then subdivided into the same three segments used previously in this report: the 36.5-mile segment from Waukegan to Spaulding, the 37.5-mile segment from Spaulding south to Joliet, and the 31-mile segment east from Joliet to Lynwood at the Illinois-Indiana state line.

With respect to transit usage, the number of households has proven to be a better ridership indicator than overall population statistics. To help in visualizing the ridership potential of each of the three study-corridor segments, the number of households and density per square mile for each of the segments, as well as the entire corridor, are summarized in Table 4. This table gives the 1990 number of households for each segment, the 2010 estimated households and the recently projected 2020 households both with and without the proposed South Suburban Airport (SSA). [As previously noted, because of the current uncertainty regarding the construction of a third major Chicagoland airport (to be located in the south suburbs near Peotone and Monee), CATS and NIPC chose to prepare two different scenarios, with or without the airport.] The two scenarios test the effect of potential development on land use and travel projections throughout the region, and show just where and how the proposed third airport would have the greatest impact. Also shown on this table are the percentage differences between the 1990 and 2010 households, as well as the 2010 and 2020 households, again both with and without the South Suburban Airport.

The EJ&E segment with the highest current number of households is the 36.5-mile Waukegan-to-Spaulding segment, which traverses Lake County and the northwestern corner of Cook County. This is also the most dense of the three segments along the EJ&E Corridor, with 469 households per square mile. The segment with the next highest density, at 404 households per square mile, is the Spaulding-to-Joliet segment, traversing the entire western edge of DuPage County and northwestern Will County.

Between 1990 and 2010, the fastest-growing segment is projected to be the Spaulding-to-Joliet segment near the DuPage-Kane County line, with a 59% increase in households to 641 households per square mile by 2010. The Waukegan-to-Spaulding segment in Lake County will be the next fastest-growing area between 1990 and 2010, with a 33% increase projected. This will increase the density in this segment to 624 households per square mile by 2010.

For the year 2020, the household projections depend on whether or not a South Suburban Airport is assumed to be in place. With or without a South Suburban Airport, the Spaulding-to-Joliet segment continues to show the greatest increase in number of households, with a 78% or 79% increase in both actual numbers and density of households. The household density in this segment would increase to either 724 or 721 households per square mile by 2020, with or without the airport. The segment east of Joliet (between Joliet and Lynwood) is projected to show the next-highest growth rate by the year 2020, with a 60% increase in households over 1990 figures if the South Suburban Airport is not built, and a 77% increase if the airport is built. However, even with the largest percentage differential, the household density east of Joliet would still be the lowest of the three segments in the EJ&E Corridor.

The Waukegan-to-Spaulding segment has the smallest percentage differential regarding the presence or absence of a South Suburban Airport (as might be expected), with a projected 49% 1990-2020 growth rate in number of households, reduced to 45% if the airport is built. However, even with this more modest growth rate, the household density still would increase to either 700 or 682 households per square mile.

The bottom portion of Table 4 shows that the current trend toward a decreasing average household size is expected to continue into the next century, with the average household within the EJ&E Corridor decreasing from 2.96 persons per household in 1990 to 2.87 persons in 2010 and 2.74 in 2020. At the present time, the differences in average household size between the various EJ&E segments are minimal. However, the average household size trend decrease from 1990 to 2010 in the Spaulding-to-Joliet segment is greater than in the other two segments. This difference begins to disappear by 2020 as the decreases in the other two segments make significant jumps. Similar demographic statistics have been compiled on the population and population density expected to occur in each of the EJ&E Study segments (see Table 5).

Table 4
Demographic Statistics - Households

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding	184,420	245,376	33%	275,254	49%	267,922	45%
Spaulding-Joliet	162,654	258,384	59%	290,505	79%	291,733	79%
Joliet-Lynwood	109,331	129,797	19%	174,850	60%	193,532	77%
TOTALS	**456,405**	**633,557**	**39%**	**740,609**	**62%**	**753,187**	**65%**

Households/Square Mile

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding 393 sq. mi.	469	624	33%	700	49%	682	45%
Spaulding-Joliet 403 sq. mi.	404	641	59%	721	78%	724	79%
Joliet-Lynwood 331 sq. mi.	330	392	19%	528	60%	585	77%
WEIGHTED AVG. 1,127 sq. mi.	**405**	**562**	**39%**	**657**	**62%**	**668**	**65%**

Average Household Size

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding	2.98	2.92	-2.0%	2.71	-9.1%	2.71	-9.1%
Spaulding-Joliet	2.94	2.81	-4.4%	2.77	-5.8%	2.77	-5.8%
Joliet-Lynwood	2.95	2.90	-1.7%	2.74	-7.1%	2.74	-7.1%
AVERAGES	**2.96**	**2.87**	**-2.8%**	**2.74**	**-7.3%**	**2.74**	**-7.3%**

Table 5
Demographic Statistics - Population

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding	550,394	715,310	30%	746,374	36%	725,578	32%
Spaulding-Joliet	478,141	725,130	52%	805,601	68%	809,403	69%
Joliet-Lynwood	322,856	375,900	16%	478,544	48%	530,309	64%
TOTALS	**1,351,391**	**1,816,340**	**34%**	**2,030,51**	**50%**	**2,065,290**	**53%**

Population/Square Mile

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding 393 sq. mi.	1,400	1,820	30%	1,899	36%	1,846	32%
Spaulding-Joliet 403 sq. mi.	1,186	1,799	52%	1,999	69%	2,008	69%
Joliet-Lynwood 331 sq. mi.	975	1,136	17%	1,446	48%	1,602	64%
WEIGHTED AVG. 1,127 sq. mi.	**1,199**	**1,612**	**34%**	**1,802**	**50%**	**1,832**	**53%**

3.2.4 Changes in Employment

With respect to potential transit usage, employment density is just as important as household density. NIPC predicts that by 2020 employment in the six-county region will grow by 1.4 million new jobs, mostly in the suburbs. This growth will range from 71% in Lake County (to 389,000 jobs) to more than double in Will County (from 99,000 to 233,000 jobs, a 135% increase). Within the EJ&E Corridor itself, between 1990 and 2020 total employment is projected to increase 74% to 82%, depending on whether or not the South Suburban Airport is built. Between 1990 and 2010, the total corridor employment is expected to increase by 59% (see Table 6).

In a segment-by-segment comparison, at the present time the employment base and the employment densities are roughly the same in the Waukegan-to-Spaulding and Spaulding-to-Joliet segments, with nearly 470,000 total jobs in 1990 at an average density of 590 jobs per square mile in the two segment areas. The Joliet-to-Lynwood segment currently has a much lower employment density of only 337 jobs per square mile.

Table 6
Demographic Statistics - Employment

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding	233,756	397,704	70%	390,244	67%	357,168	53%
Spaulding-Joliet	235,895	369,585	57%	402,235	71%	396,961	68%
Joliet-Lynwood	111,683	159,553	43%	217,887	95%	302,815	171%
TOTALS	**581,334**	**926,842**	**59%**	**1,010,366**	**74%**	**1,056,944**	**82%**

Employment/Square Mile

SEGMENT	1990	2010	% DIFF 1990-2010	2020 w/o SSA	% DIFF 1990-2020	2020 w/ SSA	% DIFF 1990-2020
Waukegan-Spaulding 393 sq. mi.	595	1,012	70%	993	67%	909	53%
Spaulding-Joliet 403 sq. mi.	585	917	57%	998	71%	985	68%
Joliet-Lynwood 331 sq. mi.	337	482	43%	658	95%	915	172%
WEIGHTED AVG. 1,127 sq. mi.	**516**	**822**	**59%**	**896**	**74%**	**938**	**82%**

Between 1990 and 2010, the employment densities will increase unevenly along the EJ&E Corridor, ranging from a 70% increase in the Waukegan-to-Spaulding segment to a 43% increase in the Joliet-to-Lynwood segment. In 2010, the employment density in Lake County and northwestern Cook County (Waukegan to Spaulding) is projected to be 1,012 jobs per square mile, while western DuPage County and northwestern Will County (Spaulding to Joliet) increases by 57% to 917 jobs per square mile. The Joliet-to-Lynwood segment would increase by 43% to 482 jobs per square mile.

By 2020, the possibility of a South Suburban Airport again makes a significant difference in the distribution of jobs within the EJ&E Corridor. The Spaulding-to-Joliet segment would have the highest employment density at 985 jobs per square mile if the airport is built and 998 jobs per square mile if the airport is not built. These figures represent increases of 68% and 71%, respectively, over the 1990 employment data. In the Waukegan-to-Spaulding segment, the employment density increase over 1990 will “only” be 53% (to 909 jobs per square mile) if the South Suburban Airport is constructed, but would increase 67% to 993 jobs per square mile if the airport is not built. In either case, this would represents a decrease from the projected 2010 density of 1,012 jobs per square mile for this segment through Lake and northwestern Cook Counties.

As expected, the greatest impact of a South Suburban Airport would occur in the Joliet-to-Lynwood segment. Without the airport, the employment density would increase 95% to 658 jobs per square mile. However, if the airport is built the employment density would increase an astounding 172% to 915 jobs per square mile.

3.3 PROJECTED LAND USES

3.3.1 Land Use and Zoning Data

To get some idea of projected land uses in the EJ&E Corridor, overall land use plans and zoning maps were obtained from Lake, Cook, DuPage and Will Counties, as well as from many of the communities that would be served by an OCS. Except for some larger portions in Will County, very little agricultural land is projected to remain within the EJ&E Corridor. Commercial, office/business and industrial land uses would seem to be the best indication of employment centers that could benefit by access to suburb-to-suburb transit service. Color-coded maps depicting these land use and zoning projections to the year 2000 for the entire corridor are portrayed in Appendix K.

3.3.2 Major Employment Locations

In addition to the land use and zoning files, data was also obtained from many of the corridor communities on specific large-employer facilities and the number of employees at each location. This data is also shown on the three segment maps in Appendix K. While not a complete listing of all the major employers in the corridor, the data collected to date supports the overall impression given by the zoning map information regarding the largest employment concentrations.

Large employment clusters can be found along the Waukegan-to-Spaulding segment south of Waukegan and near the potential Vernon Hills, Mundelein, Hawthorn Woods, Lake Zurich, Prairie Stone and Spaulding station sites. Along the Spaulding-to-Joliet segment, several large employment concentrations occur near the DuPage-Kane County line all the way from Spaulding to the potential Naperville station site and in the vicinity of Joliet. The major employment concentrations along the Joliet-to-Lynwood segment are along the paralleling I-80 industrial segment, roughly from Richton Park east to the Indiana State line.

3.4 PLANNED ROADWAY IMPROVEMENTS

The Illinois Department of Transportation Fiscal Year 1997-2001 Proposed Highway Improvement Program includes a number of projects which cross the EJ&E. Most of these projects are of the ongoing maintenance type, such as resurfacing and bridge repair projects. None of the proposed projects should have significant impact on the study corridor. The projects are listed in Appendix J.

3.5 RIDERSHIP POTENTIAL

Ridership projections for the proposed Outer Circumferential Service are difficult to make during this preliminary Phase I Feasibility Study. This is due largely to the fact that the level of detail regarding station facilities, location and access, service frequencies and physical track condition is limited. Generally, ridership projections are not conducted until later phase studies, because these studies are more in-depth and provide a greater level of detail, allowing more reliable and realistic ridership projections.

At this time, based on the limited data currently available, it would appear that there is some potential for OCS to be viable. However, more detailed analyses, particularly travel demand forecasts performed using sophisticated computer modeling, remain to verify what are now only presumptions based on broad-scope regional and EJ&E Corridor projections.

3.5.1 Potential Viability of Suburb-to-Suburb Commuter Rail Service

As noted in the earlier section on Population and Employment Trends, there are ongoing shifts both locally and nationally in population and employment growth away from the central city into the surrounding suburbs. This in turn has lead to dramatic shifts in commuting patterns, away from traditional suburb-to-city commutes to both suburb-to-suburb and city-to-suburb commutes. To date, public transportation has not been able to successfully serve these new travel demands, resulting in increased traffic and congestion on streets and highways throughout the region. Looking forward to the 21st Century, future land use plans coupled with the growth in population and employment will only exacerbate this problem, requiring the exploration of other services to mitigate congestion. Long before the year 2020, it is likely that the provision of an OCS could rapidly become an outright necessity and thereby a viable transportation alternative.

With respect to the EJ&E Corridor, in the previous sections it has been established that both people and jobs in the corridor are projected to grow, often quite dramatically. However, determining exactly where the growth will occur is complicated somewhat by the lack of a clear decision on the construction of a new South Suburban Airport. Clearly, the facilities to expand air travel will greatly affect development within the region, but also important is the substantial ancillary development that will occur in the larger area surrounding the new airport, if it is actually built.

Planning for a potential OCS and attempts to substantiate its viability must move forward with or without that decision. Currently, the higher household and employment densities that exist in the Lake County and northwest Cook County areas traversed by the Waukegan-to-Spaulding segment, seem to indicate that this northernmost segment would have the highest probability of being able to support a suburb-to-suburb public transportation service in the shorter term. The number of locally supported potential stations is also highest in this segment. Given these circumstances, it would appear that today the northern end would have the highest potential for success.

Continuing in that hypothetical direction, by 2010 the next logical extension of this basic service territory would be into the central Spaulding-to-Joliet segment. By 2020, an extension into the southernmost Joliet-to-Lynwood segment would follow, since this area is projected to experience increased densities that could support a suburb-to-suburb commuter rail service, regardless of the construction of a new South Suburban Airport. The number of locally supported potential stations is smaller but equal in these two segments.

However, the locational specifics of higher-density residential developments and their counterpart employment sites (whatever their form--light industrial, office, retail, etc.) will be particularly important, as the respective concentrations of people and jobs would provide important nodes of travel origins and destinations. As this report has stated, the approximately equal-length geographical segment divisions were delineated solely for the compilation of data and early comparison of the general northern, central, and southern sectors. More than likely, a segment chosen for inaugural OCS on the EJ&E would not precisely coincide with any of the three arbitrary segments.

3.5.2 Commuter Rail Service Support Measures

Besides the population and employment densities being high enough to support an OCS, potential ridership will also depend on the ability of commuters to reach a station from their homes and reach their employment destinations from a station. Traditionally, with suburb-to-city commuter rail service, the focus is on the mode of access to the outlying station. While at most suburban stations the majority of rail commuters drive and park at the station, they also walk, cycle, take a bus or taxi, or are dropped off by another driver. At the destination (95% of the time downtown Chicago), fixed-route and shuttle buses or taxis await but the majority are able to walk to their workplace. Given current suburban land-use patterns, the majority of potential OCS suburb-to-suburb rail commuters would have to depend on modes other than walking to egress from the rail stations, particularly to the workplace destinations following their trips.

The home-to-station trip segment would continue to be provided by the same methods currently used by the traditional suburb-to-city commuters: park-and-ride, kiss-and-ride (drop-offs), local Pace bus service (either fixed-route or feeder buses), and some bicycle and walk trips. However, the biggest potential drawback to suburb-to-suburb work commute trips, as well as city-to-suburb trips (generally called “reverse-commutes”), would be at the employment/workplace end of the trip. These trips would require an improved local public transit system (i.e., distribution buses or vans as “reverse-feeder” services) between the individual stations and the major employment sites. These services could be provided either by public (Pace) bus service or private services sponsored all or partially by employers. Presently, there are only a few station-to-workplace shuttle services available to employees in suburban locations who might otherwise be rail commuters.

Some major employers, such as Sears at the Prairie Stone complex in Hoffman Estates, have some shuttle-bus services to and from the nearest available train station. They also provide longer over-the-road contract bus services from selected locations not in easy reach of reasonably direct commuter rail service. Sears became one of the earliest innovators of multiple types of transit connections in the region, in order to get their employees to the suburban Prairie Stone site when their headquarters was relocated from downtown Chicago. Some of the routes and services were discontinued when employees moved closer and drove to work, or took other jobs, but the process of facilitating their employees’ work trips is monitored continuously for potential alterations and new implementations. Although these shuttle services are bus- and van-oriented, there is a rail component in some of the trips. Notably, the implementation of an OCS in the EJ&E Corridor would allow for an on-site station and short shuttle-bus trip within the Prairie Stone development.

Another example for providing this type of employee-to-workplace service is the Lake-Cook Shuttle Bug, operating out of the three-year-old Lake-Cook Road Station on Metra’s Milwaukee District-North Line. This service, which provides employee access to many companies in the six-mile-long Lake-Cook office/light-industrial corridor, was funded at start-up primarily by a two-year CMAQ grant, and was successfully operated over that time by shuttle vans. Beginning in March 1998, small Pace buses replaced the original vans that provided shuttle service to the workplace from the station over six different corridor service routes. At present, they provide both morning and evening door-to-door shuttle service to over 500 daily riders.

The Shuttle Bug continues to be free to employees of subscribing companies, with a nominal charge of 50¢ per trip for other riders. Interestingly, while this shuttle service was originally expected to primarily accommodate city-to-suburb reverse-commute rail riders, the majority of the current shuttle users are suburb-to-suburb commuters coming from stations on the Milwaukee District-North Line north and northwest of the Lake-Cook Road Station. This station and its shuttle services can be considered a model for the potential OCS stations (including Prairie Stone), albeit in many cases at a reduced scale.

Pace is also offering similar shuttle services on a pay-per-ride basis out of the CTA Blue Line River Road Station to remote United Air Lines reservation and accounting centers west of O'Hare Airport, and from the CTA Orange Line Midway Airport Station along Archer Avenue to UPS administrative offices in Willow Springs. Although both trial shuttle bus operations are partially subsidized by CMAQ funds, similar services could just as easily be subsidized by cooperating employers in the business and industrial concentrations along the EJ&E Line. Other existing Pace reverse-commute feeder routes include service from the Lisle and Naperville Stations on the Burlington Northern Santa Fe to the I-88 East-West Tollway Corridor, and from the Wood Dale Station on the Milwaukee District-West Line to the Chancellory Business Park.

In addition to providing shuttle services at both workplace destinations and residential origins, future land uses in OCS station areas could be newly developed or altered to provide increased development densities. This "relatively recent" phenomenon has been dubbed Transit-Oriented Development (TOD), although many examples already existed along older established transit systems; they occurred more or less spontaneously through market forces. Today, such station-area designs are being supported and encouraged by insightful suburban communities, in Chicagoland and other major cities nationwide, that have either run out of space to grow in their station areas or are reviving their downtowns through concentrated pedestrian-oriented environments. TODs would obviously allow more walking access to the station at the residential ends of commuter trips, as well as providing commercial services to local residents that at the same time keeps the sales taxes in town. Workplace destinations can also take on the form of TODs, particularly in office and retail environments.

Several years ago, Metra and NIPC collaborated to produce the so-called Land Use Guidelines, a brochure and accompanying report that portrayed the important elements of a successful station area. A subsequent brochure and report examined the relationship between commuter rail stations and local commercial areas, and a comparable (upcoming) set is examining residential development in and around station areas. These documents can provide the basis for discussions with EJ&E communities on how to facilitate future developments that would support OCS implementation.

3.5.3 Need for Further Ridership Studies

Although the household and employment forecast numbers are substantial, it is obvious from the statistics presented in this section that any OCS decision needs to be based on more than just the household and employment projections. Specific locations of higher-density housing developments, commercial office and retail shopping centers, and light-industrial complexes also need to be analyzed in terms of their accessibility to individual train stations. Concentrated suburban developments and local transit services that can be made available to provide the necessary connections to supplement pedestrian access might be the most important components of developing suburb-to-suburb commuter rail service.

Given the increased population and employment densities along much of the EJ&E Corridor, and the likelihood of employer-provided shuttle services at commuter rail station locations, the ridership potential for an OCS along the EJ&E Corridor could be sufficient to consider commuter rail operation along the most-dense segment of the corridor. However, specific rail service parameters (segment end points, station locations, train scheduling) will have to be studied in much further detail in the next phase of the Study before any actual rail ridership projections can be developed.

4.0 POTENTIAL OPERATIONS

As noted earlier, the EJ&E route was divided into three segments for presentation of information gathered and general discussion purposes. Since ridership estimates and a line capacity analyses are not a part of this Phase I Feasibility Study, potential route segment or terminal options have not been determined. However, in order to be able to estimate potential capital costs, it was necessary to make some assumptions in general terms about how an OCS would operate. The assumed operating parameters are outlined below:

- The potential service would operate on weekdays from 6 a.m. to 12 midnight. Trains would operate hourly in each direction, except during peak periods. During the three-hour morning and evening peak periods, service would operate on 30-minute headways in each direction.

- Determination of the improvements necessary to safely and efficiently support commuter rail service were based on assumed service levels and operations.

- Commuter service would utilize either conventional rolling stock (diesel locomotives with passenger coaches) or diesel multiple units (DMUs), with the number of train sets dependent upon the eventual service segment or segments and final level of service proposed for start-up implementation.

- Potential community station locations come from meetings and discussions held with officials from each community, and are subject to change in future Study phases.

- Potential commuter station sites (including station buildings, parking lots, and other associated site improvements) would be funded, constructed, maintained, and operated by the host communities, although subject to Metra criteria and supervision.

- Train equipment would be stored and maintained at new layover facilities. The number and location of these layover facilities is dependent upon the eventual service segment or segments implemented. In addition, a new heavy maintenance facility would be constructed. The location of this facility also would be dependent upon the eventual service segment or segments implemented.

- Existing train speed limits were taken from the most recent EJ&E Timetable. Proposed 79 mph commuter train speeds are based on upgrading the railroad's physical plant (including signals) to permit higher operating speeds. Other factors such as station spacing and interlockings would not always allow such speeds to be attained.

- The location of the suggested CTC signal system was based on incorporating existing and potential siding interlocking signals, as well as a maximum spacing of two miles between track-side signals.

- Dwell times at potential stations were estimated to be two minutes. Turnaround time at terminal points (time to "change ends", i.e., reverse the train's direction) was estimated to be 15 minutes.

- Commuter service would be operated through a trackage-rights agreement. Trackage-rights would generally entail a fixed fee for Metra to operate over tracks maintained by the EJ&E, plus possible performance incentives for efficient dispatching and on-time performance. <u>The exact nature of any service agreement would be subject to negotiation and agreement between Metra and the EJ&E.</u>

4.1 STATION TYPES

Below are brief summaries of the potential commuter and transfer station sites. The noted transfer stations would add an additional stop on each of the existing Metra commuter lines, as well as necessitate coordination of schedules between trains operating on the EJ&E and the existing Metra commuter lines. This would likely require some adjustments to existing Metra commuter line schedules and operations.

Rail Segment 1: Waukegan to Spaulding

A total of thirteen potential station sites have been identified along this segment. Three would be transfer-only stations, located at Rondout (MD-N), Leithton (NCS), and Barrington (UP-NW). Three other potential station sites would be joint transfer and park-and-ride stations, located at Waukegan (UP-N), North Chicago (UP-N), and Spaulding (MD-W). Prairie Stone in Hoffman Estates would be a destination-only station (i.e., without park-and-ride facilities), while the other six stations in Green Oaks, Vernon Hills, Mundelein, Long Grove, Hawthorn Woods, and Lake Zurich would have park-and-ride facilities.

Rail Segment 2: Spaulding to Joliet

A total of eight potential station sites have been identified along this segment. Three would be transfer-only stations, located at West Chicago (UP-W), Eola (BNSF), and West Joliet (HC). The other five stations in Aurora, Naperville, Plainfield, Shorewood, and Joliet would have park-and-ride facilities.

Rail Segment 3: Joliet to Lynwood

A total of eight potential station sites have been identified along this segment. The station at East Joliet (RID) would be a transfer-only station. Two would be joint transfer and park-and-ride stations, located at Brisbane [(New Lenox) on the proposed SWS extension] and the existing Matteson/Park Forest (MED) station. The other five stations in Frankfort, Richton Park, Matteson, Sauk Village, and Lynwood would have park-and-ride facilities.

4.2 COMMUTER TRANSFERS

One of the things that has long been intriguing about an OCS is the potential for commuter transfers to and from existing Metra radial lines that the EJ&E intersects. This is an additional element that would make an OCS unique not only for Metra, whose existing routes are radial (Chicago CBD-oriented), but among commuter rail systems in general. Certainly the provision of suburb-to-suburb service is the primary motivator behind the entire investigation of feasibility, and there is ample enthusiasm about the need to provide rail travel to link homes and jobs in the suburbs. But as noted in the introduction to this report, OCS stations could also be utilized as origin or destination points for travel to downtown Chicago (or in reverse) by commuters transferring at one of the Metra/EJ&E rail intersections to (or from) existing Metra services.

An obvious benefit on inbound trips (to the City) would be reducing auto travel to outlying radial-line stations by commuters driving to and originating their trip from closer-to-home OCS park-and-ride stations. Frequent parking problems at existing stations could concurrently be avoided. For outbound trips (from the City), the obvious benefit would be increasing the number of potential destinations for reverse-commuters. There is also a third possibility that is a hybrid of the other two: utilizing the OCS as a link between existing radial lines to travel between suburbs that are not located along the EJ&E. One can envision travel, to cite just one example, between Crystal Lake on the UP-Northwest Line and Naperville or Aurora on the BNSF by transferring first in Barrington and later at Eola; the possible combinations are quite numerous. It remains to be seen which of these would prove to be more significant, or if commuters would take advantage of transfer opportunities at all. [It is well-documented, particularly in the computer-modeling of anticipated travel demand (i.e., ridership forecasting), that the need to transfer to or from trains on different routes provides a notable disincentive by adding to travel time (waiting) and general inconvenience.] There are many unknowns about potential utilization; hopefully any lurking disincentives can be identified and resolved in future Study phases. It might take all three categories of trips to attract sufficient ridership to make the OCS financially feasible.

As noted earlier, Appendix F tabulates Metra's service levels along each of its existing lines. While a detailed operational analysis of potential train meets between the EJ&E and other Metra lines has not yet been performed, a preliminary assessment of Metra's existing service schedules was made to suggest potential markets. Reviews of service levels on existing Metra lines, varying between one train per hour and five trains per hour during the peak morning and evening "rush-hour" periods, appear to indicate that transfers between the EJ&E and many of these lines could be feasible.

Transfers between Metra lines would provide something entirely new to Metra, but whether commuters would actually utilize them has yet to be determined. Scheduling of OCS trains along the EJ&E to create meets at the radial lines might appear to be relatively easy, but there would have to be a substantial amount of coordination with existing Metra schedules that would likely result in adjustments of train times and perhaps increased frequencies as well. The combined efforts of travel demand forecasting and line capacity analyses, including the testing of a variety of scenarios for both, will be the subject of subsequent studies.

4.3 INTERLINE OPERATIONS

It has been suggested that perhaps some current Metra trains could be routed onto the EJ&E for through-service to selected destinations. Consideration of actually switching Metra trains between OCS and radial lines at certain locations goes another step beyond commuters boarding and alighting trains at transfer stations while the train operations remain basically independent. Appendix C shows the location of intersecting rail-line quadrants in which there are existing connecting tracks between the EJ&E and the Metra lines. Among the eleven Metra lines, there are full and/or partial connecting tracks at nine of the intersections. If the switching of trains between rail lines should become a recommended mode of operation, additional connecting tracks could be required for those intersecting lines currently without them or in additional quadrants at some crossings.

For example, at Spaulding there are connecting tracks in the southwest and southeast quadrants of the intersection of the EJ&E and MD-W lines. These connecting tracks could easily be used by westbound OCS trains (westbound by timetable--actually northbound at this point) on the EJ&E switching lines to go either direction on the MD-W, or eastbound or westbound trains on the MD-W switching lines to go east (south) on the EJ&E. However, for eastbound (southbound) trains on the EJ&E to go either direction on the MD-W, or for eastbound or westbound trains on the MD-W line to go west (north) on the EJ&E, a backing maneuver would be necessary (as well as the engineer changing operation and control from one end of the train to the other), based on the current connecting-track alignments. Thus, additional connecting tracks in the northwest and/or northeast quadrants would likely be required to permit easier movement of trains between two lines.

If the physical movement of trains between rail lines begins to occur on a frequent basis, most of the existing connecting tracks would need to be upgraded (including turnout and rail replacement) to allow for a smooth and higher-speed switching of commuter trains between rail lines.

The City of Joliet has expressed interest in the possibility of OCS trains serving the downtown Joliet Union Station, which already serves two existing Metra lines and Amtrak, in addition to their preferred OCS park-and-ride station site located west of the downtown area. This could be accomplished by eastbound OCS trains on the EJ&E switching to the BNSF freight line north of the downtown area and subsequently switching to the HC, or westbound OCS trains on the EJ&E switching to the RID east of the downtown area, in order to access Union Station. In this case, such operations would combine the transfer options by first moving OCS trains onto the Rock Island District or Heritage Corridor to access Union Station, and then have commuters change to the existing radial-line trains. Another possibility would route the OCS trains through Union Station by utilizing the connecting track in the southeast quadrant of the RID/HC crossing, although that would require the train crew to change ends as discussed in the Spaulding example. These scenarios would also require review of operating trains through the lift bridge and BNSF connecting track in more detail to assess how such commuter train operations might work.

Detailed capacity and operational analyses to examine the feasibility of both passenger transfers and through-train service possibilities would occur in future Study phases, assuming that the EJ&E would be willing to consider such concepts. In order to best serve the noted commuting patterns, it could be more feasible to designate only certain existing Metra lines as transfer lines for the potential EJ&E service, based on the ridership projections and capacity/operational analyses performed during the next phase. Within this framework, consideration would have to be given to the timing between trains on the selected intersecting lines, with perhaps only certain designated trains stopping at transfer points.

4.4 SINGLE VS. DOUBLE TRACK

The initial examination of existing conditions necessary to estimate presumed capital improvement needs assumed that Metra commuter trains and EJ&E freight trains would operate on the same track. Current and projected levels of freight service appeared to allow such coexistence, albeit with track and signal upgrades as well as additional or lengthened passing sidings. The first set of cost estimates for capital improvements was based on this premise.

However, EJ&E management stated at the outset of the Study, and reiterated in subsequent discussions, that their existing track capacity would be required for present and future freight operations. This would require Metra to construct a separate and virtually exclusive track for commuter train operations, and would theoretically allow EJ&E exclusive use of their present physical plant without interference from Metra commuter operations. It would also, theoretically, allow Metra to operate without interference from EJ&E freight operations. However, at least three potential operating difficulties quickly became apparent:

- How would EJ&E service industries on the “Metra side” of the right-of-way? EJ&E local switching operations would have to either cross over Metra’s track to access an industrial siding, or EJ&E locals would have to operate on portions of the new “Metra track” to reach a new turnout connected to the siding. In either case, additional interlockings would be required if CTC is installed.

- How would Metra's commuters coming from a station and park-and-ride facility on "EJ&E's side" of the right-of-way get to the platform safely? There could only be one platform, located on the "outside" of the Metra commuter track. Metra would have to install (and the EJ&E would have to permit) signalized crosswalks at these locations, which would mean that commuters would be walking across the active freight track. Otherwise, pedestrian underpasses could be required.

- How would either freight trains or commuter trains pass one another? At present, the EJ&E has passing sidings at strategic locations (some are used occasionally for train storage), but the location of these sidings would be usurped by "Metra's track" located beside "EJ&E's track". Obviously, since the EJ&E requires use of these sidings, Metra would have to build "outside" of the two tracks resulting in three parallel tracks at some locations. However, Metra would also need passing sidings of its own to allow two commuter trains to pass each other. This would require <u>separate</u> passing sidings for each operation, with "Metra's sidings" located in between (longitudinally) those utilized by the EJ&E. Certain locations would find four tracks side-by-side, which might not always be practical in restricted right-of-way.

For these reasons, and in order to reduce required capital expenditures, it was proposed that freight and commuter trains would operate together on the mostly single-track EJ&E, at least for initial service, with Metra passing sidings separate from (i.e., interspersed between) EJ&E passing/storage sidings. In some cases, existing EJ&E sidings would be lengthened and shared. However, in order to address the very real possibility that separated operations would be necessary, and assuming that the potential "problems" cited above could be overcome, the EJ&E management's expressed desire to separate commuter and freight operations must be examined.

Brief descriptions and order-of-magnitude capital cost estimates for three scenarios are provided in the next section. Exactly how Metra OCS commuter trains would operate under any of the three alternative physical plant arrangements remains an open question. Such operational determinations are more suitable in the context of line capacity analyses, where freight and commuter train scheduling options and usage forecasts are tested against current and proposed improvements to the physical plant. Potential single- and double-track operations will be an important component of the series of line capacity analyses in subsequent phases of the overall EJ&E Study.

5.0 CAPITAL IMPROVEMENTS

This section identifies, in general, the items analyzed for upgrading of each segment in order to accommodate commuter rail service. It is important to note that all of the upgrades described would be for the main line track only. Based on discussions with the EJ&E, all existing sidings are used as directional sidings as well as storage sidings. Thus, it is assumed that any necessary passing sidings for commuter rail use would need to be newly constructed, and the existing sidings would not be used by commuter trains due to their possible use and ready availability for storage or passing of freight trains by the EJ&E.

However, potential emergency use of existing sidings cannot be excluded, so upgrades to turnouts and crossovers would be made while other existing physical conditions on the sidings would remain as they are. In addition, the suggested improvements have been developed based on an assumed level of commuter service and levels of freight-train activity. More rigorous analyses, in particular computer simulations of operations (line capacity analyses), would be required before final improvements could be determined. Again, keep in mind that <u>the required improvements presented in this section are considered necessary to operate commuter trains efficiently, and are not intended to portray or imply that the current EJ&E physical plant and infrastructure is in substandard condition for operating their freight service.</u> Appendix L contains a detailed cost estimate for each segment (including a more-detailed breakdown of quantities), and also wetland maps and floodway maps for new potential passing siding locations. The following section describes the required improvements for the joint-running single-track alternative.

5.1 IMPROVEMENTS TO PHYSICAL PLANT

5.1.1 Track

Replacement of some existing main track with 136# continuous welded rail (CWR) would be necessary due to soft spots and/or poor welds in existing gas-welded rail, existing jointed rail, and rail wear through curves.

5.1.2 Ties

Tie counts along the main line revealed that between 10% and 30% (depending upon the segment) of the existing ties would need to be replaced. The vast majority are due to aging rather than mechanical wear.

5.1.3 Roadbed

The majority of the identified problems with the existing roadbed should be alleviated by undercutting the ballast along the respective segments and adding new ballast. In addition, the ditch line should be recut and/or cleaned out for the entire length of each segment to restore proper drainage. In some areas, the fill has narrowed, resulting in the lack of a ballast shoulder next to the rail. Additional fill would have to be placed to restore proper side slopes and ballast shoulders to the roadbed.

5.1.4 Other Track Material (OTM)

The most significant items that need to be added to the rail system are rail anchors. As the rail anchoring pattern is sporadic along the line, box anchoring on every other tie along each segment would be necessary.

5.1.5 Turnouts

In order to permit higher-speed commuter operations, existing turnouts to connecting tracks and to sidings leading to connecting tracks would be upgraded to No. 20 turnouts and rail-bound manganese frogs with guard rails. Although existing sidings are assumed to only be needed for emergency situations, the turnouts and crossovers leading into and out of the sidings would be upgraded with rail-bound manganese frogs (the existing switches will remain). Turnouts leading to industrial leads and storage yards not accessed by commuter rail would also have the existing solid frogs upgraded to rail-bound manganese frogs.

5.1.6 Passing Sidings

In order to permit an assumed service frequency of 30 minutes during peak periods for each station site, several miles of new passing sidings would need to be installed (their final length and location would be dependent upon the selected operating route length and location). The EJ&E has indicated that their existing sidings are used as directional sidings, as well as storage sidings, so it was assumed that the existing sidings could not be used for train-passing movements due to the potential of freight trains being stored on the sidings. Thus, new sidings would need to be constructed to allow for Metra train meets.

In determining passing siding lengths and locations, as well as the number of train sets needed to operate over each segment, a very preliminary train operation schedule between station sites was determined. By using the assumed service level of a train every 30 minutes at each potential station location proposed by the communities (during the morning and evening peak periods), a very rough timetable was developed. Analysis of train movements in the timetable determined sections of the rail line where train meets would most likely occur, and thus the location and length of passing sidings was ascertained. These determinations would be subject to considerable refinement in the next Study phase, where capacity and operations would be computer-modeled for freight and commuter operations. At this point in the overall Feasibility Study, the precise location of future passing sidings is less important than having a general number and length of sidings to contribute to developing order-of-magnitude capital cost estimates.

5.1.7 Structures

In areas of new passing sidings, all bridges carrying the EJ&E tracks over a feature would need to be widened to accommodate the second track, and all culverts would need to be extended due to the additional roadbed width associated with adding a second track.

5.1.8 At-Grade Crossings

All existing roadway crossings would be upgraded (as necessary) to crossbucks, bells, flashing lights, and gates. Reconstruction of the crossings would be performed in conjunction with the signal upgrades. For those crossings which would be double-tracked (due to the addition of new passing sidings), not only would the signals be modified and/or upgraded to crossbucks, bells, flashing lights, and gates, but the entire roadway crossing would be reconstructed. All at-grade crossing improvements would be to the signal system and/or roadway only. [Note that potential new grade separations of the railroad from roadways are not included as part of this Phase I Study; they could be considered in future Study Phases if IDOT and/or the respective communities deem them to be necessary or desirable. Grade separations are considered to be outside the purview of the overall Study, and therefore would have no effect on the capital cost estimates.]

5.1.9 Signals

Each segment would be upgraded to full centralized traffic control (CTC). This would necessitate adding control points, intermediate signals, universal crossovers, new interlockings at some locations, and modification of existing siding signals. Included as part of the CTC are switch machines, circuit microprocessor controls, radio-controlled data systems, electrically coded track circuits, underground cable, control signals, signal relays, and signal instrument housings. For the initial service segment, wherever it eventually would occur, the following additions and upgrades would be necessary:

- New CTC control points for new sidings
- Modification of existing signalized sidings to CTC control points
- Intermediate signals, at approximately two-mile spacing
- Universal crossovers for new sidings four miles or greater in length
- New interlockings at Rondout, Barrington, West Canal Bridge (Phoenix Line, MP 2.4), East Canal Bridge (intersection of the EJ&E and BNSF, MP 1.6), and East Joliet (intersection of the EJ&E and RID, MP 0.8)

5.1.10 Storage Yards and Maintenance Facilities

In order to permit overnight storage of trains and proper positioning of train sets to allow 30-minute service levels during the morning peak period, storage yards would need to be constructed along the rail line. They would be necessary at both ends of the service route, with the possibility of an intermediate location as well, depending upon the length and location of the actual start-up service route. The storage yards would consist of several tracks allowing overnight storage of trains, a welfare building for train crews, and a parking lot for train crew vehicles. Only the interior cleaning of the trains would occur at these yards.

A heavy maintenance facility would also have to be built. Due to its central location along the EJ&E line, Eola appears to be the most logical location, as it would provide the flexibility to service the entire rail line in the future, should the potential service expand that far. More discussion regarding the heavy maintenance facility is in Section 5.3.

5.2 JOLIET YARD

Several challenges are presented for trains operating through the Joliet area. First, west of the Joliet Yard there is a lift bridge over the Des Plaines River. This bridge is currently single-tracked, with room for a second track. Due to the large amount of river traffic, the bridge is normally left in the open position and lowered for train movements. The speed limit over the bridge is 10 mph, and it is within an interlocking which includes not only the bridge, but also the connecting track to the BNSF line on the east side of the Des Plaines River. Thus, any train using the connecting track holds the interlocking, preventing use of the bridge by other trains until the interlocking is cleared. Second, EJ&E freight trains utilize designated existing tracks to bypass the Joliet Yard, if that is not their destination.

A new bypass track would be constructed to allow commuter trains to pass through the yard without conflict with normal yard and train operations. In order to keep freight and commuter traffic separated as much as possible, and allow higher-speed operation of commuter trains, several improvements are suggested. (Note: These upgrades are subject to revision and refinement after further analysis of freight operations):

- Construct a separate bridge over the Des Plaines River for commuter use, south of the existing bridge. This bridge would have sufficient clearance over the river so that there would be no interference with river traffic. To accomplish this a declining grade approximately 3000' in length (the approximate length of the fill required to provide sufficient clearance over the Des Plaines River), would be necessary on either side before returning to the main line right-of-way.

- Construct a new track at the south end of the rail yard for use as a commuter bypass track. This track would be signalized and exempt from yard operating rules. This would include new turnouts, some track relocation, and other miscellaneous items associated with creating the new bypass track, with the intent of eliminating the mixing of freight and commuter traffic on existing tracks designated for through freight trains.

5.3 RAIL SUPPORT FACILITIES

For service along the EJ&E line, construction of a new heavy maintenance facility at Eola would be recommended. This is necessary due to the limited capacity remaining at Metra's existing heavy maintenance facilities at Western Avenue and 47th Street, as well as the fact that OCS trains would have to make separate off-line deadhead trips to get there. Typical operation of this facility would require train sets to rotate through this facility during off-peak periods once per day. Thus, a centralized location along the rail line lends itself to the most efficient operation of train sets by avoiding or minimizing deadhead movements (movements of empty train sets into the facility). The expansion of the existing Eola siding area appears to afford the best opportunity for the maintenance facility location.

While this facility might not necessarily be centered along the overall EJ&E route, dependent upon the service route ultimately selected for initial service start-up, it would be positioned to service trains along the entire rail line, should implementation along the entire rail line eventually become feasible. If the route segment eventually selected for commuter rail service does not include Eola, recommended alternate locations for this heavy maintenance facility along the EJ&E line would be: Spaulding siding area (west side of the EJ&E track), West Chicago siding area (west side of the EJ&E track), or the Joliet Yard (south end). The final location of this facility would be determined based on the actual service segment chosen, and would be subject to negotiation and agreement with the EJ&E.

This facility would most likely include storage tracks for trains using the facility, a train washing facility for cleaning the exterior of the train sets, and a heavy maintenance building for inspection and repair of locomotives, cab cars, and passenger coaches.

5.4 ROLLING STOCK

For each segment, the minimum number of train sets necessary to provide service to each station site at 30-minute intervals during the morning and evening peak periods was estimated. The northern and southern segments would require four train sets, while the central segment would require six train sets. The number of train sets remains constant whether conventional Metra train sets or diesel multiple units (DMUs) are used. They are determined by their ability to cover the proposed schedules and service levels, and in particular to provide the ability to recycle equipment, i.e., for each train set to have enough time in the schedule to change the direction of travel at the terminal.

The precise number of coaches (and consequent seats) in each train set cannot be determined until a decision on the most appropriate rolling stock is made. In turn, the type of equipment (DMUs or conventional) will be largely influenced by the overall travel demand forecasts (ridership projections) as well as the distribution by time of day. Therefore, for the moment the consists (a consist is the locomotive and number of coaches) are considered equivalent in order to compare projected capital costs for the two types of rolling stock. Each of the rolling-stock alternatives have benefits and drawbacks associated with them that must be carefully evaluated, including initial cost, operating and maintenance costs, flexibility of train sets, operational reliability, and conformance with the requirements of the Americans with Disabilities Act (ADA).

5.4.1 Conventional Rolling Stock

Diesel locomotives with passenger coaches have been the conventional mode of rolling stock for commuter rail systems around the country. This equipment is currently used by Metra on most of its routes in the Chicago area [Metra's Electric District and NICTD's South Shore Line use electric multiple units (EMUs)]. Conventional rolling stock operates on a push-pull concept, with a locomotive at one end of the train set and a cab car at the opposite end. The locomotive supplies all of the power necessary for operation of the train. The cab car combines an operating cab with a passenger coach, permitting operation of the locomotive from the opposite end of the train, with no need to turn the train around to change the direction of travel.

Conventional train sets have been successfully used in commuter applications for many years, and have established a proven performance and safety record. Advantages include existing maintenance facilities and trained operators and mechanics. They also are compatible with existing train sets used on the Metra system. Disadvantages include the need for a locomotive with the coaches in order to comprise a train set, resulting in less flexibility for interchange of units, and the need for the same-size locomotive to power a train set, regardless of the number of passenger coaches in the consist.

Passenger cars are available in single-level and bi-level ("gallery car") coach configurations. The single-level coaches seat approximately 100 to 120 passengers per car, while the conventional gallery cars used by Metra today can each accommodate 140 to 160 passengers per car (the amount varies by original specifications given to or developed by the manufacturer). All new passenger coaches are designed to be ADA-compatible; the required larger rest room and open area to accommodate wheelchairs reduces the overall seating capacity. The larger figure for number of available seats reflects the older non-accessible coaches still in use. Shifting of equipment from the current roster, including additional rehabilitations of older coaches as done for the North Central Service, would result in a variation of total available seats in each consist.

The approximate cost of a new diesel-powered locomotive is $2.4 million. New conventional passenger coaches (gallery cars), including cab cars, have an average cost of about $2 million per car. Each conventional train set would have a consist of one locomotive and five coaches, with one spare locomotive and two spare coaches added to the total for each segment. These rolling stock numbers are portrayed in the capital cost estimate tables.

5.4.2 Diesel Multiple Units

DMUs are self-contained diesel-powered units, providing both the propulsion and operating systems for the car as well as coach seating for passengers. Both DMUs and EMUs are used extensively in Europe and many other locations worldwide. DMUs can operate as single units, or in train sets of up to ten cars; they can seat approximately 85 to 105 passengers, depending upon seating design and configuration. Although the DMU operates on the principal of all cars in a set providing propulsion power, unpowered trailer cars may be used, with some subsequent service degradation (e.g., slower acceleration rates resulting in longer travel times). A DMU train set can operate in either direction, with cabs located at both ends of each car and therefore each train set. Although much lighter in weight than conventional rolling stock, the DMUs would be designed to meet Federal Railroad Administration (FRA) standards.

DMUs appear to be a good option for low-density passenger corridors, or corridors with higher usage during peak-period commutes and lower usage during the remainder of the day (the circumstances anticipated on the potential OCS). The individually powered cars enable trains to be configured in larger sets to handle the peak periods, and to easily break down into smaller sets to accommodate a smaller commuter demand during off-peak periods. DMUs also have an advantage over conventional train sets with faster acceleration rates and reduced travel times. DMUs generally accelerate faster than conventional locomotive-hauled equipment, which usually leads to greater operating economies, particularly for short trains. Since each DMU car is self-propelled, they have the advantage of maintaining the same hauling capacity per car, as opposed to a conventional train set where the hauling capacity diminishes as passenger cars are added. A locomotive hauling two cars does not perform the same as a locomotive hauling four cars.

Disadvantages of the DMUs over conventional rolling stock include the larger up-front capital investment for the DMUs, stocking of separate and different repair parts, modification of maintenance facilities or construction of new maintenance facilities, and training of operators and mechanics. The DMU is designed for maintenance in standard facilities but, as most of the equipment is located under the car, pit space must be provided for maintenance. Special equipment may be necessary to maintain the engines, transmissions, and gear units, as these are non-standard elements when compared to existing conventional rolling stock.

Several foreign manufacturers, including Nippon Sharyo, ABB, Siemens-Duewag, and Bombardier have begun development of new DMUs that will conform to FRA requirements. Of these, the Nippon Sharyo equipment appears to be most advanced. The prototype (not yet built) Nippon Sharyo DMU has been designed to meet all FRA requirements as well as the applicable requirements of the Federal Transit Administration and ADA. This DMU has been designed around an existing EMU car body that is presently in use on the NICTD South Shore Line, which operates between northwestern Indiana and downtown Chicago. The proposed cars have been designed, but it is not known when production of such units would make the DMUs available. When a prototype is built, it will still need to be FRA-tested to ensure compliance with existing rail car standards.

The cost of DMUs has been difficult for suppliers to estimate, as necessary modifications to meet FRA standards are not known at this time. This cost may vary depending upon options selected and quantity ordered, among other variables, including potential additional costs for providing ADA compatibility. For this reason, a conservative projection of $3 million for each unit was used in developing the estimated costs. Each DMU train set would have a maximum consist of five cars, the same as the conventional consists in order to derive comparable cost figures, even though the number of available seats would likely be smaller. These rolling stock numbers are portrayed in the capital cost estimate tables.

5.5 COMPARATIVE CAPITAL COST ESTIMATES

Estimated capital costs for the entire potential EJ&E/OCS route are within an order-of-magnitude range between $605.7 and $638.9 million, as portrayed in Table 7. The $33 million difference is due solely to the two types of rolling stock proposed. More to the point, the table indicates that the cost differential among the three segments is relatively small, particularly when the costs are displayed on a cost-per-mile basis. Keep in mind that the evaluation of alignment options should not focus solely on the lowest cost estimate, since those with higher costs might also have more stations and general community support. Additional details of the capital cost estimates in this table is provided in Appendix L.

Included as part of these estimated capital costs are $9.8 million for two new train layover facilities, $24.9 million for a new heavy maintenance facility, $1.9 million for initial procurement of spare parts inventory, and $20.5 million for modifications to the Joliet Yard (including track and signal work, and the new bridge over the Des Plaines River). Depending upon the chosen terminals and initial operating segment at the time of service start-up, all of these costs may not be incurred at once. For example, modifications to the Joliet Yard would not be necessary unless the initial OCS operation would run through the Joliet Yard. In addition (at least initially), heavy maintenance might be able to be performed at one of Metra's existing facilities.

The cost estimates include a contingency level of 30% of estimated capital costs. This contingency level is appropriate since no facilities have had any in-depth design or engineering, even conceptually. The level of contingency will decrease, and the confidence in the capital cost estimates will increase, if and when the project proceeds through the design phase. Also included in the estimates is a 12% allowance for potential costs associated with the proposed project such as design, engineering, and construction management.

The cost estimates in Table 7 result from a scenario of operating potential Metra OCS trains jointly with freight trains on the mostly single-track EJ&E. Metra initially felt that the levels of freight traffic on the existing EJ&E route were moderate enough that a second track would not be necessary. However, EJ&E management indicated that they desired a separate Metra-exclusive track to isolate commuter operations from their freight service. As a result, two other scenarios were created, as described in the next section.

5.6 ADDITIONAL INFRASTRUCTURE

The potential difficulty of operating commuter trains on the same tracks with freight trains, particularly when freight train traffic is quite frequent, was noted earlier. At the specific request of the EJ&E, capital cost estimates were developed for an alternate scenario that would add a second track parallel to the existing physical plant to allow for separated freight and passenger operations. Table 8 summarizes the capital cost estimates for a two-track EJ&E/OCS alternative that provides Metra with a separate track on which to conduct the potential OCS operations. The order-of-magnitude costs range between $873.6 and $906.8 million, again with the difference due solely to the two types of rolling stock proposed. As discussed above, the costs for new layover facilities, a new heavy maintenance faciltiy, and modifications to the Joliet Yard are included as part of these estimated capital costs.

The first alternate scenario essentially provides a new track, passing sidings, signal system and interlockings, new bridges parallel to existing EJ&E bridges, and additional track through grade crossings (signals would operate for either EJ&E freight or OCS commuter trains), all for the virtually exclusive use of Metra commuter trains. The cost estimates for park-and-ride stations or transfer facilities would be increased slightly due to some necessary reconfigurations caused by staying on one side of the right-of-way. Costs for requisite layover and maintenance facilities and necessary rolling stock would not change. What is not included in this second set of capital cost estimates are improvements to the track, sidings, and turnouts, track-side signal system, or any other components of the existing EJ&E physical plant. These were included in the joint-running scenario, but would not be necessary in the separated-operations scenario.

However, despite the potential separation between freight and commuter trains, there is a very real possibility that Metra's trains by themselves could still encounter performance-reliability problems. For example, scheduled train meets must be timed rather precisely so that two trains operating in opposite directions on the single track will meet at the designated passing point. If there are delays for any reason to either of the trains, one train must wait on the siding until the other arrives. Instead of one late train, there would be two, and the problem would be compounded when late arrivals at the terminal begin a domino effect of late trains.
Currently, Metra has several routes on which portions are operated with only a single track. Generally, these routes provide less than the optimal full-service (20-minute headways in the peak period/peak direction, hourly in both directions in off-peak) that is present on most existing Metra lines, and certainly fall short when trying to serve suburban employment destinations. Two examples illustrate the point:

- On the Milwaukee District North Line (MD-N) to Fox Lake, there is no reverse-commute service on the single-track segment west of Rondout to take potential commuters to or from suburban jobs in the peak period. This is due to the steady stream of peak-period trains that serve peak-direction commuters, while there is no second track which could allow for reverse-commute trains to pass them. In the morning, the first Chicago-bound train leaves Fox Lake at 4:50 a.m., while the first outbound (reverse-commute) train does not arrive in Fox Lake until 8:31 a.m. In the evening, no Chicago-bound train leaves Fox Lake between 4:05 p.m. and 7:15 p.m. In addition, hourly service in the off-peak is only available to Grayslake, with the four station stops northwest of Grayslake having only two-hour service due to the inability of trains to recycle and pass each other on the single track (the Grayslake train lays over on a siding).

- On the 2½-year-old North Central Service (NCS) to Antioch, only limited service consisting of four trains (roughly 30-minute headways) in the peak-period peak-direction is available, due to the line being mostly a single-track operation. A single midday train is provided in each direction in the off-peak. Any potential expansion of this service, for which there is great demand, must await the completion of the second track. While some of the new NCS commuters might feel that something is better than nothing, the fact remains that this service is not competitive with adjacent full-service lines. Therefore, it has not achieved its full potential of diverting riders to the new service, relieving pressure on commuter parking at several existing stations as intended.

The best way to eliminate or at least significantly reduce potential operating problems created by single-track operation is to provide for a double-track commuter operation, with trains running in a single direction (but still with bi-directional signals to route around disabled or delayed trains) on each of the two tracks. Physically the system would require two main tracks plus a series of crossovers and interlockings allowing the flexibility to switch mains, as well as generally double the number of turnouts, diamonds, and signals. Grade crossings would have to allow for a second Metra-exclusive track, and second Metra-exclusive bridges would also be required at each location. Station facilities would have to provide a second platform, including stairways and ramps to access them. Essentially, all of the estimated capital cost figures would be doubled with the exception of rolling stock and depots/parking lots at stations.

Metra prides itself on its on-time performance on the existing system, making every effort to provide consistent and reliable service. Potential new services, including the proposed OCS in the EJ&E Corridor, must not be allowed to degrade that record. However, providing a service that can take people to suburban job locations is a particularly important aspect of potential circumferential routes that do not terminate in downtown Chicago. The proposed OCS and the proposed Inner Circumferential Service (ICS) routes would serve not only multiple residential origins (like existing lines now serve) but also multiple employment destinations (not the concentrated Chicago CBD like existing lines now serve), presenting a critical need to provide frequent service throughout the service-day. Since there would be many suburban employment concentrations that must be served, the assumption has therefore been made that the OCS and the ICS must provide a minimum of three-hour-peak 30-minute headways, and hourly service throughout an 18-hour service-day, in order to be effectively utilized to their full potential by new Metra commuters.

For the counterpart ICS, both the single-and double-track options assume that Metra trains would operate separately from freight trains, due to the heavier (than EJ&E) levels of freight traffic that are already present on the Indiana Harbor Belt Railroad (IHB) and the Belt Railway of Chicago (BRC). However, given the present levels of freight traffic (and short-term projections of expected traffic increases), Metra considered it feasible to suggest joint operation of EJ&E freight trains and OCS commuter trains on a single-track-with-passing-sidings alternative that would include improvements to the existing EJ&E physical plant.

Metra operates the North Central Service (albeit with a limited number of trains) on single track along with Wisconsin Central freight trains, and current plans are to continue joint operations on two tracks when the ongoing NCS double-tracking project is completed. Metra believes that similar operations could also be feasible on the EJ&E, a concept that would be discussed with EJ&E management during future Study phases and especially during the line capacity analyses in Phase II. (Note that if two-track joint running should become acceptable, some cost elements could change, e.g., additional crossovers and interlockings to add flexibility or some reduced crossover and interlocking requirements at freight sidings on the "Metra track".) If implementation of an OCS is pursued after additional studies, such operations would have to be negotiated with the EJ&E. A lot will depend upon the levels of EJ&E freight traffic that are current (and projected) at the time when such a decision might be made.

Further Metra studies would provide more information on potential ridership expectations, and how different service levels might influence Metra's ability to attract commuters to the potential OCS. In particular, the line capacity analyses in Phase II will portray the numbers of trains that can be operated on various levels of physical infrastructure that might be provided. However, Metra knows from experience that, in general, providing more trains attracts more riders. In order to operate more trains, Metra-exclusive double track could be the ultimate objective; this would be Metra's responsibility alone if joint operations continue to be unacceptable to the EJ&E management. Should that become the desired option for both parties, the capital cost estimates could be expected to increase beyond (higher than) the summary costs portrayed on Tables 7 and 8. The third-scenario order-of-magnitude costs would increase to between $1.314 and $1.347 billion (see Table 9). Again, costs for new layover facilities, a new heavy maintenance faciltiy, and modifications to the Joliet Yard are included as part of these estimated capital costs. Based on what is known at this time, the sets of figures in Tables 7, 8, and 9 can be regarded as a projected three-scenario range which encompasses the minimum and maximum order-of-magnitude cost estimates for the entire 105-mile route.

TABLE 7

Capital Cost Estimates for Joint-Running Single-Track Outer Circumferential Alternative

Categories of Capital Infrastructure Requirements			Segment 1 Waukegan to Spauldi		Segment 2 Spaulding to Joliet		Segment 3 Joliet to Lynwood		Other[3]		Total Entire Route	
Description	**Unit**	**Unit Cost**	**Quantity**	**Cost[1]**	**Quantity**	**Cost[1]**	**Quantity**	**Cost[1]**	**Quantity**	**Cost[1]**	**Quantity**	**Cost[1]**
New Track, including Grading (ground level)	Track-mile	$1,500,000							1.5	$2.3	1.5	$2.3
New Track (subballast, ballast, ties, rail, other track material)	Track-mile	$950,400	8.5	$8.1	9.8	$9.3	6.8	$6.5			25.1	$23.9
Major Excavation and Grading (new embankment)	Track-mile	$96,800	8.9	$0.9	9.8	$0.9	6.8	$0.7			25.5	$2.5
Rehabilitated Track (rail, other track material)	Track-mile	$501,600	19.0	$9.5	15.2	$7.6	27.1	$13.6			61.3	$30.7
Rehabilitated Track (ties, rail, other track material)	Track-mile	$765,600							1.1	$0.8	1.1	$0.8
Install Turnouts	Each	$150,000	24	$3.6	33	$5.0	25	$3.8	10	$1.5	92	$13.8
Install Crossovers	Each	$300,000			2	$0.6	2	$0.6			4	$1.2
Install Diamonds	Each	$300,000							1	$0.3	1	$0.3
Track Removal	Track-mile	$158,400	19.0	$3.0	15.2	$2.4	27.1	$4.3	0.2	$0.0	61.5	$9.7
Remove Existing Turnouts	Each	$20,000	16	$0.3	27	$0.5	21	$0.4	9	$0.2	73	$1.5
Tie Replacement	Each	$80	16,525	$1.3	16,980	$1.4	28,070	$2.2			61,575	$4.9
Ballast Undercutting and Track Surfacing	Track-mile	$282,500	36.5	$10.3	44.6	$12.6	31.0	$8.8			112.1	$31.7
Rehabilitated Frogs	Each	$12,000	19	$0.2	26	$0.3	24	$0.3			69	$0.8
Drainage Ditch Cutting / Cleaning	Track-mile	$7,900	73.0	$0.6	89.2	$0.7	62.0	$0.5			224.2	$1.8
Salvage and Scrap	Lump Sum	n/a	1	($0.9)	1	($0.7)	1	($1.2)			3	($2.8)
	Subtotal Track Work			**$37.0**		**$40.7**		**$40.3**		**$5.1**		**$123.1**
New Bridges	Linear Foot	$10,000	677	$6.8	65	$0.7			1,520	$15.2	2,262	$22.6
Extend Existing Culverts	Linear Foot	$150	700	$0.1	525	$0.1	400	$0.1			1,625	$0.2
Relocate Retaining Wall	Linear Foot	$300							675	$0.2	675	$0.2
	Subtotal Bridges			**$6.9**		**$0.7**		**$0.1**		**$15.4**		**$23.1**
Upgrade Existing Crossing to CFBG	Each	$200,000	13	$2.6	23	$4.6	1	$0.2			37	$7.4
Add Second Track, Rebuild Crossing, Relocate Signals	Each	$355,000	12	$4.3	8	$2.8	13	$4.6			33	$11.7
Upgrade Existing Pedestrian Crossing to CFB	Each	$100,000			4	$0.4					4	$0.4
	Subtotal Grade Crossings			**$6.9**		**$7.8**		**$4.8**				**$19.5**
Install New Interlockings	Each	$1,500,000	2	$3.0	4	$6.0	3	$4.5			9	$13.5
Install Intermediate Signals, Bi-Directional CTC	Each	$450,000	23	$10.4	23	$10.4	16	$7.2			62	$27.9
Install Intermediate Signals, One Track / One Direction	Each	$150,000	15	$2.3	8	$1.2	8	$1.2			31	$4.7
Modify Existing Signals	Each	$100,000	15	$1.5	41	$4.1	36	$3.6			92	$9.2
Remove Existing Signals	Each	$50,000	2	$0.1	6	$0.3	4	$0.2			12	$0.6
Install Electric Locks	Each	$100,000	25	$2.5	32	$3.2	15	$1.5			72	$7.2
	Subtotal Signal System			**$19.7**		**$25.2**		**$18.2**				**$63.1**
Park-and-Ride Stations / Transfer Facilities	Lump Sum[2]	n/a	13	$8.9	9	$13.8	7	$5.6			29	$28.3
Layover Facilities, Maintenance Facility, Spare Parts	Lump Sum[2]	n/a								$36.6		$36.6
Subtotal Stations and Coach Storage / Maintenance Facilities				**$8.9**		**$13.8**		**$5.6**		**$36.6**		**$64.8**
Subtotal for Physical Plant including Stations				**$79.3**		**$88.2**		**$69.0**		**$57.1**		**$293.5**
Contingency (30%)				$23.8		$26.4		$20.8		$17.2		$88.1
Engineering, Design, and Construction Management (12%)				$9.5		$10.6		$8.3		$6.9		$35.2
Total Estimated Cost of Improvements to Physical Plant				**$112.6**		**$125.1**		**$98.1**		**$81.1**		**$416.9**
Locomotives (including one spare)	Each	$2,400,000	5	$12.0	7	$16.8	5	$12.0			17	$40.8
Coaches (including two spares)	Each	$2,000,000	22	$44.0	30	$60.0	22	$44.0			74	$148.0
Subtotal Rolling Stock (Conventional)				**$56.0**		**$76.8**		**$56.0**				**$188.8**
Diesel Multiple Unit Passenger / Operating Units (including two spares)	Each	$3,000,000	22	$66.0	30	$90.0	22	$66.0			74	$222.0
Subtotal Rolling Stock (DMUs)				**$66.0**		**$90.0**		**$66.0**				**$222.0**
TOTAL ESTIMATED CAPITAL COST (Conventional Rolling Stock) (1997 dollars)				**$168.6**		**$201.9**		**$154.1**		**$81.1**		**$605.7**
TOTAL ESTIMATED CAPITAL COST (DMUs) (1997 dollars)				**$178.6**		**$215.1**		**$164.1**		**$81.1**		**$638.9**
Total Route Length / Estimated Capital Cost Per Route Mile (Conventional Rolling Stock			36.5	**$4.6**	44.8	**$4.5**	30.9	**$5.0**			112.2	**$5.4**
Total Route Length / Estimated Capital Cost Per Route Mile (DMUs)			36.5	**$4.9**	44.8	**$4.8**	30.9	**$5.3**			112.2	**$5.7**

[1] Figures are in millions of dollars, rounded to a single decimal point. Due to rounding of numbers, columns may not appear to add correctly. See Appendix L for more-detailed breakdown of costs.

[2] Station cost figures are order-of-magnitude estimates, with site-specific factors such as length of platform, size of depot or parking lot (all require ridership estimates) subject to change in the MIS or Phase II Feasibilit
Additional land for parking expansion or potential environmental concerns that could require mitigation will be determined at that time.

[3] This category includes modifications to the Joliet Yard, new train layover facilities, and a new heavy maintenance facility.

THERE ARE NO COST ESTIMATES FOR LAND ACQUISITION OF POTENTIAL STATION SITES, COACH YARD STORAGE SPACE, OR ADDITIONAL RIGHT-OF-WAY.

TABLE 8

Capital Cost Estimates for Metra-Exclusive Single-Track Outer Circumferential Alternative

Categories of Capital Infrastructure Requirements			Segment 1		Segment 2		Segment 3		Other[3]		Total	
			Waukegan to Spauldi		Spaulding to Joliet		Joliet to Lynwood				Entire Route	
Description	Unit	Unit Cost	Quantity	Cost[1]	Quantity	Cost[1]	Quantity	Cost[1]	Quantity	Cost[1]	Quantity	Cost[1]
New Track, including Grading (ground level)	Track-mile	$1,500,000							1.5	$2.3	1.5	$2.3
New Track (subballast, ballast, ties, rail, other track material)	Track-mile	$950,400	45.2	$43.0	51.8	$49.2	37.7	$35.8			134.7	$128.0
Major Excavation and Grading (new embankment)	Track-mile	$96,800	45.2	$4.4	51.8	$5.0	37.7	$3.6			134.7	$13.0
Rehabilitated Track (rail, other track material)	Track-mile	$501,600	2.2	$1.1	7.9	$4.0	5.8	$2.9			15.9	$8.0
Rehabilitated Track (ties, rail, other track material)	Track-mile	$765,600							1.1	$0.8	1.1	$0.8
Relocate #10 Turnouts	Each	$80,000	14	$1.1	24	$1.9	15	$1.2			53	$4.2
Install #10 Turnouts	Each	$110,000	5	$0.6	34	$3.7	33	$3.6			72	$7.9
Install #10 Crossovers	Each	$220,000	2	$0.4	6	$1.3					8	$1.8
Install #20 Turnouts	Each	$150,000	8	$1.2	6	$0.9	4	$0.6	10	$1.5	28	$4.2
Install #20 Crossovers	Each	$300,000			2	$0.6	2	$0.6			4	$1.2
Install Diamonds	Each	$300,000	11	$3.3	3	$0.9	4	$1.2	1	$0.3	19	$5.7
Track Removal	Track-mile	$158,400	2.2	$0.3	7.9	$1.3	5.8	$0.9	0.2	$0.0	16.1	$2.6
Remove Existing Turnouts	Each	$20,000	3	$0.1	1	$0.0	1	$0.0	9	$0.2	14	$0.3
Tie Replacement	Each	$80	1,000	$0.1	3,600	$0.3	5,255	$0.4			9,855	$0.8
Ballast Undercutting and Track Surfacing	Track-mile	$282,500	2.2	$0.6	7.9	$2.2	5.8	$1.6			15.9	$4.5
Rehabilitated Frogs	Each	$12,000	16	$0.2	27	$0.3	15	$0.2			58	$0.7
Drainage Ditch Cutting / Cleaning	Track-mile	$7,900	73.0	$0.6	83.4	$0.7	60.6	$0.5			217.0	$1.7
Salvage and Scrap	Lump Sum	n/a	1	($0.1)	1	($0.4)	1	($0.3)			3	($0.7)
Subtotal Track Work				**$56.8**		**$72.0**		**$53.0**		**$5.1**		**$186.9**
New Bridges	Linear Foot	$10,000	2,165	$21.7	1,347	$13.5	799	$8.0	1,520	$15.2	5,831	$58.3
Extend Existing Culverts	Linear Foot	$150	2,470	$0.4	2,230	$0.3	2,025	$0.3			6,725	$1.0
Relocate Retaining Wall	Linear Foot	$300							675	$0.2	675	$0.2
Subtotal Bridges				**$22.0**		**$13.8**		**$8.3**		**$15.4**		**$59.5**
Upgrade Existing Crossing to CFBG	Each	$200,000	2	$0.4							2	$0.4
Add Second Track, Rebuild Crossing, Relocate Signals	Each	$355,000	22	$7.8	33	$11.7	25	$8.9			80	$28.4
Upgrade Existing Pedestrian Crossing to CFB	Each	$100,000			4	$0.4					4	$0.4
Place Two Additional Tracks, Rebuild Crossing, Relocate Signals	Each	$460,000	11	$5.1	9	$4.1	7	$3.2			27	$12.4
Subtotal Grade Crossings				**$13.3**		**$16.3**		**$12.1**				**$41.6**
Install New Interlockings	Each	$1,500,000	11	$16.5	13	$19.5	6	$9.0			30	$45.0
Install Intermediate Signals, Bi-Directional CTC	Each	$450,000	25	$11.3	65	$29.3	44	$19.8			134	$60.3
Install Intermediate Signals, One Track / One Direction	Each	$150,000	33	$5.0	48	$7.2	42	$6.3			123	$18.5
Install Electric Locks	Each	$100,000	5	$0.5	28	$2.8	9	$0.9			42	$4.2
Subtotal Signal System				**$33.2**		**$58.8**		**$36.0**				**$128.0**
Park-and-Ride Stations / Transfer Facilities	Lump Sum[2]	n/a	13	$9.3	9	$14.6	7	$5.6			29	$29.5
Layover Facilities, Maintenance Facility, Spare Parts	Lump Sum[2]	n/a								$36.6		$36.6
Subtotal Stations and Coach Storage / Maintenance Facilities				**$9.3**		**$14.6**		**$5.6**		**$36.6**		**$66.1**
Subtotal for Physical Plant including Stations				**$134.6**		**$175.4**		**$115.0**		**$57.1**		**$482.1**
Contingency (30%)				$40.5		$52.7		$34.6		$17.2		$144.9
Engineering, Design, and Construction Management (12%)				$16.2		$21.0		$13.8		$6.9		$57.9
Total Estimated Cost of Improvements to Physical Plant				**$191.2**		**$249.1**		**$163.4**		**$81.1**		**$684.8**
Locomotives (including one spare)	Each	$2,400,000	5	$12.0	7	$16.8	5	$12.0			17	$40.8
Coaches (including two spares)	Each	$2,000,000	22	$44.0	30	$60.0	22	$44.0			74	$148.0
Subtotal Rolling Stock (Conventional)				**$56.0**		**$76.8**		**$56.0**				**$188.8**
Diesel Multiple Unit Passenger / Operating Units (including two spares)	Each	$3,000,000	22	$66.0	30	$90.0	22	$66.0			74	$222.0
Subtotal Rolling Stock (DMUs)				**$66.0**		**$90.0**		**$66.0**				**$222.0**
TOTAL ESTIMATED CAPITAL COST (Conventional Rolling Stock) (1997 dollars)				**$247.2**		**$325.9**		**$219.4**		**$81.1**		**$873.6**
TOTAL ESTIMATED CAPITAL COST (DMUs) (1997 dollars)				**$257.2**		**$339.1**		**$229.4**		**$81.1**		**$906.8**
Total Route Length / Estimated Capital Cost Per Route Mile (Conventional Rolling Stock			36.5	**$6.8**	44.8	**$7.3**	30.9	**$7.1**			112.2	**$7.8**
Total Route Length / Estimated Capital Cost Per Route Mile (DMUs)			36.5	**$7.0**	44.8	**$7.6**	30.9	**$7.4**			112.2	**$8.1**

[1] Figures are in millions of dollars, rounded to a single decimal point. Due to rounding of numbers, columns may not appear to add correctly. See Appendix L for more-detailed breakdown of costs.

[2] Station cost figures are order-of-magnitude estimates, with site-specific factors such as length of platform, size of depot or parking lot (all require ridership estimates) subject to change in the MIS or Phase II Feasibility St

Additional land for parking expansion or potential environmental concerns that could require mitigation will be determined at that time.

[3] This category includes modifications to the Joliet Yard, new train layover facilities, and a new heavy maintenance facility.

THERE ARE NO COST ESTIMATES FOR LAND ACQUISITION OF POTENTIAL STATION SITES, COACH YARD STORAGE SPACE, OR ADDITIONAL RIGHT-OF-WAY.

TABLE 9

Capital Cost Estimates for Double-Track Outer Circumferential Alternative

Categories of Capital Infrastructure Requirements			Segment 1		Segment 2		Segment 3		Other		Total	
			Waukegan to Spauldi		Spaulding to Joliet		Joliet to Lynwood				Entire Route	
Description	Unit	Unit Cost	Quantity	Cost [1]	Quantity	Cost [1]	Quantity	Cost [1]	Quantity	Cost [1]	Quantity	Cost [1]
New Track, including Grading (ground level)	Track-mile	$1,500,000							2.0	$3.0	2.0	$3.0
New Track (subballast, ballast, ties, rail, other track material)	Track-mile	$950,400	72.4	$68.8	81.1	$77.1	59.9	$56.9			213.4	$202.8
Major Excavation and Grading (new embankment)	Track-mile	$178,933	72.4	$13.0	81.1	$14.5	59.9	$10.7			213.4	$38.2
Rehabilitated Track (rail, other track material)	Track-mile	$501,600	3.2	$1.6	8.3	$4.2	7.3	$3.7			18.8	$9.4
Rehabilitated Track (ties, rail, other track material)	Track-mile	$765,600							2.4	$1.8	2.4	$1.8
Relocate #10 Turnouts	Each	$80,000	16	$1.3	27	$2.2	15	$1.2			58	$4.6
Install #10 Turnouts	Each	$110,000	8	$0.9	42	$4.6	35	$3.9			85	$9.4
Install #10 Crossovers	Each	$220,000	2	$0.4	4	$0.9					6	$1.3
Install #20 Turnouts	Each	$150,000	6	$0.9	26	$3.9	22	$3.3	11	$1.7	65	$9.8
Install #20 Crossovers	Each	$300,000	22	$6.6	16	$4.8	8	$2.4			46	$13.8
Install Diamonds	Each	$300,000	18	$5.4	6	$1.8	8	$2.4	1	$0.3	33	$9.9
Track Removal	Track-mile	$158,400	3.2	$0.5	8.3	$1.3	7.3	$1.2	1.5	$0.2	20.3	$3.2
Remove Existing Turnouts	Each	$20,000	3	$0.1		$0.0	1	$0.0	9	$0.2	13	$0.3
Tie Replacement	Each	$80	1,450	$0.1	3,760	$0.3	6,610	$0.5			9,855	$0.9
Ballast Undercutting and Track Surfacing	Track-mile	$282,500	3.2	$0.9	8.3	$2.3	7.3	$2.1			18.8	$5.3
Rehabilitated Frogs	Each	$12,000	16	$0.2	32	$0.4	15	$0.2			63	$0.8
Drainage Ditch Cutting / Cleaning	Track-mile	$7,900	73.0	$0.6	83.4	$0.7	60.6	$0.5			217.0	$1.7
Salvage and Scrap	Lump Sum	n/a		($0.1)		($0.4)		($0.3)			0	($0.7)
Subtotal Track Work				**$101.1**		**$118.6**		**$88.6**		**$7.2**		**$315.5**
New Bridges (EJ&E over feature)	Linear Foot	$10,000	3,130	$31.3	2,660	$26.6	1,315	$13.2	1,520	$15.2	8,625	$86.3
New Bridges (EJ&E under feature)	Linear Foot	$20,000	760	$15.2	520	$10.4	715	$14.3			1,995	$39.9
Extend Existing Culverts	Linear Foot	$150	3,400	$0.5	3,120	$0.5	2,800	$0.4			9,320	$1.4
Relocate Retaining Wall	Linear Foot	$300							675	$0.2	675	$0.2
Subtotal Bridges				**$47.0**		**$37.5**		**$27.9**		**$15.4**		**$127.8**
Upgrade Existing Crossing to CFBG	Each	$200,000	2	$0.4							2	$0.4
Upgrade Existing Pedestrian Crossing to CFB	Each	$100,000			4	$0.4					4	$0.4
Place Two Additional Tracks, Rebuild Crossing, Relocate Signals	Each	$460,000	33	$15.2	42	$19.3	32	$14.7			107	$49.2
Subtotal Grade Crossings				**$15.6**		**$19.7**		**$14.7**				**$50.0**
Install New Interlockings	Each	$1,500,000	26	$39.0	28	$42.0	17	$25.5			71	$106.5
Install Intermediate Signals, Bi-Directional CTC	Each	$450,000	56	$25.2	66	$29.7	50	$22.5			172	$77.4
Install Intermediate Signals, One Track / One Direction	Each	$150,000	66	$9.9	80	$12.0	56	$8.4			202	$30.3
Install Electric Locks	Each	$100,000	12	$1.2	53	$5.3	21	$2.1			86	$8.6
Subtotal Signal System				**$75.3**		**$89.0**		**$58.5**				**$222.8**
Park-and-Ride Stations / Transfer Facilities	Lump Sum [2]	n/a	13	$14.1	9	$16.8	7	$8.7			29	$39.6
Layover Facilities, Maintenance Facility, Spare Parts	Lump Sum [2]	n/a								$36.6		$36.6
Subtotal Stations and Coach Storage / Maintenance Facilities				**$14.1**		**$16.8**		**$8.7**		**$36.6**		**$76.2**
Subtotal for Physical Plant including Stations				**$253.1**		**$281.5**		**$198.4**		**$59.2**		**$792.3**
Contingency (30%)				$75.9		$84.5		$59.5		$17.8		$237.7
Engineering, Design, and Construction Management (12%)				$30.4		$33.8		$23.8		$7.1		$95.1
Total Estimated Cost of Improvements to Physical Plant				**$359.4**		**$399.8**		**$281.7**		**$84.0**		**$1,125.0**
Locomotives (including one spare)	Each	$2,400,000	5	$12.0	7	$16.8	5	$12.0			17	$40.8
Coaches (including two spares)	Each	$2,000,000	22	$44.0	30	$60.0	22	$44.0			74	$148.0
Subtotal Rolling Stock (Conventional)				**$56.0**		**$76.8**		**$56.0**				**$188.8**
Diesel Multiple Unit Passenger / Operating Units (including two spares)	Each	$3,000,000	22	$66.0	30	$90.0	22	$66.0			74	$222.0
Subtotal Rolling Stock (DMUs)				**$66.0**		**$90.0**		**$66.0**				**$222.0**
TOTAL ESTIMATED CAPITAL COST (Conventional Rolling Stock) (1997 dollars)				**$415.4**		**$476.6**		**$337.7**		**$84.0**		**$1,313.8**
TOTAL ESTIMATED CAPITAL COST (DMUs) (1997 dollars)				**$425.4**		**$489.8**		**$347.7**		**$84.0**		**$1,347.0**
Total Route Length / Estimated Capital Cost Per Route Mile (Conventional Rolling Stock			36.5	**$11.4**	44.8	**$10.6**	30.9	**$10.9**			112.2	**$11.7**
Total Route Length / Estimated Capital Cost Per Route Mile (DMUs)			36.5	**$11.7**	44.8	**$10.9**	30.9	**$11.3**			112.2	**$12.0**

[1] Figures are in millions of dollars, rounded to a single decimal point. Due to rounding of numbers, columns may not appear to add correctly. See Appendix L for more-detailed breakdown of costs.

[2] Station cost figures are order-of-magnitude estimates, with site-specific factors such as length of platform, size of depot or parking lot (all require ridership estimates) subject to change in the MIS or Phase II Feasibility Study. Additional land for parking expansion or potential environmental concerns that could require mitigation will be determined at that time.

THERE ARE NO COST ESTIMATES FOR LAND ACQUISITION OF POTENTIAL STATION SITES, COACH YARD STORAGE SPACE, OR ADDITIONAL RIGHT-OF-WAY.

6.0 RECOMMENDATIONS

This Phase I Feasibility Study has examined the three segments of the proposed route for providing a new commuter rail service in the EJ&E Corridor, in order to determine whether any of them might be physically and financially feasible. The Study has also determined the level of community support, i.e., which cities or villages would agree to sponsor and fund potential stations and parking facilities, should the proposed project reach the implementation stage. The intent was either to recommend one or more of the segments, or the entire route, for more detailed studies, or to decide that no further studies should be pursued if all of the segments were deemed physically or financially infeasible and/or where little local support was evident.

This report has shown that potential commuter service along the EJ&E Corridor appears to be physically feasible. However, there are major capital costs involved, particularly when separate commuter-only tracks are necessary to avoid conflicts with freight trains. All along the route, local support is substantial. Based on the evaluations in this report, this Phase I Feasibility Study recommends that the potential Outer Circumferential Service in the entire EJ&E Corridor be studied further. <u>It should be understood that this conclusion and recommendation is qualified based on the findings in this Study phase alone, and does not account for any "unknowns" that may emerge from more detailed studies. Furthermore, at the present time the results of this Study phase cannot and should not be construed as indicating that the EJ&E/OCS route will be considered operationally viable or even desirable at the completion of the remaining Study phases.</u>

6.1 ELEMENTS OF A MAJOR INVESTMENT STUDY

The sequence of studies that are required to determine the feasibility of new commuter rail routes provides that the next step be a Phase II Feasibility Study. However, implementation and start-up costs that would exceed Federal criteria and could be considered as "major," suggests that a Major Investment Study (MIS) should precede the Phase II Feasibility Study. Such studies are mandated by the Federal government prior to funding allocations to proceed with implementation. [<u>Note that in TEA-21, the successor to ISTEA, the terminology has changed but the function remains similar.</u>] A MIS is required to evaluate the comparative suitability (against other modes of transportation) of providing commuter rail service in new corridors or expanded service in existing corridors. Five modes can be analyzed as possible solutions:

- **Baseline:** Base alternative incorporates planned improvements that are part of the 2020 Regional Transportation Plan, i.e., they are assumed to exist before the new proposals are considered.

- **Highways:** Alternatives include expansion of any number of possible routes, both existing expressways and major arterial roads, by adding lanes to increase capacity.

- **Rail Routes:** Alternatives include beginning new service, infrastructure upgrades to expand service (including schedule expansion to "full service"), extension of existing lines to serve new areas, new or increased parking facilities and/or additional trains on existing routes.

- **Bus Routes:** Alternatives include new or expanded service on feeder routes, remote parking lots with shuttle buses, or express bus service that complements the train schedule.

- **Transportation Management:** Alternatives include a variety of strategies within the classes of demand management, system management, and intelligent transportation systems.

The potential commuter rail alternative must be measured against other modes, in order to determine if commuter rail service is the most effective and feasible option for serving the travel demand, or at least is superior to all other options. After developing all of the possible alternatives specific to the corridor in question, screening measures are used to pare down the list to options which appear to be most feasible. (Alternatives screened out from further consideration must have appropriate rationale for their dismissal.) Each of the remaining options are then evaluated further with respect to travel demand and travel times; estimated capital and operating costs; local (study area) social and environmental impacts; and broader regional benefits of the potential OCS service such as air quality improvements, reductions in vehicular miles traveled, and enhanced travel-efficiency contributions to the commuter rail system.

Keeping with the result that this Phase I Study has declared all segments to be feasible, the MIS should precede the detailed work required in Phase II. The MIS would seek to declare that the commuter rail alternative would make the greatest contribution toward serving travel demand and relieving traffic congestion in the study area. Since Federal dollars are most assuredly the primary portion of the eventual funding package for implementation, it makes sense to fulfill the Federal requirement before the more-detailed studies (some of which are quite expensive and time consuming) in Phase II. Travel demand forecasts, which were outlined for study in Phase II, would become a part of the MIS. Following sufficient evaluation in the MIS process, and presuming that commuter rail is found to be the best alternative for addressing present and future travel demand in the corridor, the Phase II Feasibility Study would begin.

6.2 ELEMENTS OF A PHASE II FEASIBILITY STUDY

A Phase II Feasibility Study would be designed to evaluate the Phase I recommendation within a more in-depth and expanded scope. It would also allow for a more effective use of financial resources and the time required to perform the Study. This Phase I Study has concluded that the entire EJ&E Corridor should be studied further as a commuter rail option, continuing with a Phase II Study. A Phase II Feasibility Study includes the following general elements:

- Ridership estimates would be completed utilizing the most recently accepted regional-planning base-year demographic and socioeconomic forecasts. This would include evaluating travel demand, travel time, service frequency, rail transfer options, intermodal transfers, and service fares. If this has been completed for the MIS, probably only an update and review would be necessary.

- Environmental assessment would focus upon construction impacts, water systems and wetlands, air quality issues, noise and vibration, living species, historical issues and other actions which could require recommended mitigation strategies.

- Site studies would evaluate physical locations of existing and potential rail infrastructure such as crossovers, turnouts, additional passing sidings, interlockings and CTC signal systems, at-grade highway crossings, and rail-from-rail or rail-from-highway grade separations.

- Line capacity analyses would evaluate a variety of commuter and freight train operating scenarios on the recommended alignment. Operating scenarios would consider conditions such as freight train densities and system capacities, operating rules that regulate speed and signal restrictions, freight system volume forecasts, and the potential for the maximum allowable number of commuter trains, including scheduled revenue trains and non-revenue trains.

- Refined cost estimates would include more-detailed and site-specific capital cost estimates, as well as identification of costs that are subject to change as a result of updated design and engineering specifications. In particular, the revised cost estimates would take into account additional infrastructure needs identified by the line capacity analyses.

6.3 FURTHER STUDY PHASES

6.3.1 Service Segments

Once ridership projections are completed, an analysis of the EJ&E Corridor could be done in order to determine which segment or segments (not necessarily the arbitrary divisions used here) are best supported by the projected ridership. It is most likely that projections would not justify implementation of the entire rail line initially, but rather a segment or segments (perhaps even two discontinuous portions) of the rail line. After the start-up service segment(s) is determined, line capacity analyses and more detailed analyses of the necessary physical plant upgrades can be performed. Many upgrades are service-option driven, such as the need for and location of passing sidings and signals. Also, upgrades to the railroad physical plant would most likely only be necessary along the service segment(s), and not the entire rail line.

6.3.2 Rail Facilities

Decisions regarding the specific start-up service segment(s) would also allow for a more detailed analysis of necessary rail support facilities. Construction of new layover facilities for overnight storage and light maintenance of train sets would most likely be required. However, at least initially, daily inspections and heavy maintenance might be able to be performed at one of Metra's existing facilities. Thus, the large capital investment for a heavy maintenance facility could be deferred until the number of train sets operating on the OCS justify this expenditure. Current capacity at existing facilities, coupled with a projection of the number of train sets needed to service the OCS, would be the basis for this evaluation.

6.3.3 Rolling Stock

The opportunity exists for the use of alternative rolling stock (DMUs) on this line. DMUs are ideally suited for high-volume peak-period ridership and lower-volume off-peak ridership, due to the relative ease of reconfiguring train sets and the ability for each unit to operate independently. The proposed cars have been designed, but it is not known when production of such units would make the DMUs available. When a prototype is built, it will still need to be FRA-tested to ensure compliance with existing rail car standards. In addition, initial capital expenditure for the DMUs would be much greater than for conventional train sets. At this point of the overall Feasibility Study, conventional rolling stock would probably make the most sense for the potential start-up OCS segment along the EJ&E line. This is subject to change if DMUs are further developed before Study completion, and subsequent Study phases point to their utility.

6.3.4 Commuter Transfers

While the potential for transfer to every one of Metra's existing radial commuter lines is present, more detailed analysis of operations and schedules would have to be done to determine if transfers are feasible. Although scheduling of trains along the EJ&E to create meets at the radial lines might appear to be relatively easy, coordination and potential adjustment of the schedules on the radial lines may not only affect the individual lines, but could cascade to other radial lines. Schedules for cycling in and out of the maintenance yards for daily inspections and maintenance could also be affected, as well as the staging of trains at the downtown Chicago terminals. It is recommended that two or three of the radial lines be selected (based on service levels and flexibility in existing schedules) initially as test lines for commuter transfers. Based on the results of modeling the train meets, as well as the ancillary adjustments to other operations, these transfer points could then be placed into operation. After a review of the operation of these potential transfer points, a decision could recommend continuation, elimination, or expansion of transfer stations to other radial lines.

6.3.5 Interline Operations

Of the eleven Metra lines, there are full and/or partial existing connecting tracks at nine of the intersections. It has been suggested that perhaps some current Metra trains could be switched onto the EJ&E for through service to selected destinations. If the movement of trains between rail lines begins to occur on a frequent basis, most of the existing connecting tracks would need to be upgraded (including turnout and rail replacement) to allow for a smooth and higher-speed transfer of commuter trains between rail lines. If the switching of trains between rail lines should become a recommended mode of operation, additional connecting tracks may need to be constructed not only for those intersecting lines currently without them, but also in different quadrants for some that currently have them. This idea has not received the attention that commuters transferring between existing lines and the OCS has, and would require considerable study to determine operational feasibility.

6.3.6 Vanpool and Feeder Bus Services

Since the EJ&E would serve a unique market, when compared to the market traditionally served by Metra, ridership may be closely linked to the ability of commuters to travel conveniently from their destination train station to their place of employment. Traditionally, commuters have been able to travel from home to the train station with relative ease; however, travel at the end of the commute to the actual place of employment has not been readily available. It is therefore recommended that close coordination be undertaken with Pace and major employers along the EJ&E in order to plan convenient transportation (vanpools, feeder-bus service) from the destination train stations to major employment centers.

6.3.7 Land Use Planning

Another component recommended for the next phase of this Study is a review of proposed land uses surrounding the potential station sites. Working with the communities, land uses surrounding the community station sites should be conceptually planned to include those types of developments that traditionally support commuter rail service. The Metra/NIPC Land Use Guidelines point out that concentrated development around station sites generates pedestrian movements and decreases the reliance on use of the automobile. Appropriate land uses in areas surrounding commuter rail stations can serve to generate ridership from residential areas and attract ridership to local business and commercial destinations. Transit-Oriented Development (TOD) is becoming more and more popular throughout the nation as a way to not only offer convenient shopping, dining, housing, and transportation options within walking distance, but in many cases is the impetus behind redevelopment or creation of new community downtown areas. Many new housing developments are being planned using TODs, driven by the demand for transit access near residential, business, and commercial areas. Further studies should include TOD planning by the local communities in conjunction with Metra.

6.3.8 Environmental Impacts

A full study of all environmental issues [at least an Environmental Assessment (EA)] would be performed during later phases of the overall OCS Feasibility Study. After locations of stations, sidings, and any other improvements are identified, a field review would be performed to delineate wetlands and floodway/floodplain elevations at or near these locations and ensure that no potential for encroachment exists. Any proposed improvements that lie within a wetland or floodway/floodplain would need to be relocated to avoid impacts and any unavoidable impacts to wetlands and floodway/floodplain would require that steps be taken to minimize or mitigate these impacts.

6.3.9 Ridership Projections

Any decision regarding a potential start-up segment or segments for OCS would follow extensive testing of any number of alternative travel-demand scenarios based on logical terminal points. Computer-generated travel demand forecasting would combine NIPC forecasts, trip-making origins and destinations, modal-opportunities scenarios that are tested by instituting hypothetical land-use concentrations, or configurations including feeder and reverse-feeder bus routes to enhance the results. Line capacity analyses (coupled with capital improvement requirements and costs) would determine feasible (financially and operationally) segment(s) that could be implemented with relative ease, and match them with the most desirable ridership-producing segment(s). Ultimately, there must be concurrence by the EJ&E Railway and the potential stations must have retained their community support.

6.4 REGIONAL BENEFITS

Regional and subregional benefits would be expected from the implementation of new commuter rail service. Of course, this assumes that physical and cost-effective viability would continue to be demonstrated in future phases of this Feasibility Study. Overall benefits to the region would include the following items:

Minimal Environmental Impacts Compared to Other New Transportation Improvements: Although further and more detailed studies will need to be performed to determine the necessary improvements in order to initiate commuter rail service, preliminary analysis indicates that there will be minimal impacts to the environment (such as existing wetlands, floodways/floodplains, and sensitive noise receptors). This is largely due to the fact that the improvements will occur along an established rail line, with improvements other than stations and parking facilities occurring within the dedicated right-of-way.

More Energy-Efficient Modes of Transportation and Air Quality: This project would also most likely contribute to the attainment of a National Ambient Air Quality Standard (as defined by the Federal ISTEA-CMAQ legislation). This would occur due to diverting auto trips to downtown Chicago and suburban employment areas into a more energy-efficient and clean-air option. Also, riders might be diverted from existing Metra stations, freeing up scarce parking and attracting new CBD-destined riders to those locations.

Reduced Travel Times: Passengers using this potential commuter service would experience a reduction in travel times as the suburban roadway system becomes increasingly congested, as well as allowing for better use of their commute time. This would also reduce overall travel times on the roadway system, as more riders are attracted to the new commuter service.

Enhanced Mobility in the Region: This new commuter line would attract riders currently not served by Metra, namely the suburb-to-suburb commuter. This enhances the mobility, via mass transit for a larger segment of the populace, to commute from suburban households to suburban employment centers.

Limit Urban Sprawl: A substantial portion of the area that the EJ&E Railway passes through is currently undeveloped. By initiating new commuter service, an opportunity for many communities is opened up for transit-oriented development. Possible land use at or near the potential EJ&E commuter stations could include higher-density housing, which would support the commuter service. This, in conjunction with possible new commercial, business/office, and light industrial development around the station sites, could help limit or contain urban sprawl by encouraging higher development densities.