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Executive Summary

Introduction
This report is a sequel to the “Kansas City Region Commuter Rail Study, Initial Corridor Screening” a report transmitted to Mid-America Regional Council March 20, 2001. That report investigated 19 individual rail lines radiating from downtown Kansas City. Those lines were grouped into eight corridors and evaluated for their future commuter rail potential over a 20-year planning horizon. The Mid-America Regional Council (MARC) Board of Directors accepted that report and MARC’s Total Transportation Policy Committee (TTPC) instructed the consultant team to pursue a more detailed review of three corridors as shown on page 3. To view a larger pull-out version of the map see page 9 of the full report.

This report responsively presents an in-depth analysis of the feasibility of implementing commuter rail service on any or all of three corridors in the greater Kansas City region, specifically:

- Odessa-Kansas City over Kansas City Southern (KCS), designated as Corridor D in the previous report
- Warrensburg/Pleasant Hill-Kansas City over Union Pacific (UP), Corridor E
- Topeka/Lawrence-Kansas City over Burlington Northern Santa Fe (BNSF), Corridor H

Ridership estimates conducted during the Initial Corridor Screening indicated that the initial potentially-feasible segment of the Warrensburg-Kansas City corridor would be between Pleasant Hill and Kansas City. It is that segment which is examined in this report, and the corridor is hereinafter described as Pleasant Hill or Corridor E. Similarly, Lawrence-Kansas City was found to be the initial feasible segment of Corridor H. That portion of the corridor is the subject of this analysis and the corridor is referred to as Lawrence or Corridor H.

This report also addresses hub terminal requirements and some community considerations not specific to any single corridor. A separate report addressing Implementation Strategy soon will be submitted, followed by a project Final Report.

A convenient, efficient and attractive downtown terminal station is central to the success of the proposed commuter rail service. Three possible downtown terminal locations were evaluated: (1) Kansas City Union Station, (2) Riverfront, in the vicinity of 2nd and Cherry Streets, and (3) West Bottoms, near the 12th Street viaduct.
These locations were evaluated in terms of several key factors, including:

- Downtown destination accessibility,
- Rail access and capacity,
- Street access, and
- Interface with bus, high capacity transit and I-35 commuter rail

Kansas City Union Station emerged as the clear choice for a center city terminal. Its access to destinations and intermodal connections is superior to that of other locations. The building, setting, access and on-site amenities also make it stand out.

In addition, Union Station’s history as a rail transportation hub and its current function as a multi-modal center, including Amtrak intercity passenger service, give it significant standing in public perception. Its major drawback is constrained rail capacity, both on-site and in terms of commuter train access, a deficiency that other sites also could experience to some degree. Union Station should be the primary candidate unless railroad capacity constraints cannot be resolved.

**Study Process**

In order to assess ridership and costs, commuter rail service schedules were hypothesized in each corridor. Conceptual station locations were identified. Stations, parking, layover and shop facilities and of course equipment comprise the passenger-related investment necessary to institute commuter rail service. Sample schedules were produced for each corridor, based upon running times after recommended track improvements. At least three trains each way daily were projected, the minimum that offers riders a reasonable choice and spans the periods of heaviest commutation.
Potential Kansas City Region Commuter Rail Corridors

Scale

20 Miles
Forecasts
MARC has developed a mode choice paradigm as part of its regional travel model that utilizes the Emme/2 modeling software. This model was originally developed as part of the Southtown Corridor light rail evaluation. It was subsequently updated to include a representation of commuter rail service between the I-35 Corridor in Johnson County and Kansas City Union Station. The three selected potential commuter rail lines were coded into the regional transit network. The current mode choice model was augmented with a mode choice component that utilized model information to produce a commuter rail modal share and perform a commuter rail mode trip assignment.

The mode choice model produced year 2020 estimates of commuter rail boardings for the three lines, assuming inbound a.m. and outbound p.m. travel. The total estimated daily commuter rail ridership was:

Odessa-Kansas City 3,346
Warrensburg-Kansas City 4,434
Topeka/Lawrence-Kansas City 2,238

Annual farebox revenues for the estimated riders in these specific corridors are:

<table>
<thead>
<tr>
<th>Route</th>
<th>($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odessa-Kansas City</td>
<td>2.35</td>
</tr>
<tr>
<td>Warrensburg-Kansas City</td>
<td>3.27</td>
</tr>
<tr>
<td>Topeka/Lawrence-Kansas City</td>
<td>1.54</td>
</tr>
</tbody>
</table>

The capital cost of passenger-related improvements (including rolling stock) necessary to accommodate commuter rail schedules in addition to the freight trains now moving over the three corridors is as follows:

<table>
<thead>
<tr>
<th>Route</th>
<th>($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odessa-Kansas City</td>
<td>$133.8</td>
</tr>
<tr>
<td>Warrensburg-Kansas City</td>
<td>141.5</td>
</tr>
<tr>
<td>Topeka/Lawrence-Kansas City</td>
<td>117.9</td>
</tr>
</tbody>
</table>

These estimates each include a one-third share of estimated system capital costs shared by all corridors of $33.3 million, representing Union Station improvements and an equipment maintenance shop.

Host freight railroads are likely to require capacity-related improvements with funding by a would-be commuter rail sponsor to enable shared use of tracks. The nature and extent of improvements required will have to be negotiated with the owner on a line-by-line basis. Only when there is a committed and funded commuter rail sponsor will the host railroads undertake serious discussions about capacity improvements. All estimates prior to that must be viewed as preliminary and subject to major revision.
Annual operating costs associated with the provision of commuter rail service in each corridor are as follows:

<table>
<thead>
<tr>
<th>Corridor</th>
<th>($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odessa-Kansas City</td>
<td>6.04</td>
</tr>
<tr>
<td>Pleasant Hill-Kansas City</td>
<td>5.99</td>
</tr>
<tr>
<td>Lawrence-Kansas City</td>
<td>5.23</td>
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Annual total subsidy requirements are:

<table>
<thead>
<tr>
<th>Corridor</th>
<th>($million)</th>
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<tbody>
<tr>
<td>Odessa-Kansas City</td>
<td>3.69</td>
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<tr>
<td>Pleasant Hill-Kansas City</td>
<td>2.72</td>
</tr>
<tr>
<td>Lawrence-Kansas City</td>
<td>3.70</td>
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Daily round-trip subsidy requirements per passenger are:

<table>
<thead>
<tr>
<th>Corridor</th>
<th>($/passenger)</th>
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<tbody>
<tr>
<td>Odessa-Kansas City</td>
<td>8.64</td>
</tr>
<tr>
<td>Pleasant Hill-Kansas City</td>
<td>4.82</td>
</tr>
<tr>
<td>Lawrence-Kansas City</td>
<td>12.98</td>
</tr>
</tbody>
</table>

The implementation of commuter rail would have an impact on the service levels and cost of area bus systems with which it was integrated. The amount of shuttle bus service necessary to distribute and collect train riders in the downtown area would represent a significant addition to KCATA’s current service. Additional capital and operating funds would be required to support that addition.

As in the Initial Corridor Screening, the consultant team has followed guidelines of the Federal Transit Administration’s (FTA) New Starts Criteria to the extent possible in this preliminary feasibility assessment. The updated and refined information developed for the three corridors that are the subject of this report is summarized below using the same measures as presented in Table 10 of the prior report. The top row of the following table lists various FTA new start criteria. The second row identifies study measures which are closely related to the FTA criteria. Below that, each corridor’s projected performance with respect to those study measures is set forth.
Corridor Summary

<table>
<thead>
<tr>
<th>FTA Criteria</th>
<th>Mobility</th>
<th>Environmental and Other</th>
<th>Operating Efficiencies</th>
<th>Cost Effectiveness</th>
<th>Cost Effectiveness</th>
<th>Cost Effectiveness</th>
<th>Land Use and Other</th>
<th>Other</th>
</tr>
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<tr>
<td>Related Study Measure</td>
<td>Average Speed (mph)</td>
<td>Ridership</td>
<td>Operating Cost per Passenger ($)</td>
<td>Capital Cost ($ million)</td>
<td>Capital Cost per Passenger (4)</td>
<td>Subsidy per Passenger Round Trip</td>
<td>Opportunities or Barriers</td>
<td>Freight Conflicts Outside Terminal Area</td>
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<td>Odessa-KC (Corridor D)</td>
<td>33.9</td>
<td>3,346</td>
<td>7.08</td>
<td>133.8</td>
<td>40,026</td>
<td>8.64</td>
<td>Low</td>
<td></td>
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<tr>
<td>Pleasant Hill-KC (Corridor E)</td>
<td>36.5</td>
<td>4,434</td>
<td>5.30</td>
<td>141.5</td>
<td>31,912</td>
<td>4.82</td>
<td>Special Events Service to Sports Complex</td>
<td>High</td>
</tr>
<tr>
<td>Lawrence-KC (Corridor H)</td>
<td>38.6</td>
<td>2,238</td>
<td>9.17</td>
<td>117.9</td>
<td>52,700</td>
<td>12.98</td>
<td>Major University</td>
<td>Mixed High and Low</td>
</tr>
</tbody>
</table>

The primary objective of a new service would be to attract and hold ridership, thereby accomplishing secondary objects related to reduced traffic congestion and air quality. For that reason, additional consideration of the ridership forecasts is warranted. Comparison of projected ridership with current or initial ridership on other commuter rail systems was a measure used in the Initial Corridor Screening that continues to offer assistance in benchmarking potential Kansas City region services.

Several of the existing ridership figures have been updated since a similar figure was presented in the Initial Corridor Screening Report. It was determined that all three corridors exceed the Virginia Railway Express (VRE) initial ridership target and Corridor E exceeds the VRE mature service expectation of 4,000 riders (VRE mature service expectations represent half of VRE's two route system). Both Corridors D and E compare well with the recently implemented and rapidly growing services of Altamont Commuter Express (ACE) in California and Trinity Railway Express at Dallas-Fort Worth, Texas.

In evaluating the ridership findings, it should be borne in mind that 974 daily Independence passengers are credited both to Route D and Route E. If both were implemented, the 974 riders would be split among the two routes.

The emphasis of this element of the study has been to develop an enhanced understanding of the prospects for commuter rail service in all three corridors as opposed to developing enough information to screen corridors with early potential from those with later, or little apparent, potential, as was the task of the previous report. Upon consideration of the previous report, the key questions revolved around comparing corridors with one another and selecting among them. Now, the appropriate questions to be posed are:
• Does commuter rail have a future in the Kansas City Region?
• How do these projected costs and benefits compare with other transportation alternatives?
• Where do we go from here?

The first two questions now can be considered by citizens and planners in the light of the findings of this report. The study team believes that all three lines examined have a potential role to play in the region’s long term transportation system, and recommends that all remain under consideration. The timing and pace of development depends upon local evaluation of not only the three commuter lines (plus the I-35 service), but also possible enhancements of the Interstate highways, new and upgraded highways and streets, HCT (high capacity transit, i.e., modern light rail vehicles or rapid transit) and other transportation initiatives.

The final question above will be addressed in the next report which responds to RFP Task 5, Develop Implementation Strategy. That report will address such topics as:

• Financial planning
• Interjurisdictional service issues
• Institutional arrangements, including service operator selection
• Freight railroad coordination, and
• Next steps
Introduction

This report is a sequel to “Kansas City Region Commuter Rail Study, Initial Corridor Screening” dated March 20, 2001. That volume surveyed 19 rail lines radiating from downtown Kansas City. Those lines were grouped into eight corridors and evaluated for their future commuter rail potential over a 20-year planning horizon. The Mid-America Regional Council (MARC) Board of Directors accepted that report and MARC’s Total Transportation Policy Committee (TTPC) instructed the consultant team to pursue a more detailed review of three corridors. This report represents an in-depth analysis of the feasibility of implementing commuter rail service on any or all of three corridors in the greater Kansas City region, specifically:

**Corridor Designation**

- **D** Odessa-Kansas City over Kansas City Southern (KCS) (Line 8, 5/20/01 Screening Study)
- **E** Pleasant Hill-Kansas City over Union Pacific (UP) (Line 10, 5/20/01 Screening Study)
- **H** Lawrence-Kansas City over Burlington Northern Santa Fe (BNSF) (Line 17, 5/20/01 Screening Study)

A fourth corridor, Olathe-Kansas City over BNSF, was not considered for further study in this project because it is the subject of the I-35 Commuter Rail Project, currently in the preliminary engineering stage (see Map).

This report also addresses hub terminal requirements and some community-wide considerations common to all the corridors. A separate report addressing Implementation Strategy soon will be submitted, followed by a project Final Report.

**Commuter Rail**

As explained in the previous report, commuter rail may be described as railroad local and regional short-distance passenger train service between a central city, its suburbs and/or another central city. Its trains may be either locomotive-hauled or self-propelled, using equipment that looks much like conventional intercity passenger cars used by Amtrak. Commuter rail, an example of which is illustrated at page 10, is characterized by multi-trip tickets, specific station-to-station fares, and usually only one or two stations in the central business district. It is also known as "suburban (or metropolitan) rail." Commuter rail usually shares a right-of-way and/or trackage with conventional freight or passenger trains. Due to exorbitant cost of acquiring property,
Typical Commuter Rail Train

new commuter rail services typically operate over existing rail routes and trackage as opposed to developing new rights-of-way. Improvements are often made by the commuter rail sponsoring agency to improve travel time or increase track capacity as part of the service implementation, by means of track and signal upgrades and additional trackage.

**Relationship with Light Rail**

An important distinction between light rail transit (LRT) and commuter rail is illustrated by the type of equipment each uses. Commuter rail uses equipment termed as "compliant", which is to say that it meets the Federal Railroad Administration (FRA) Passenger Car Safety Standards. "Non-compliant" equipment used for LRT is generally lighter and therefore costs less, requires less power, consumes less fuel, and may have better braking characteristics compared with compliant equipment. Light rail equipment is "non-compliant" due to a number of factors, not the least of which is its lower compressive strength which would make it more vulnerable to crushing in the event of a collision with conventional rail equipment. Consequently, light rail would only operate on shared track with conventional railroad operations using strictly segregated time periods. This temporal separation is possible only on lightly used freight lines, and is not an option on the lines under study in this project. LRT typically serves as a circulator of people within a metropolitan area and hence it features numerous and closely spaced stops in a single urban area and often operates on city streets to reach key destinations. If extended beyond the urban core, it also may serve suburban commuters.

LRT projects or other High Capacity Transit (HCT) projects such as Bus Rapid Transit would complement commuter rail service; although neither would be a necessary condition for the success of the other. The typical dispersed nature of employment
centers in North American metropolitan regions makes an effective downtown core
distribution service essential to commuter rail’s success; this role could be played by
HCT and shuttle busses or by shuttle busses alone. Conversely, HCT’s value to the
community would be enhanced by its movement of thousands of commuter rail riders
between Union Station and their places of work. In short, HCT, if developed, would be
a valuable enhancement to commuter rail, but is not necessary to its success.
Terminal Requirements

Downtown Terminal Location

Kansas City Union Station (KCUS) is an obvious candidate for the downtown commuter rail terminal of the Mid-America Region. However, it was appropriate to determine whether there are other viable candidate locations and, if so, which is the most desirable. Three possible terminal locations were identified: (1) Kansas City Union Station, (2) Riverfront, in the vicinity of 2nd and Cherry Streets, adjacent to the passage of the UP tracks under the Heart of America Bridge (a proposed station location on the Central Business Corridor Transit study), and (3) West Bottoms, near the 12th Street viaduct over the Kansas City Terminal Railway (KCT) tracks.

These locations were evaluated in terms of several key factors, including:

- Destination accessibility and impact on ridership,
- Rail access and capacity,
- Site characteristics – sufficient space, street access, and
- Interface with other transportation services, including bus, HTC and I-35 commuter rail.

Kansas City Union Station

KCUS opened in 1914 to handle passenger trains of the 12 railroads that originally formed the KCT. KCUS served as a rail transportation hub from its opening in 1914, and currently hosts Amtrak’s six daily arrivals and departures. Its heritage and atmosphere are unique, and it remains strongly associated with rail travel in the public mind. KCUS serves Crown Center destinations well, with many being accessible via enclosed walkways. Downtown employment destinations are further than most people would choose to walk, but can easily be reached via shuttle busses operating on main streets.

KCUS was designed to be accessible from all major rail lines, and all lines under study could reach KCUS using KCT tracks. KCT pointed out that commuter trains operating to/from KCUS on the lines designated as 9 (KCS) and 10 (UP) in the Screening Study would conflict with north-south UP and KCS freight trains at Sheffield crossing. These conflicts would be similar to those that were eliminated by the Sheffield Flyover, which unfortunately cannot be used by the proposed commuter trains. Rail capacity would become an issue at Union Station as commuter train volume increases beyond start-up levels. This is addressed more fully below.

KCUS has sufficient space for passenger facilities and amenities; it enjoys good access to major downtown streets. Enclosed waiting space, snacks and beverages already are available and reading material and sundries easily could be offered.
A role as a transit center was an important component of the redevelopment of KCUS. Busses call at both the east and west entrances, and it also is a stop on the Downtowner North-South Shuttle. KCUS has been proposed as an LRT stop and is likely included on the route of any north-south light rail or bus rapid transit (BRT) project that may be implemented. KCUS also is proposed to be the downtown terminal of the I-35 commuter rail service.

**Riverfront (Second and Cherry Streets)**
This location is approximately one-half mile from the City Market area, but does not serve the downtown (about one mile away) or the Crown Center area (almost two miles distant) particularly well.

**Figure A**
River Front (Second and Cherry Street)

UP’s River Subdivision main line, oriented in approximately an east-west alignment, passes under the south end of the Heart of America Bridge at this location. Commuter trains operating on UP lines, such as Screening Study Line 10 (Pleasant Hill and Warrensburg) would have ready access to this line, although those trains would have to skirt the busy Neff Yard area to reach this location. For commuter trains operating on other than UP lines, access to this station would require an agreement with UP in addition to the owner of the balance of the route. Odessa trains would have to skirt Knoche Yard and then could reach the proposed station using UP tracks or via the
KCS industrial trackage that crosses Cherry Street about one block to the south. Lawrence commuter trains would use the KCT Bluff Line to reach the UP line serving this location. Some prospective commuter trains on other rail lines may have ready access to this station location via existing rail lines and connections; others do not. However, this location does offer one advantage with respect to trains from Screening Study Lines 9 and 10; instead of crossing the north-south UP and KCS main tracks at grade under the new Sheffield Flyover, they would avoid the Sheffield area entirely by using the UP and/or KCS to reach this station.

The site is not highly desirable in terms of configuration or appearance. On the East side of the bridge, north side of Second Street there are several buildings and storage yards (a State of Missouri maintenance yard with an office building, a Sprint parking lot, and another old building). On the west side of the bridge is the old railroad freight house. The surrounding area is not very pleasing to the eye, with old run down warehouses, empty buildings, vacant lots that are overgrown with weeds and trash everywhere.

If constructed, light rail would be above the UP tracks at the south end of a new Missouri River bridge. Transfer between the commuter and LRT systems would be via elevators and escalators. The area's present configuration is not well suited for a bus transit terminal.

The two advantages of this location are the ability to connect with a possible light rail system, which now faces an uncertain future, and the avoidance of freight rail conflicts at Sheffield, advantages which could be offset by other conflicts along this route. Thus this location is not desirable at this time.

Third Street east of Broadway would be a variation of the Second and Cherry riverfront station concept. While closer to River Market and its parking, this site would suffer from most of the disadvantages of a Cherry Street location, and moreover is not on the most-frequently-described light rail corridor.

West Bottoms
The first Union Depot in Kansas City was built in the West Bottoms area in 1878. After a flood consumed it in 1903, KCT was established in 1906 to construct the Union Station that exists today.

A West Bottoms station could be established near where 12th Street crosses over the KCT Bluff Line on an overhead bridge. That location is very near the Union Street location of the original Kansas City Union Depot. It is about one mile from downtown and about two miles from Crown Center. It is not within walking distance of any significant destinations.
The site is located along KCT tracks and close to BNSF and UP tracks as well. Accessibility to trains of numerous railroad companies was a factor in establishment of the Union Depot close to this location. Today’s rail access appears to be acceptable, although additional investigation would be required to determine whether connections between the station area and the BNSF or UP lines to Lawrence and Topeka are indeed efficient.

The site proved to be difficult to access from downtown when the Union Depot was there, and the same would hold true today. The Union Depot was connected to downtown by an elevated railway that used the 8th Street Tunnel. The same challenging topography still exists, separating the potential station site from downtown and the Crown Center area and making even access to the site by shuttle busses an indirect and time consuming maneuver. While there may be development plans for the West Bottoms, very few potential trip origins or destinations currently occur near the site.

Finally, a West Bottoms location offers no possibility of interface with the probable route of a future north-south light rail system or BRT system, nor with I-35 commuter rail or Amtrak intercity rail service. As indicated, shuttle bus distances to downtown are similar to other sites, but the vertical separation from downtown and the 12th Street Bridge would hinder shuttle connections. Like the Riverfront site, the distance to Crown Center is even farther than to downtown.

**Conclusion**

Kansas City Union Station is the clear choice for a commuter rail terminal. Its access to destinations and intermodal connections is superior to that of other locations. The building, setting, access and on-site amenities also make it stand out. In addition,
Union Station’s history as a rail transportation hub and its current function as a multi-modal center give it significant standing in public perception. Its major drawback is constrained rail capacity both on-site and in terms of commuter train access, a deficiency that other sites also could experience to some degree. Union Station should be the primary candidate unless railroad capacity constraints cannot be resolved. Figure C is a diagram of the station facilities and current track configuration of KCUS and its immediate vicinity.

**Potential Use of Kansas City Union Station Rail Facilities**

The commuter rail system’s downtown terminal needs sufficient station platform trackage for passenger boarding and adequate trackage to store trainsets that are between runs in a location that does not interfere with the ability of other commuter or intercity passenger trains to arrive, discharge, board and/or depart.

**Station Platform Trackage - Current**

Trackage at Union Station is drastically reduced from that extant during its glory years as an intercity passenger train terminal. The station currently has three tracks that can be used as passenger loading or unloading tracks. All three are connected at both ends to the KCT main line. Track 29 is the southernmost such track, and is closest to the station. It is used by Amtrak’s St. Louis trains and is available to share with I-35 commuter trains, according to KCT. Track 30 is the middle and longest station track; it is used by Amtrak’s Southwest Chief trains. Track 31 is the northernmost and shortest of the station tracks. It is commonly used to store mail and express cars.

In addition to the three passenger tracks, there are two stub-ended tracks that enter the station grounds from the west. They skirt the north edge of the parking lot, ending just outside the north end of the former waiting room. These tracks are intended for display of railcars or locomotives or to accommodate other display items that might arrive by rail. (A light rail car on a railroad flatcar was displayed there in the summer of 2001.)

**Station Track Use - Current**

Amtrak operates the only passenger trains using Union Station at present. Its service consists of three trains in each direction daily, as follows.

<table>
<thead>
<tr>
<th>Train</th>
<th>Eastbound</th>
<th>Westbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>304 Ann Rutledge</td>
<td>Dep. 7:35 AM-Originating</td>
<td></td>
</tr>
<tr>
<td>4 Southwest Chief</td>
<td>Arr. 8:11 AM-Dep. 8:21 AM</td>
<td></td>
</tr>
<tr>
<td>301 Kansas City Mule</td>
<td>Arr. 1:10 PM-Terminating</td>
<td></td>
</tr>
<tr>
<td>306 St. Louis Mule</td>
<td>Dep. 3:05 PM-Originating</td>
<td>Arr. 8:40 PM-Terminating</td>
</tr>
<tr>
<td>303 Ann Rutledge</td>
<td></td>
<td>Arr. 10:31 PM-Dep. 10:41 PM</td>
</tr>
</tbody>
</table>

Source: Amtrak National Timetable, Spring/Summer 2002
Figure C
Kansas City Union Station
Track and Facilities Configuration

Freight Tracks
Spur
Kansas City Terminal Main Tracks
Platforms
Amtrak
Display Tracks
Track 31
Track 30
Track 29
Station
Main Street
Grand Avenue
Sant Fe Jct.
Rock Creek Jct.

Not All Tracks Shown
Not To Scale
Station Platform Trackage - Future
Two projects are planned which will alter the track configuration at and in the vicinity of Union Station. The first would result in removal of one of the three station tracks. According to KCT, KCUS plans to widen the platform between tracks 29 and 30 and to construct a walkway connecting that platform and Amtrak’s new waiting room in the station. KCT states that track 29 would remain in its current location, track 30 would be shifted a few feet to the north, and track 31 would be removed as part of that project.

Removal of track 31 would significantly reduce the platform capacity at KCUS and would hinder implementation of commuter rail service above and beyond the I-35 project. Although the shortest of the station tracks, it could hold two or three commuter trains depending on length. With I-35 commuter trains using track 29 and Amtrak’s Southwest Chief using track 30 during the AM peak period, loss of track 31 severely restricts the platform footage available to potential commuter service.

The second project centers on a new track connection between KCT’s main tracks in the vicinity of KCUS and Burlington Northern & Santa Fe Railroad (BNSF) tracks in Kansas west of the present Santa Fe Junction. This would create a new, grade-separated connection between BNSF’s Argentine Yard and the KCT main line, avoiding existing conflicts with other train traffic at Santa Fe Junction. The “High Line” and other trackage in the vicinity of Union Station and Santa Fe Junction would be modified or reconstructed as part of the project.

KCT has formed a subsidiary known as the Westside Intermodal Transportation Corporation to carry out the project. Reportedly, approval is in place for all funding. The schedule for the High Line is 24 months from planned start of construction in spring 2002. Planned Argentine Connection construction time is 24 to 30 months starting in late summer 2002.

As part of that project, KCT plans to construct an additional, third main track adjacent to the station, connecting the present end of the third main track east of the station with the new Argentine Connection and the reconfigured trackage west of KCUS. The new main track would be located just north of the relocated KCUS track 30. When that construction takes place, KCUS effectively will be hemmed in on the north side, and any expansion of trackage (other than adaptation of the stub tracks) will be far more difficult and expensive.

Station Track Use – Future
Commuter service is proposed on the I-35 corridor in addition to the three routes examined in this report. If all four were to be implemented, services that do or potentially might use the station would include:
Two important station track capacity issues must be addressed. First, will there be sufficient platform trackage to load/unload trains during the peak periods? Second, will there be sufficient trackage to store trainsets that are awaiting their next use, particularly in the midday hours between the morning and evening peak periods?

Peak period train movements are critical to terminal requirements. During the morning peak period of 6:30 to 9:30 A.M., 16 trains are scheduled to arrive or depart. This activity equates to six trains per hour, but would probably be more intense at the “peak of the peak”. Evening peak departures would occur at almost the same rate.

Even if the two platform tracks could handle the loading or unloading of that level of peak period trains, it would require that inbound trains promptly be moved away from the platform tracks to make room for the subsequently arriving trains. Similarly, during the evening peak period empty trains would have to be staged away from the platform tracks and then moved rapidly to the platform when preceding trains are loaded and depart. An option to increase capacity at Union Station is described below.

### Potential Modifications to Accommodate Commuter Service

While not intended for regular passenger service, the two stub (display) tracks, could be reconfigured as necessary for commuter train use. Shuttle busses could park very close to the trains and a convenient transfer between the two could be accomplished. Lighting, perhaps canopies and other amenities would be required, and modification to track spacing or switches also may be necessary. Converting these tracks for commuter use would result in some loss of parking, but space is available for addition of a parking garage if necessary. Should commuter train volumes increase, it may be possible to construct additional parallel but shorter tracks south of the existing pair of stub tracks.

Existing or new stub tracks could be used by commuter trains arriving from or departing to the west, including the I-35 service and service from Lawrence or Topeka. Services to/from the east, including Odessa and Pleasant Hill could be accommodated.

### Table 2

**Kansas City Union Station Track Use-Future**

<table>
<thead>
<tr>
<th></th>
<th>AM Peak Arrivals (6:30-9:30AM)</th>
<th>Other Arrivals</th>
<th>PM Peak Departures (4:00-6:30PM)</th>
<th>Other Departures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amtrak</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>I-35 Commuter</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Odessa Commuter</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasant Hill Commuter</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lawrence Commuter</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>16</td>
<td>3</td>
<td>14</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Amtrak National Timetable, Fall-Winter 2001, RLBA estimates.
in two ways. They could arrive and depart at the east end of KCUS and share Tracks 29 and 30 with Amtrak (a problem in the morning, since Amtrak has departures at 7:35 AM and 8:21 AM). Alternatively, but less desirably, they could operate around the north side of the Terminal Area (as discussed below) thus arriving and departing at the station’s west end just like Lawrence trains, and using the stub tracks and/or sharing Tracks 29 and 30 with Amtrak.

This plan for using stub tracks and sharing the two remaining station tracks with Amtrak is sufficient for initiating commuter service, although a more detailed examination of how the trackage could be modified and used is necessary to determine the precise volume of trains that could be accommodated. In order to grow past that volume, new facilities at a different location would be needed. It may be possible to use space east of KCUS to construct several stub tracks that would accommodate commuter trains arriving and departing at the east end of the station. These tracks would be relatively short and it may be necessary to reconstruct the overpasses at Grand Avenue, McGee Street and Oak Street as well as widening the railroad cut between those crossings to make room for the east end of the new station tracks and their connection to KCT.

Another possibility would be to use the several freight tracks north of the KCT main tracks directly across from KCUS. New passenger facilities, a grade separated connection to KCUS and/or multimodal transfer facilities would be needed. The freight operations conducted there would have to be relocated and there it is an operational disadvantage for KCT to have commuter trackage on both sides of its main line. Even if these obstacles were overcome, space for commuter rail use is limited.

As commuter rail grows, it may be necessary to completely reconfigure the KCUS site or develop an alternate or a second downtown terminal. The latter course also would necessitate reconsideration of a fixed downtown distribution system. However, that level of commuter rail service is well into the future.

**Layover, Service and Shop Facilities**

A commuter rail service needs facilities for overnight storage of trainsets, usually at its outer terminals, daytime storage of trainsets at or near its central city terminal, equipment servicing and equipment maintenance. However, that does not mean that four separate facilities are required; often one facility may serve two or three of the above functions. For example, equipment maintenance, servicing and daytime storage could be co-located at a single facility. It is preferable that overnight storage facilities be located as close as possible to a commuter rail line’s outer terminal. Daytime storage near the morning peak period terminus is preferable for peak-period services that store and/or service most or all equipment between the morning and evening rush periods. This section will focus first on daytime layover facilities; servicing and shop needs are then addressed.

Under normal circumstances, the only passenger equipment that is stored at Union Station is Amtrak’s Mule trainset for about two hours in mid-afternoon and the Ann
Rutledge trainset overnight. Even while the Southwest Chief and the Ann Rutledge trainsets are both in the station for a few minutes at night, station trackage is more than adequate for current use; if the number of commuter trains were to increase to carry more passengers than are forecast at startup, additional trackage would be needed. If the station had more trackage, daytime commuter train layover could take place there. Many commuter rail services store a portion of their trainsets at terminal platform tracks or in adjacent coach yards. However, trainsets do not have to be stored at the station proper; they could be moved a short distance between the station and a layover facility, as are most Virginia Railway Express (VRE) and Maryland Transportation Administration’s MARC commuter trainsets that lay over in downtown Washington, DC. This pattern would be necessary at KCUS, as existing station tracks could not be tied up with stored equipment. At least two appropriate locations appear to be available at this time. After unloading passengers during the AM peak period, trains would move either singly or “doubled-up” from KCUS to one of the nearby holding locations.

As already established, Union Station’s tracks will be strained to accommodate commuter rail loading and unloading and are unable to support train storage. Thus it will be necessary to provide a storage location near Union Station that can accommodate most or all of the commuter trainsets. Based on the potential services shown above, there could be a need to store up to 16 commuter trains totaling approximately 9,600 feet in length. Commuter trains need to be able to move freely between the storage facility and Union Station, preferably without crossing the KCT main line (thus avoiding potential delays to both commuter and freight trains). This discourages use of locations to the north of the KCT main lines. Development and topography rule out a storage facility east of Union Station. One site that would have been a candidate location is the former KCT roundhouse and South Coach Yard, to the south and west of Union Station. That area is now being commercially developed and is no longer available. One location that appears promising at this time is the former railroad yard on the BNSF Fort Scott Subdivision (the proposed I-35 commuter rail line) near Southwest Boulevard and West 31st Street. Another possibility is the vicinity of Santa Fe Junction near the Kansas River.

A typical layover facility would include at least the following:

**Layover Facility**

- Sufficient tracks, considering the possibility of fleet expansion
- 480 volt standby power (required to maintain train heat and cooling and operate lights and doors without operating the train’s power plant)
- Crew and maintenance building
- Fencing and security
- Lighting
- Level storage tracks with drip pans for locomotives
- Ability to change consists without entering the main track
- Roadway vehicle access to all tracks
Service facilities enable the daily inspection, minor maintenance, cleaning and replenishing of supplies. Servicing facilities are usually located in conjunction with either the daytime storage or the overnight layover tracks. Typical components are listed below.

**Service Facility**
- Sand refilling facility
- Fueling facilities with drip pans
- Fuel storage
- Non-potable water for locomotives and coaches
- Potable water as needed
- Toilet dumping (or truck access)
- Train washer
- Fencing and Security
- Lighting
- Building for supplies, office, lockers and washroom

Shop facilities are necessary for periodic maintenance as well as replacement or repair of failed components and repair of minor damage. Shop facilities also usually are located in conjunction with the either the daytime storage or the overnight layover tracks. Shops also generally include servicing facilities. Typical features of shop facilities are listed below.
Shop Facility
- Preventive maintenance area with inspection pits
- Heavy maintenance area with jack pads
- Overhead crane
- Specialty shop areas – electrical, air brake
- Parts and material storage area
- Locker and washrooms
- Office
- Tracks for equipment awaiting or released from repair

It is assumed that a single facility would be developed that would include maintenance shop, servicing and daytime layover facilities. This could be at the 31st Street location on BNSF, near Santa Fe Junction or in another location deemed suitable at the time of service implementation. All components described above would be present. The facility would support all three corridors and ideally would be capable of expansion to accommodate increased service on those corridors and/or new service on other corridors, such as the proposed I-35 service, both of which would call for servicing an increased fleet of locomotives and passenger cars.

Cost of this facility is estimated at approximately $30 million, including site preparation, engineering and contingencies.

Rail Capacity and Improvements in the Terminal Area
Kansas City is the second busiest rail freight gateway in the U.S. and many of the study lines host moderate to heavy train volumes. Rail line owners may have legitimate concerns about the impacts upon freight operations of installing commuter rail service. In many instances, capacity improvements such as upgraded signal systems or additional trackage may be warranted. The nature and extent of improvements required will have to be negotiated with the owner(s) on a line-by-line basis. Only when there is a committed and funded commuter rail sponsor will the host railroads undertake serious discussions about capacity improvements. All estimates prior to that must be viewed as preliminary and subject to major revision.

Each route’s capacity should be evaluated outside and inside the “terminal area”, the boundary of which is defined for this study as the first connecting point with the KCT that an inbound train would encounter, whether or not the train actually moves onto KCT trackage at that point. See Figure E on page 25.

For the most part it is not difficult to conceptualize improvements that would reduce the impact of conflicts outside the terminal area. Right-of-way is likely to be available for additional trackage where required, and lines that are not equipped with Centralized Traffic Control (CTC) signal systems could be brought up to that standard. (CTC is an
effective means of train control whereby the dispatcher can align switches and signals and trains move under signal indication.) This is not to say that improvements agreed upon by negotiation will be inexpensive.

Inside the terminal area (shown on Figure E), the situation becomes more complex because of multiple junctions and yards, slow speed train movements and right-of-way that in places is not wide enough to accommodate any more trackage. Corridors D and E intersect the terminal area at Rock Creek Junction, near I-435 and U.S. 24 on the city’s east side. Between Rock Creek Junction and Union Station are two alternate routes: (1) the KCT Main Tracks via Sheffield and Grand Avenue, and (2) the UP Sedalia Subdivision via Neff Yard, paralleling the Missouri River and connecting to KCT at Broadway, then via the KCT Bluff Line to Southwest Boulevard and a short distance on the KCT Main Tracks to Union Station. The first route is more direct and would be appreciably shorter in running time but offers two disadvantages in terms of capacity: (1) commuter trains would cross the KCS Pittsburg Subdivision and the UP Coffeyville Subdivision at grade at Sheffield because track configuration would not permit commuter trains to take advantage of the Sheffield Flyover, and (2) commuter trains would use the busy KCT Main Tracks, the Sheffield-Union Station portion of which already is planned to consist of three main tracks when the Argentine Connection project is completed. The second route would skirt the busy UP Neff Yard complex. It was used by passenger trains in the pre-Amtrak era.

While the route via Sheffield and Grand Avenue is preferable and is used in this analysis, the consultant team recommends that both routes through the terminal area remain under consideration at this stage of feasibility evaluation. When commuter rail advances to preliminary engineering and decisions are made upon timing, routes and number of trains to be implemented, serious discussions may be opened with the railroads to determine terminal area routing and, eventually, the appropriate improvements to be made. Initial recommended capacity improvements inside and outside the terminal area and associated cost estimates are presented in the report segments devoted to each of the three corridors.
Figure E

Kansas City Region Terminal Area

Not to scale.
Not all lines shown.
Source: RLBA.
Community Wide Considerations

**Land Use and Station Prototype**
The development of a commuter rail system to serve the Kansas City region presents opportunities for moving toward new land use development patterns that are more efficient, appealing, and socially equitable in comparison with more typical development patterns that depend almost exclusively upon automobiles for personal transportation. A commuter rail station can serve as the hub of a mixed-use community that allows for transit, walking, and cycling as well as for travel by car. With the higher densities that come with more compact development, pedestrian travel and public transportation become more predominant. Persons without the means or ability to drive themselves can use the commuter rail system for travel throughout the region.

Commuter rail may be able to foster a land redevelopment program in the Kansas City area such as that recently proposed for Manassas Park on the Manassas line of the Virginia Railway Express (VRE). Near the existing Manassas Park commuter rail station, a new mixed-use development has been proposed, to include shops, a hotel, and a gated apartment complex, on 11 acres of land presently used for industrial purposes. Kansas City area communities served by commuter rail may realize benefits as reported in a study published in the Transportation Research Record #1623, which notes that in northern New Jersey, increased commuter rail ridership has led directly to increased patronage of existing businesses in the vicinities of established commuter rail stations.

However, there may be some constraints to the utility of commuter rail service being applied in the Kansas City area that should be kept in mind.

First, unless and until service becomes bi-directional throughout the day, commuter rail services may not be available to serve many types of trips besides peak hour weekday trips to and from work. That means that a person without access to a car would be dependent on walking, cycling, or local public transportation during times or to places where commuter rail service is unavailable. A commuter's fear of being stranded during non-service hours may be mitigated by a guaranteed taxi ride home policy, such as offered by Virginia Railway Express or by a coordinated bus service, which runs during those hours or in the reverse peak direction. Such a bus service is briefly described on page 35. Even many types of work trips may not be well served by commuter rail, given that some retail, institutional, industrial and service jobs may not be accessible, either on foot or by transit, from typical downtown commuter rail destinations.

Parking is a concern deserving of much consideration of any potential new start commuter rail operation. In fact, a shortage of available parking spaces has often been a barrier to increased ridership on commuter railroad systems, including older larger systems such as the Long Island Rail Road, as well as newer systems such as
the Altamont Commuter Express (ACE), provider of commuter rail service between Stockton and San Jose, California. Additionally, a need for an increase in parking spaces has often conflicted with policies of some municipalities that have sought to maintain or enhance a land use pattern that is more dense and pedestrian oriented as opposed to auto oriented.

This section presents three prototype station types and associated land use policies for application in the areas around outlying commuter rail stations in the Kansas City region to provide for:

- controlled, attractive, and efficient transit oriented land development around proposed new commuter rail stations within established communities,
- sufficient parking capacity at outlying stations with good highway access, and
- employment opportunities for workers across a wide range of incomes at stations that will serve industrial, institutional, and retail developments,

For each land use policy presented, this section also presents a strategy for multimodal accessibility, and a strategy for land use policy implementation. It should be kept in mind that the type of station facility recommended for each specific location should not be considered as set in stone, but should be revisited as implementation nears to assure that the station type conforms to contemporary community plans and desires (which should be affirmatively solicited as commuter rail planning continues). The discussion of each corridor includes an analysis of multimodal access and land use at each proposed station within each of these three corridors.

In all three corridors, land use and access policies should be designed to discourage persons, especially pedestrians, from crossing active railroad tracks at grade. This policy is especially important where tracks are being used intensively for freight, i.e. on the inner part of Corridor H (BNSF line east of Holliday) and along Corridor E (UP line from St. Louis). For example in southern Connecticut, due to safety concerns, the Branford commuter rail station has been reconfigured on the Shore Line East (SLE) system, so that commuter rail trains can only be approached from the south side of the train tracks.

**Prototype Station #1 - Transit Oriented Development (TOD)/Established Community Stations**

On each corridor, several stations are proposed to be located within established communities; these will be described as TOD/Established Community stations. Figure F represents a typical TOD/Established Community Station. Estimated cost is $2.1 million. A specific potential location for a commuter rail station in each community was selected pursuant to a review of current and proposed land use policies for that community. The locations that have been suggested are generally in conformity with these policies.
One option would be to adopt a design overlay district for the area within 1/4 to 1/2 mile of any commuter rail station proposed to be located within an established community. The overlay would be adopted at the discretion of the local governing body. Within the overlay district, new detached single family residential developments would be discouraged.

Community planners would face a difficult decision concerning the number of parking spaces to provide. On one hand, to minimize the volume of new vehicular traffic upon existing local streets and highways, only minimal park and ride facilities would be provided within TOD overlay districts: say 50 or fewer parking spaces at the station. If curb parking were permitted, strict time limits would be imposed and enforced, in order to discourage on-street commuter parking within the overlay zone. Drop-off facilities should be provided along with facilities for bus transit access, in communities where existing bus transit services are available. However, the other widely held view is that most commuter rail passengers drive to the station and that failure to provide sufficient spaces will discourage system ridership rather than shift connecting trips to transit. The consultant team believes the best approach is to provide sufficient park and ride stations to attract the bulk of connecting auto trips but, (although a modification of the conventional TOD concept) also to provide parking to accommodate those auto users who prefer to use a TOD station in the community center. Manassas, Virginia on the VRE system is an example of a traditional train station within an established community that is walking distance from business and residential areas and transit served, but still offers parking for auto users.

To encourage pedestrian activity and transit supportive development, and to the extent that undeveloped space existing within an overlay district, new development should be subject to requirements that set minimum floor area ratios and minimal (e.g. zero feet) setbacks from sidewalks. Mixed land uses should be encouraged within the overlay district: retail, office, and medium to high density residential.
Open space should be provided within common areas (e.g., in small parks or at key intersections) within the overlay district. Bike lanes and bike racks should also be provided within the district. Where local transit services are currently available in the vicinity of a proposed new commuter rail station, modifications to existing routes should be proposed.

Prototype Station #2 - Fringe Area Park and Ride
In general, park and ride lots should be located "downstream" from the drivers who will be using the park and ride lot, and "upstream" from bottleneck interchanges, intersections, or congested links in the regional highway network. Commuters will not necessarily utilize the park and ride lots closest to their own homes, if the use of another lot will lead to consistently lower overall travel times.

To ensure maximum utilization of the new commuter rail system, the aggregate capacity of fringe area park and ride lots should be sufficient to meet projected travel demands for each corridor. Also, if sufficient parking capacity is provided at fringe area park and ride lots, then new streams of auto traffic will not interfere with pedestrian, bicycle and bus traffic around commuter rail stations located within established communities.

Ridership has been projected for each corridor (see page 41 below). Given that every passenger round trip is counted as two trips or boardings, the number of required parking spaces in each corridor would be roughly half the number of projected daily boardings, with some extra space to encourage growth. The actual number of required parking spaces would be reduced due to auto occupancy rates greater than 1.0 persons per car (with carpooling), "kiss and ride" passenger trips, and the use of bus transit, bicycles and sidewalks for access to commuter rail stations. On the other hand, factors that call for some additional space above expected demand are that parking lots typically appear to be full when several spaces are still unoccupied, demand might not match supply at each parking lot location, and that over time, actual commuter rail boardings may exceed the number projected.

For each commuter rail station to be located outside of an established area, fringe area park and ride lots should be located and designed to optimize:

- visibility from major roadways,
- safe and convenient access along well defined access routes with adequate capacity,
- safe and efficient on-site traffic operations both for cars and for local and express bus services,
- convenience and safety for pedestrians walking between their cars and the commuter rail platform,
• facilities for dropping off and picking up (kiss-and-ride) car passengers, and

• adequate and comfortable facilities available for waiting and alighting commuter rail passengers.

Figure G depicts a typical Fringe Area Park and Ride station. Estimated cost is $3.1 million.

Prototype Station #3 - Outlying Employment Centers
Due to the nature of the development that has occurred along busy rail lines as they enter Kansas City itself, the new commuter rail system could potentially tap into existing employment opportunities for industrial and service workers. One such employment center has been identified at the Kansas City, Kansas station (KCK) proposed to be located along Corridor H (Lawrence). Other commuter rail stations are located reasonably close to major hospitals and retail centers, which are also potential employers of economically disadvantaged commuter rail passengers. As implementation proceeds, other Outlying Employment Center stations may be identified.
Figure G

TYPICAL PROTOTYPE #2 TRAIN STATION
(FRINGE AREA PARK & RIDE)
(Scale: 1" = 100')

TALIAFERRO & BROWNE, INC.
CONSULTING ENGINEERS-SURVEYORS
KANSAS CITY, MISSOURI

KC COMMUTER RAIL STUDY
TYPICAL STATION SITE PLAN LAYOUT-II

The RLBA Team
The emphasis at stations of this type is making possible efficient transfer of passengers from trains to busses, vans or HCT vehicles in order to complete their journey to their destinations. At the destination end of a commuter rail trip, shuttle vans or transit buses would be needed to carry workers between stations and employment sites. KCATA buses are already serving the areas around Kansas City, Kansas station in Corridor H, as well as commuter rail stations on Corridor D and Corridor E in Independence and Lee's Summit. Potential employers may choose to meet trains with their own shuttle vans. Figure H represents a Prototype #3 station. Its estimated cost is $2.1 million.

**Station Components/Amenities**

Station design, configuration and construction standards are important elements in attracting and retaining ridership. Some commuter rail stations make use of existing station buildings that formerly served intercity passengers, or in some cases still do. Other commuter rail stations have no traditional station structure and no employee on duty. These are often called park-and-ride stations, which aptly describes their function. Regardless of the station prototype chosen and whether or not a station building is provided, there are necessary and optional station features.

**Necessary**
- Boarding platform,
- provision for wheelchair boarding,
- Platform and parking lot lighting,
- adequate parking,
- a bus lane and "kiss and ride" (drop-off) lane and
- ticket vending machines.

**Optional**
- public address system,
- newspaper or vending machines,
- pay telephones,
- system information,
- security cameras,
- benches or landscaping and
- shelter for inclement weather.
Figure H

TYPICAL PROTOTYPE #3 TRAIN STATION
.OUTLYING EMPLOYMENT CENTERS.
(Scale: 1' = 100')

The RLBA Team

TALIAFerro & Browne, Inc.
Consulting Engineers-Surveyors
Kansas City, Missouri

KC COMMUTER RAIL STUDY
TYPICAL STATION SITE PLAN LAYOUT- III

The RLBA Team
As described in the preceding report, some communities have taken over "ownership," figuratively if not literally, of "their" commuter rail stations, making them into a special community location. By the same token, encouragement of passenger service retail establishments co-located with the station performs a similar synergistic function, each reinforcing the other. Community or private initiative may take over here, transferring a mere commuter rail structure into a "signature" community location, destination and development node.

**General Capital Costs-Feeder Distribution System**

For the purposes of this analysis, it was assumed that one additional bus would be required to reduce headways on existing bus routes from 60 minutes to 30 minutes, and that another bus would be required to reduce headways from 30 minutes to 15 minutes. For each new bus, the estimated capital cost is $275,000.

To reduce headways on Independence Circulator Routes the cost would range from $825,000 - $1,650,000 and costs to initiate service to the Kansas City, Kansas Station could cost up to $1,375,000.

It would be difficult to estimate more accurately the capital cost requirements for reducing headways on existing bus routes or for providing new circulator type services to provide access to nearby park and ride facilities.

The number of new buses required will vary according to the length of the route, the relationship of the route to other routes in the system, and the specific types of bus to be operated. Destination stations such as KCUS and Kansas City, Kansas would require dedicated bus services above and beyond that which currently exist to handle anticipated commuter rail riders looking to transfer to other downtown locations.

Additional capital costs would be incurred if a complementary bus service were implemented such as a "shadow service" which ran during off peak hours and in reverse peak direction of commuter rail. Such a service could share the same identity and branding as the commuter rail service and could help alleviate commuter concerns of being stranded.

Offsetting the capital costs of any proposed new circulator routes or the reduction of headways on existing routes, and the capital costs of new park and ride facilities, there would be anticipated savings from reducing or eliminating services on existing express bus routes operated by the Kansas City Area Transportation Authority that would become redundant once commuter rail service begins. Three such routes likely to become redundant would be the #24X Independence Express, the #152 Lee's Summit/Raytown Express, and the #170 Blue Springs Express.
**Economic, Environmental & Social Considerations**

Environmental Justice (EJ) initiatives are meant to involve a potentially affected public in developing transportation projects that fit harmoniously within their communities without sacrificing safety or mobility. As mentioned in the Initial Corridor Screening report, concerns that should be addressed in any EJ considerations are:

- What is the area of impact for the use of the federal transportation funds?
- What constitutes low income and minority populations?
- How should the specific target low income and minority population for the area impacted be identified?

Efforts in this portion of the study have been aimed at outlining an approach to be used in subsequent implementation planning to map out an impact area and identify potential target EJ populations.

Of the Federal legislation and executive orders pertaining to EJ, none prescribe specific methodology. State and local transportation agencies are free to explore and devise effective analytical techniques and public involvement approaches to ensure transportation plans successfully integrate EJ into decision making.

The determination of a project impact area should be reviewed and agreed to by the participants through a public involvement process. US DOT Order 5610.2 on EJ as well as TEA-21 direct and encourage opportunities for public participation in matters that may impact human health and the environment. Such a process can alert state and local agencies about EJ concerns so that they do not result in surprises during the project development stage. These discussions should be recorded as part of documenting the entire EJ process. In defining a specific project area all the land within the logical termini of the project area as well as adjacent areas, that may be reasonably impacted by it could be used. One possible approach would be use of the census tracts within and adjacent to the proposed corridors.

Typically used definitions of "target" populations have been:

- At least one-half of the population is of minority status
- At least half of the population is of low income status
- The percentage of the population of minority status is at least ten percentage points higher than for the entire county in which the population is located.
- The percentage of the population of low-income status is at least ten percentage points higher than for the entire county in which the population is located.

Several methods may be used to identify "target" populations. For example:

- If there is no concentrated low income or minority population in a project area, it may be reasonable to use the state or regional average as the base and any
area with a percentage equal to or several percentage points more than the state or regional average being considered adequate to identify a "target area."

- There are several ways to decide on what percentage or ranges of percentages higher than the regional or statewide average is reasonable to designate an area as a "target area." One way to do this is to determine the regional or statewide average of minority or low income populations. This number can be used as the threshold population percentage for defining a low income or minority target area. Then plot or map the locations of low-income areas in increments 25 percent lower and greater than this average. For example if the statewide minority population were at 12 percent, define ranges from 0-9 percent (12 percent - (12 percent x .25 percent)), 9-12 percent, 12-15 percent (12 percent + (12 percent x .25 percent)) and over 15 percent. The first range would be areas significantly below the regional or statewide average and would likely not be a target area. The second and third ranges would be close to but just below or above the regional or statewide average. These areas may or may not be included depending on how these pockets fell with regard to the fourth range. The final range would be areas significantly above the regional or statewide average. These areas would generally be part of the impact area.

- If there is any doubt about what is a reasonable concentration of low income or minority populations to be considered a target population, the statewide average could serve as the minimum base percentage for an area to be designated a target population area.

Potential impacts mentioned in Executive Order 12898 that could be evaluated may include, but are not limited to:

- bodily impairment, infirmity, illness or death;
- air, noise, and water pollution and soil contamination;
- destruction or disruption of man-made or natural resources;
- destruction or diminution of aesthetic values;
- destruction or disruption of community cohesion;
- destruction or disruption of a community’s economic vitality;
- destruction or disruption of the availability of public and private facilities and services;
- vibration;
- adverse employment effects;
- displacement of persons, businesses, farms, or nonprofit organizations;
- increased traffic congestion;
- isolation;
- exclusion or separation of minority or low-income individuals within a given community or from the broader community; and
- the denial of, reduction in, or significant delay in the receipt of benefits.
Some of these impacts can be quantified in measurable units, such as residential displacements, business and farm displacements estimated travel times, air quality changes and noise increases. Other impacts cannot as easily be quantified. These impacts, such as destruction of aesthetic value, decreased land value projections and adverse employment will have to be based on qualitative standards. They will require subjective analysis by staff and discussion during a public involvement process.
Commuter Rail Ridership Forecasts

MARC has developed a mode choice model as part of a regional travel model that utilizes the Emme/2 modeling software originally developed as part of the Southtown Corridor light rail evaluation. The model was then updated and used as part of the Northland Major Investment Study; it included a representation of a commuter rail line that would serve the I-35 Corridor in Johnson County with its terminal in Union Station. Commuter rail however, was not explicitly defined in the mode choice model. In order to specifically model a commuter rail mode, a two phased approach was undertaken.

The project began with the evaluation of 19 rail corridors located within eight travel corridors that radiated outward from downtown Kansas City, Missouri. Ridership potential was estimated using a planning technique that rested on the cost of travel by automobile, express bus and commuter rail. The share of commuter rail ridership was estimated from areas that would be served by a commuter rail line. This approach provided a method to obtain comparative ridership forecasts for rail lines within the eight travel corridors. The ridership projections were used as part of the decision process in selecting rail corridors to be investigated during the detailed corridor assessment portion of the study, in which the three selected potential commuter rail lines were coded into the regional transit network. The current mode choice model was augmented with a mode choice component that utilized model information to produce a commuter rail modal share and perform a commuter rail mode transit assignment.

Commuter Rail Mode Choice Model

The estimation of commuter rail ridership used a multinomial nested logit model which shows $p$ as equal to the probability of using mode $i$ for travel from zone $p$ to zone $q$ the with basic formulation of which is:

$$P(i)pq = \frac{DU(i)}{\sum DU(i,n)pq}$$

Where

$DU(i)$ = The disutility function associated with using mode $i$

$\sum DU(i,n)$ = sum of disutility functions for all competing modes

Model Inputs

The following files were utilized from the Emme/2 model:

- Year 2020 congested vehicle travel time matrix
- Year 2020 vehicle travel distances
- Transit time matrix (time to travel via transit mode)
- Transit in-vehicle travel times
- Transit walk times
- Total transit waiting times
- Transit boarding times
An impedance function was developed for travel by each mode. The auto disutility was calculated as a function of auto travel time, auto travel distance and parking costs. Impedance functions were developed for each transit mode to include in-vehicle time, wait time, access time and cost of fares.

The impedance functions were:

- **Auto impedance =** $4 \times \text{(travel times)} + 5 \times \text{(travel distance)}$
- **Commuter Rail Impedance =** $4 \times \text{(rail travel time)} + 8 \times \text{(walk time to the station + wait time + other access time)}$
- **Express Bus Impedance =** $5 \times \text{(express bus travel time)} + 10 \times \text{(walk time to stop + wait time = other access time)}$

**Model Output**
The Emme/2 model produced a commuter rail zone–to-zone trip table. These trips were assigned to the transit network, which produced the number of passenger boardings at each rail transit station for those stations located within the regional model coverage.

Stations outside the limits of the regional model were Odessa, Eudora and Lawrence. Boardings for those three stations were obtained by starting with the ridership estimates produced in the Initial Corridor Screening. A ratio of the modeled portion of each corridor’s total ridership using Emme2 divided by the corridor’s total in the Initial Corridor Screening was calculated to measure the proportion and direction of difference noted in the second, more detailed evaluation (using the Emme2 model). That ratio was applied to the initial estimates for Odessa, Eudora and Lawrence in order to adjust those estimates to the pattern of the remainder of their respective corridors.

**Ridership Results**
The mode choice model was run to produce year 2020 estimates of commuter rail trip boardings for the three rail lines. The results are shown in Table 3.
Table 3
Daily Commuter Rail Ridership Forecasts
(Year 2020)

<table>
<thead>
<tr>
<th>Corridor</th>
<th>Service Location</th>
<th>Ridership (2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>I-70 Commuter Rail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Odessa</td>
<td>266</td>
</tr>
<tr>
<td></td>
<td>Oak Grove</td>
<td>756</td>
</tr>
<tr>
<td></td>
<td>Blue Springs</td>
<td>1,090</td>
</tr>
<tr>
<td></td>
<td>Independence - Little Blue</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td>Independence Central</td>
<td>1,004</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3,346</td>
</tr>
<tr>
<td>E</td>
<td>South Jackson Commuter Rail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pleasant Hill</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>Lee’s Summit</td>
<td>3,354</td>
</tr>
<tr>
<td></td>
<td>Independence - Amtrak</td>
<td>974</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4,434</td>
</tr>
<tr>
<td>H</td>
<td>Lawrence Commuter Rail</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lawrence</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Eudora</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>DeSoto</td>
<td>666</td>
</tr>
<tr>
<td></td>
<td>Edwardsville</td>
<td>1,502</td>
</tr>
<tr>
<td></td>
<td>KCK</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2,238</td>
</tr>
</tbody>
</table>

Note: 974 trips at Independence are shown on both Corridors D and E. If both services were implemented, those trips would be split between the two stations and the combined ridership of the two corridors would be 6,806, or 974 less than if the two totals above were added.

Source: MARC, RLBA team.

The travel forecasts shown above represent total daily boardings in both directions. Service was modeled for inbound a.m. and outbound p.m. travel, consistent with the expected service implementation pattern. Morning boardings would be one-half of the amounts shown above and evening boardings would be the same.

The highest ridership is shown to occur on the Southern Jackson County line (Corridor E) that connects Pleasant Hill and Lee’s Summit. The highest number of boardings is in Lee’s Summit. The I-70 line (Corridor D) has the second highest ridership. Those boardings are spread over a larger number of stations than hypothesized for the Southern Jackson line. The Lawrence line (Corridor H) has the
The smallest number of boardings, despite the fact that Edwardsville is estimated to have the second highest boarding total.

**Findings**

As in the Initial Corridor Screening, the consultant team has to the extent possible followed guidelines of the FTA’s New Starts Criteria in this preliminary feasibility assessment. The updated and refined information developed for the three corridors that are the subject of this report is summarized using the same measures as presented in Table 10 of the prior report. The top row of the following table lists various FTA new start criteria. The second row identifies study measures which are closely related to the FTA criteria. Below that, each corridor’s projected performance with respect to those study measures is set forth.

<table>
<thead>
<tr>
<th>FTA Criteria</th>
<th>Mobility</th>
<th>Environmental and Other</th>
<th>Operating Efficiencies</th>
<th>Cost Effectiveness</th>
<th>Cost Effectiveness</th>
<th>Cost Effectiveness</th>
<th>Land Use and Other</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Study Measure</td>
<td>Average Speed (mph)</td>
<td>Ridership</td>
<td>Operating Cost per Passenger ($)</td>
<td>Capital Cost ($ million)</td>
<td>Capital Cost per Passenger (4)</td>
<td>Subsidy per Passenger Round Trp</td>
<td>Opportunities or Barriers</td>
<td>Freight Conflicts Outside Terminal Area</td>
</tr>
<tr>
<td>Odessa-KC (Corridor D)</td>
<td>33.9</td>
<td>3,346</td>
<td>7.08</td>
<td>133.8</td>
<td>39,998</td>
<td>8.64</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Pleasant Hill-KC (Corridor E)</td>
<td>36.5</td>
<td>4,434</td>
<td>5.30</td>
<td>141.5</td>
<td>31,912</td>
<td>4.82</td>
<td>Special Events Service to Sports Complex</td>
<td>High</td>
</tr>
<tr>
<td>Lawrence-KC (Corridor H)</td>
<td>38.6</td>
<td>2,238</td>
<td>9.17</td>
<td>117.9</td>
<td>52,700</td>
<td>12.98</td>
<td>Major University</td>
<td>Mixed High and Low</td>
</tr>
</tbody>
</table>

The primary objective of a new service would be to attract and hold ridership, thereby accomplishing secondary objects related to reduced traffic congestion and air quality. For that reason, additional consideration of the ridership forecasts is warranted. Comparison of projected ridership with current or initial ridership on other commuter rail systems was a measure used in the Initial Corridor Screening that continues to offer assistance in benchmarking potential Kansas City region services. Figure I below compares projected ridership on Corridors D, E and H against existing ridership at several systems. In addition, two planning figures used by Virginia Railway Express (VRE) are included: initial anticipated ridership upon service start-up and the expected mature ridership once the service became established in fact as well as in public perception.
Figure I
Ridership per Route Comparison
KC Region Corridors (Year 2020) and Existing Commuter Rail Services

Source: RLBA Team.
Several of the existing ridership figures have been updated since a similar figure was presented in the Initial Corridor Screening Report. It can be seen that all three corridors exceed the VRE initial ridership target and Corridor E exceeds the VRE mature service expectation. Both Corridors D and E compare well with the recently implemented and rapidly growing Altamont Commuter Express (in California) and Trinity Railway Express (in Texas) services.

The emphasis of this portion of the study has been in developing an enhanced understanding of the prospects for commuter rail service in all three corridors as opposed to developing enough information to screen corridors with early potential from those with later, or little apparent, potential, as was the task of the previous report. Upon consideration of the previous report, the key questions revolved around comparing corridors with one another and selecting among them. Now, the appropriate questions to be posed now are of the nature of:

- Does commuter rail have a future in the Kansas City Region?
- How do these projected costs and benefits compare with other transportation alternatives?
- Where do we go from here?

The first two questions now can be considered by citizens and planners in the light of the findings of this report. The study team believes that all three lines examined have a potential role to play in the region’s long term transportation system, and recommends that all remain under consideration. The timing and pace of development depends upon local evaluation of not only the three commuter lines (plus the I-35 service), but also possible enhancements of the Interstate highways, new and upgraded highways and streets, HCT and other transportation initiatives.

The final question posed above will be addressed in the next report which responds to RFP Task 5, Develop Implementation Strategy. That report will address such topics as:

- Financial planning
- Interjurisdictional service issues
- Institutional arrangements, including service operator selection
- Freight railroad coordination, and
- Next steps

**Stakeholder Involvement: Community Meetings**

Three meetings were held in August 2001 with community representatives from the corridors selected for detailed study. Those corridor endpoints are Odessa, Missouri, Pleasant Hill Missouri and Lawrence, Kansas. The meetings were held in a roundtable format. Prior to discussion, consultant team members made a brief
presentation on the work done for the initial screening, and an overview of some of the key requirements for commuter rail success.

In total, the study team talked with more than 40 community leaders. While specific concerns differed, there was a general sense of support for the continued exploration of commuter rail. Common concerns included location of stations and preservation of station/parking lot locations, whether or not specific rail lines are better than others, financing issues and use of passenger rail outside of the suburban-to-urban commute. Connections to both Johnson County points and to the Kansas City International (KCI) airport were brought up as important destinations. Additionally, there were questions about the types of riders who typically use commuter rail and questions about the modeling process. Another common concern was the ability to make commuter rail more attractive than traveling by private automobile in terms of amenities, convenience and cost.

The roundtables provided study team members with an important opportunity to gauge levels of community support and specific, community-level issues. For example:

**Odessa Corridor:**
- Impact on I-70 and downtown connections are critical
- Station locations at local communities may have significant impacts on growth and development plans
- Financing issues are important

**Pleasant Hill Corridor:**
- Warrensburg has many employees/employers who would utilize both a traditional and a reverse commute
- Rock Island Line in Lee’s Summit goes through a residential area and neighbors do not want that line reactivated
- Possible positive impact on highways and roads via less use
- Possible partnering with Amtrak?

**Lawrence Corridor:**
- Commute to/from Topeka is important
- Community support already being cultivated
- Service must be better than Amtrak’s

**Support for Commuter Rail: Public Survey**
Mid-America Regional Council conducted a survey of residents who live along three rail corridors in the Greater Kansas City area during January 2002. The purpose of the survey was to gather statistically valid input from residents in order to help determine the feasibility of developing commuter rail service along various rail corridors in the metropolitan Kansas City area.
Residents were asked for input about a wide range of issues including:

- frequency of visiting various destinations
- travel behaviors for commuting to and from work
- support for the development of commuter rail
- likelihood of using commuter rail service
- willingness to have portion of local tax dollars used to support the development of commuter rail
- priority that residents think community leaders should place on the development of commuter rail over the next 20 years

**Methodology**

The survey was administered by mail with follow-up by phone to a random sample of at least 300 households in three different corridors. A total of 933 households participated in the survey. The sample was stratified to ensure that the results would be statistically valid for each of the following corridors:

- **Odessa-Kansas City Corridor.** This corridor includes residents who live along I-70 between Odessa, Missouri, and Union Station in Kansas City, Missouri. Cities that were represented include: Odessa, Blue Springs, Bates City, Oak Grove, Grain Valley, Independence, and Kansas City, Missouri.

- **Warrensburg-Pleasant Hill-Kansas City Corridor.** This corridor includes residents who live along US-50 between Warrensburg, Missouri, and Union Station in Kansas City, Missouri. Cities that were represented include: Warrensburg, Pleasant Hill, Pittsville, Lone Jack, Lee’s Summit, Raytown, and Kansas City, Missouri.

- **Topeka-Lawrence-Kansas City Corridor.** This corridor includes residents who live along I-70 between Topeka, Kansas, and Union Station in Kansas City, Missouri. Cities that were represented include: Topeka, Lawrence, Eudora, DeSoto, Bonner Springs, Edwardsville, and Kansas City, Kansas.

The overall results for each corridor have a 95 percent level of confidence with a precision of at least +/- 5.6 percent.

**Major Findings**

**Support for the Development of Commuter Rail**

More than 70 percent of those surveyed in each of the three corridors were either “very” or “somewhat” supportive of developing commuter rail service. The level of support ranged from a low of 71 percent for residents who live along the Topeka-Kansas City corridor to a high of 74 percent for residents who live along the Odessa-Kansas City corridor.
Priority for the Development of Commuter Rail
About half of the residents surveyed in each of the three rail corridors thought community leaders should place a “very high” or “high” priority on the development of commuter rail over the next 20 years. 55 percent of the residents who live along the Odessa-Kansas City corridor thought it should be a “very high” or “high” priority; 49 percent of the residents who live along the other two corridors thought it should be a “very high” or “high” priority. Less than 10 percent of the residents surveyed thought it should be a “low” priority.

Willingness to Have a Portion of Local Taxes Used to Fund Commuter Rail
A majority of those surveyed in each of the three corridors indicated that they were either “very willing” or “somewhat willing” to have a portion of local taxes used to support the development of commuter rail. The level of willingness ranged from a low of 57 percent for residents who live along the Topeka-Kansas City corridor to a high of 63 percent for residents who live along the Odessa-Kansas City corridor.

Impact of the Defeat of Light Rail by Voters in Kansas City on Support for Commuter Rail
A majority of those surveyed indicated that the defeat of light rail by voters in Kansas City had not changed their level of support for commuter rail. For those whose level of support had changed, most are now more supportive of commuter rail than they were before the election. 24 percent of those surveyed along the Topeka-Kansas City corridor are now more supportive of commuter rail compared to 13 percent who are less supportive. 26 percent of those surveyed along the Odessa-Kansas City corridor are now more supportive compared to 9 percent who are less supportive, and 30 percent of those surveyed who live along the Warrensburg-Kansas City corridor are now more supportive compared to 7 percent who are less supportive.

Likelihood of Using Commuter Rail Service
At least two-thirds of those surveyed along each corridor indicated that they would “definitely” or “probably” use commuter rail service.

Enhancing the Likelihood of Commuter Rail Success
It is often asked of corridors where commuter rail is initially found not feasible, what would make commuter rail a success? The following considerations are responsive to that question as well as to the question, what would make commuter rail even more successful where it is implemented?

Ridership is the most critical factor in the feasibility of establishing any commuter rail system, and thus it is the first place to look in identifying the factors that would make commuter rail successful in a corridor that initially shows poor prospects. The first change in a corridor that would help to build ridership on a particular corridor previously deemed not viable is population growth in the anchor city or cities and along the corridor.
Another circumstance that could promote commuter rail development on particular routes is the location of a new facility on the corridor. A new facility could include: a large industry or group of industries, such as an industrial park; a new sports or recreational facility, such as a new baseball or football stadium; a new center for the arts and entertainment or other museums; a new educational facility, such as a college, university or city and county school; or a new airport or multimodal facility. Another possibility is the establishment of a new housing subdivision or retail center along the line that could help draw more people to the area.

Another factor that is known to increase transit ridership is highway congestion. Given that there is a threshold for people’s willingness to get out of their cars and onto public transportation, as highway congestion increases the quality of life may degrade to the extent that potential ridership could grow significantly. Related is the notion that if a major highway construction project occurs, increasing delay frequency and/or increasing extending travel times, then potential patronage could increase. Furthermore, there is also the possibility that easing congestion on the highway is not an option; the cost of adding another lane may be too great or there may be physical barriers.

If the price of gasoline becomes too high for consumers and alternative fuels and technologies continue to be much too expensive for widespread use, people may be more inclined to take the train. Secondary but complementary to concerns about the family budget, as people become more concerned with the well being of the environment, they may turn to rail as a more fuel-efficient and environmentally friendly option.

A subsequent factor in making commuter rail so attractive as to induce its introduction in additional corridors is the success and attractiveness of the region’s already-operating commuter rail system. People will want to be connected to a service that is a proven success. That success in large measure is the result of the quality of the service that is offered. In addition, the geographic scope, service hours, connectivity and ease of use of the operating system will influence the ability to attract riders in new corridors. Simply put, the bigger and better the commuter rail system is, the more likely that successful additions may be developed.

The establishment of a feeder bus system or other transportation modes that would help to increase density and a larger base from which to draw could also increase potential ridership. Zoning and favorable tax policies could also foster the development of a more substantial potential ridership base in a particular corridor.

Finally, it will be not a single factor that increases corridor population or demand for commuter rail, but rather a combination of those cited above. These factors may be shaped incrementally in small or large degree by thoughtful decisions concerning transportation services and facilities, land use, taxation and energy and environmental policy.
Odessa – Kansas City (Corridor D)

Corridor Description
This corridor, identified in the previous report as Corridor D, extends east to Odessa paralleling the Missouri River and Interstate 70. Corridor features include the Independence Center Mall, the Independence Airport, Harry S. Truman Regional Airport and, beyond the initial projected commuter service area, the Higginsville Industrial Municipal Airport.

Most of the likely commuter rail route in this corridor is owned and operated by Kansas City Southern Railway (KCS). This 34.4-mile segment of the former Gateway Western Railway Subdivision No. 3 hosts five freight trains per day. The line consists of one main track, with no signal system and is controlled by Track Warrants (TWC), wherein movement of trains is governed by verbal authority of the dispatcher, conveyed by radio. There is no passenger service on the line. The maximum train speed is 40 mph. The preferred route for Corridor D commuter trains between Rock Creek Junction and KCUS would be via a 6.2-mile segment of the KCT Main Tracks that make a direct connection. This segment has multiple tracks and is governed by a Centralized Traffic Control (CTC) signal system. An alternate route that could be used would consist of UP trackage between Rock Creek Junction, Neff Yard and Union Avenue, KCT’s Bluff line between Union Avenue and Southwest Boulevard, and the KCT Main Tracks between Southwest Boulevard and KCUS. The alternate route would be almost three miles longer and could increase running time by nearly ten minutes as compared to the preferred route via the KCT Main Tracks. In addition, the alternate route passes the busy Neff Yard, with the potential for delays to passenger trains as freight trains slowly enter or depart yard tracks.

UP’s River Subdivision also serves the corridor, connecting Lexington, Missouri with Kansas City. However, this line does not serve the populated portions of the corridor nearly as well as the KCS line which was selected as the basis of this analysis.

Stations

Station Locations

Five stations are suggested for the corridor at Odessa, Oak Grove, Blue Springs, Independence – Little Blue and Independence – Crysler, as detailed below. Although specific potential locations and suggested station prototypes are identified, these locations and station types should receive careful consideration in implementation planning. Community input and participation is vital to this aspect of project development.
Odessa (4,818 2000 pop.) The proposed station would be located north of the city on North Johnson Road, just north of I-70. The site is presently being utilized for agricultural use with a fiber optic switching station within close proximity. Downtown Odessa is located to the south of I-70, while areas to the north are predominantly agricultural at this time. The existence of large vacant plots presents an excellent opportunity to provide a large Park and Ride facility. The Odessa Outlet Mall provides an existing destination point.

This station should be developed under the land use development guidelines discussed above as Prototype #2 - Fringe Area Park and Ride.
Oak Grove (5,535 2000 pop.) The proposed station is located on the east side of town, north of the railroad tracks at the southeast corner of SE 10th Street and SE Salem Street. This site is approximately six blocks from I-70 and two blocks from downtown. The subject parcels' existing land uses are a mixture of industrial and undeveloped. Future land use plans designate the site as industrial with residential development to the north and east, and a mixture of public uses and residential to the south and west. Currently there are large vacant tracts of land to the north and east of the proposed location.

At the discretion of the local government, this station could be developed either under Prototype #1 (Transit Oriented Development within Established Communities) or Prototype #2 (Fringe Area Park and Ride). No transit services are available at or near this location at present.
Blue Springs (48,080 2000 pop.) The proposed station is located in the center of the town, five blocks west of Highway 7, at the intersection of 12th and Knox Streets. The station would be less than one mile from either I-70 or US 40 Highway. The proposed location is currently vacant with a future land use designation of low intensity residential. The future land use map indicates that areas to the immediate south as Downtown mixed use, with low intensity residential uses to the west and southwest and north. Non-residential uses front along Highway 7, US 40 and I-70.

Due to its central location, the land use scenario for development of the area around the proposed Blue Springs commuter rail station should follow Prototype #1-Transit Oriented Development/Established Community.
Independence, Mall (113,288 2000 pop.) The proposed station is located east of Independence Center Mall at the northeast corner of the intersection of I-70 and Selsa Road. The site is currently vacant, however, extensive commercial and office development has been occurring on the north and south sides of I-70. Future land use plans project the site for Business Park development with surrounding areas of highway commercial, commercial and mixed use. The proposed site has excellent access to I-70 and Highway 470 along with access to Independence Center and other existing commercial facilities surrounding 39th Street and 470. Additionally, there are large amounts of vacant land on the south and north sides of I-70 to the east of the subject site.

This site should be developed as a Fringe Area Park and Ride Facility, and land use development in the area of the station should follow the scenario previously described as Prototype #2 - Fringe Area Park and Ride. There is also a potential for retail employees to use this station for access to jobs in the Independence Mall area.
Independence - Central (113,288 2000 pop.) Although central Independence is heavily developed a possible site was located at 23rd Street west of Crysler Avenue. The site has a commercial development fronting on 23rd Street with a large parcel abutting the rail track which is currently occupied by a single family residence. In the immediate vicinity of the subject site 23rd Street is commercially developed with extensive residential development to the north and south. While the site is located near numerous historical sites and only blocks from Columbia Independence Regional Hospital, access to major arterials or highways is poor.

Land use in the area of this station should follow the approach outlined above for Prototype #1 - Transit Oriented Development/Established Community.
**Land Use**
While the Odessa and Oak Grove locations offer ample space for stations and parking, the small populations of their surrounding areas will limit the amount of development around these proposed stations. The Blue Springs and the two Independence locations are situated in or adjacent to developed areas, which may require some relocation of existing development. Currently, extensive office space is already under construction to the west of the Independence-Little Blue site with additional residential and commercial space proposed to the north along Selsa Road. With ongoing development at and near the Independence - Little Blue (Mall) location, there appears to be a real opportunity for the development of destination services and small retail shops.

**Feeder/distribution System**
The Odessa and Oak Grove station sites are not served by transit at this time. New services likely would need to be developed.

Blue Springs - The proposed station adjacent to SE Walnut Avenue would be within several blocks from the Express route (KCATA #170) between Blue Springs and Kansas City, which would probably become redundant once commuter rail service were to begin in this corridor. Feeder bus service, using the outermost part of the KCATA #170 bus route, could be used to provide access to this station from a remote park and ride facility. This remote facility could be oriented to 7 Highway, I-70, and/or US 40. The change to local access service, from express bus service to and from downtown Kansas City, should result in a capital cost reduction for bus services serving this station.

Independence – Little Blue - KCATA #183 (Independence Green) provides hourly weekday bus transit service to and from the Independence Mall in the vicinity of this station site. Route modifications could be made to include a proposed station at or near the intersection of Selsa Road. Additional buses may be required in order to shorten current headways on the Green Line, from one hour to 15 or 30 minutes.

Portions of the existing Blue Springs express bus route (KCATA #170), which currently runs between Blue Springs and Kansas City, would probably become redundant once commuter rail service begins in this corridor. However, parts of this route could be used to provide access to the Independence Mall commuter rail station from two of the existing park and ride lots served by this route, one of which is located on Highway 7 north of I-70 at Shaw Parkway, with the other located near I-70 at Woods Chapel Road.

Independence (Crysler) - Hourly circulator bus service within this area is provided by KCATA Routes numbered #285 (Independence Blue), and #292 (Independence Orange). KCATA Route #24 provides service between Independence and downtown
Kansas City. KCATA #24X, which provides express bus service between downtown Kansas City and this area, may become redundant were commuter rail service to begin. Headways on the Blue and Orange circulator lines may need to be reduced, from one hour to 15 or 30 minutes, in order to provide improved access to the new commuter rail station.

To shorten headways on the Blue and Orange lines from their existing hourly levels, additional bus purchases may be required. Existing local bus routes can be adjusted to provide employee access from this station to the Independence Regional Health Clinic.

**Service Plan**

Projected commuter train running time between Odessa and Kansas City Union Station would be about 66 minutes. Initially, four trains each way per day would be appropriate in view of the projected 3,266 daily rail trips. Headways of 40 minutes would result in all four inbound trains arriving at KCUS within a period of two hours. The same pattern could be used in the evening, or departures could be spread out to provide more flexibility for those who work late. For example, the first train would arrive in downtown Kansas City at 6:55 A.M., while the last trainset would arrive at 8:55 A.M. Representative schedules are shown below.

**Schedule: Odessa – Kansas City**

<table>
<thead>
<tr>
<th>Station</th>
<th>Morning Inbound to Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odessa</td>
<td>5:49 AM 6:29 AM 7:09 AM 7:49 AM</td>
</tr>
<tr>
<td>Oak Grove</td>
<td>6:06 AM 6:46 AM 7:26 AM 8:06 AM</td>
</tr>
<tr>
<td>Blue Springs</td>
<td>6:20 AM 7:00 AM 7:40 AM 8:20 AM</td>
</tr>
<tr>
<td>Independence - Little Blue</td>
<td>6:32 AM 7:12 AM 7:52 AM 8:32 AM</td>
</tr>
<tr>
<td>Independence Central</td>
<td>6:39 AM 7:19 AM 7:59 AM 8:39 AM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>6:55 AM 7:35 AM 8:15 AM 8:55 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station</th>
<th>Evening Outbound from Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odessa</td>
<td>5:16 PM 5:56 PM 6:36 PM 7:16 PM</td>
</tr>
<tr>
<td>Oak Grove</td>
<td>4:58 PM 5:38 PM 6:18 PM 6:58 PM</td>
</tr>
<tr>
<td>Blue Springs</td>
<td>4:44 PM 5:24 PM 6:04 PM 6:44 PM</td>
</tr>
<tr>
<td>Independence - Little Blue</td>
<td>4:32 PM 5:12 PM 5:52 PM 6:32 PM</td>
</tr>
<tr>
<td>Independence Central</td>
<td>4:25 PM 5:05 PM 5:45 PM 6:25 PM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>4:10 PM 4:50 PM 5:30 PM 6:10 PM</td>
</tr>
</tbody>
</table>
**Passenger Equipment**

Each scheduled train at service startup will require a dedicated trainset. Running times are too long for the first inbound train to complete its run to Union Station, discharge passengers and return to Odessa in time to make another inbound trip during the peak period. As demand builds and more scheduled trains are called for, extending the duration of the peak period, it may be possible to "turn back" early trains and make a reverse run to the opposite terminal and make another trip in the peak direction during the peak period. However, operating trains in the "reverse peak" direction, whether carrying passengers in revenue service or as empty "deadhead" movements, consumes far more rail line capacity and greatly increases potential passenger-freight conflicts, complicating arrangements with the host railroads and likely necessitating additional rail capacity improvements. These are strong arguments for modestly starting service with peak direction trains only.

Trainsets were projected to include a rebuilt diesel locomotive, four bilevel coaches and a bilevel cab control car (a coach equipped with an engineer's compartment with operating controls so that the train can be operated with that car in the lead). This enables push-pull operations instead of having to turn the train upon completion of each run. This greatly improves operating efficiency and is standard commuter rail operating procedure where diesel-powered trains are used. Coaches could be single level or bilevel. Bilevel cars are prevalent with agencies purchasing new equipment. Their greater seating capacity is cost-effective and the cars generally are popular with customers. A spare locomotive and cars are projected for each corridor and an allowance made for spare parts. Total rolling stock cost is projected at $54.3 million for this corridor. As implementation draws nearer, the commuter rail sponsor could choose between new and used equipment and single and bilevel cars, based upon final ridership projections, equipment availability and cost and project funding.

**Layover Facilities**

Layover facilities are required for overnight train storage and light servicing and cleaning. It is preferable to locate these as close as possible to a commuter rail line's outer terminals. It is assumed that a layover facility would be constructed near Odessa. Estimated to cost about $1.5 million, it would include the following:

- Sufficient tracks for four trainsets, with additional space to expand considering the possibility of future fleet size increases.
- 480 volt standby power (required to maintain train heat and cooling and operate lights and doors without running the train's locomotive).
- Crew and maintenance building.
- Fencing and security.
- Lighting.
- Level storage tracks with drip pans for locomotives.
- Ability to change consists without entering the main track.
- Roadway vehicle access to all tracks.
- Drop pans for locomotives.
Track
The current freight train speed on the line is 40 miles per hour east of Independence and 30 miles per hour between Independence and Rock Creek Junction. In order to support these freight train speeds, KCS maintains the track to FRA Class III standards, which allows for passenger train speeds of 60 miles per hour. Although this speed is sufficient for the commuter train schedules contemplated by this study, it is inevitable that some track upgrades would be required by KCS and would probably be desirable in terms of passenger safety and comfort.

The track improvement estimate for this line is made up of the following components:

- Installation of 27,500 new crossties (800 per mile) - $1.8 million
- Lining and surfacing of the existing track - $0.9 million
- Rail Installation - $10.8 million
- Modify grade crossings - $1.0 million

The crosstie installation figure represents a replacement rate of 27 percent, which will replace most if not all of the currently defective ties on the line and will provide a more solid and stable track structure. The entire route will need to be surfaced in order to ensure rider safety and comfort.

The rail currently in use on the line is 115RE (115 pounds per yard rolled to a section prescribed by the American Railway Engineering Association) with some short sections of 112RE. These rail sections are of sufficient weight to support the train speeds contemplated in this study. Most of the rail is in 39-foot lengths bolted together at its ends by conventional joint bars. Most commuter lines and virtually all heavy main freight lines today have Continuously Welded Rail (CWR). The use of CWR has a number of advantages, among them a smoother ride and the elimination of maintenance associated with joint bars and bolts. RLBA recommends replacing the existing rail with CWR as part of the commencement of commuter service, although it might be possible to spread that program over the first few years of service.

Rail/Highway Grade Crossings
There are 31 public rail/highway grade crossings between Odessa and Rock Creek Junction. Six of these crossings are protected by flashing lights and gates, 14 by flashing lights only and 11 by crossbucks and/or stop signs.

Commuter service will require various improvements to the existing crossing protection. Because train speeds will be increased, the existing track circuits that control flashing lights and gates will have to be lengthened in order to provide sufficient warning time. Higher train speeds and increased train frequency will create
a higher risk of more severe grade crossing accidents, and the commuter rail patrons will require increased safety at grade crossings. An organization in Washington, D.C., Operation Life Saver, has programs to enhance safety awareness in railroad environments.

The Federal Railroad Administration (FRA) maintains data concerning all rail/highway grade crossings in the country. This data includes the type of protection in place, estimated highway and railroad traffic counts and accident histories. The FRA also combines various data at each crossing to provide an "Accident Prediction Value" (APV) which quantifies the risk of crossing accidents based on various factors.

After reviewing the data on the existing crossings including current protection, highway traffic counts and the APV, RLBA recommends the installation of flashing lights and gates at two currently unprotected crossings and the installation of gates at nine crossings that currently have only flashing lights. The estimated cost of lengthening the track circuits and performing protection improvements is $0.6 million.

**Freight Impacts**

Freight traffic is light on the KCS portion of the route, amounting to only about five freight trains per day. There is no Amtrak service on that portion of the route. Impacts of adding commuter service to the KCS portion of the route are minimal, and would be more than offset by the benefits of the signal improvements recommended below.

KCT trackage between Rock Creek Junction and Kansas City Union Station is another matter. Freight traffic is heavy on that segment, with estimates reaching as high as 75 trains per day. Improvements to that segment are recommended below. Those improvements not only will provide capacity for handling commuter trains, but also will provide additional freight capacity during the approximately 18 hours per day that commuter trains would not be operating based on proposed initial schedules.

**Capacity Improvements**

The 41-mile KCS line between Kansas City and Odessa is currently the least utilized of those studied. Although perfectly suitable for its limited freight use, the line would need the most capital investment of any of the lines in order to establish commuter rail service. A description of recommended improvements to track, signals and grade crossings follows.

**Signal System and Capacity**

The KCS segment between Odessa and Rock Creek Junction is controlled by a Track Warrant Control System; it has no wayside signals and therefore no broken rail detection system. In order to provide a higher level of safety, higher train speeds and increased capacity on the line, RLBA recommends the installation of a CTC system prior to the commencement of commuter rail operations.
At $15.5 million, the installation of CTC is the largest component of infrastructure improvement cost for Corridor D, but its deployment is essential to the safe and successful startup of commuter rail operations. Indeed, it is unlikely that Kansas City Southern, would accept the additional liability risk of dispatching a mix of passenger and freight trains without a CTC system. In addition, the installation of interlockings at both ends of the existing passing siding at Grain Valley will provide a convenient point near the middle of the line for trains to pass or overtake other trains. Considering the level of freight traffic using the line, the CTC installation is the only capacity improvement that is recommended to accommodate commuter service.

**Terminal Area**
The preferred route for Corridor D commuter trains between Rock Creek Junction and KCUS would be via the KCT Main Tracks which make a direct connection between those points. Three potential capacity improvements related to use of that route would be:

1. re-configuring Rock Creek Junction to provide a direct connection between KCS and KCT tracks without using any segment of UP track,

2. upgrading the KCT’s signal system on the easternmost portion from Rock Creek to the West end of the Sheffield Flyover, a distance of about 2 miles, to more efficiently handle passenger traffic, and

3. constructing 4.3 miles of additional track along the KCT with necessary modifications to the Grand Avenue overpass.

With the construction of the Sheffield Flyover there is room for an additional track under the flyover at Rock Creek. Cost for track, crossover and signal, item (1) above, would be $2.5 million. Present signal system on the KCT is CTC but improvements may be required to the signal system on the two miles of trackage adjacent to and below the Sheffield Flyover, the cost of which would be $2 million. Track capacity on KCT from the west end of the flyover to Union Station will need to be increased, by installing an additional 4.3 miles of track at a cost of $9 million, with a modification to Grand Ave overpass bridge at a cost of $5 million for a total of $14 million for items (2) and (3). These costs would be shared with Corridor E, and thus $7 million is allocated to each corridor in the following cost tables. If the alternate route via Neff Yard and Union Avenue were used, it is likely that signal and/or track modifications would be necessary for expeditious commuter and freight train movement.

**Capital Cost Estimates**
Capital costs of implementing service on this corridor are summarized in Table 5 below.
Table 5
Capital Cost Summary: Odessa-Kansas City

<table>
<thead>
<tr>
<th>Corridor Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Improvements</td>
<td>$14,506,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements</td>
<td>15,480,000</td>
</tr>
<tr>
<td>Stations &amp; Parking</td>
<td>12,262,000</td>
</tr>
<tr>
<td>Layover Facility</td>
<td>1,476,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal Area Improvements</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Improvements</td>
<td>4,500,000</td>
</tr>
<tr>
<td>Track Improvements (Shared with Corridor E)</td>
<td>174,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements (Shared with Corridor E)</td>
<td>7,000,000</td>
</tr>
</tbody>
</table>

| Total Corridor Facilities Cost | 55,398,000 |
| Equipment Cost                 | 51,700,000  |
| Subtotal On-Corridor Cost      | 107,098,000 |
| Contingencies (15 percent)     | 16,065,000  |
| Total On-Corridor Costs        | $123,163,000 |

One-Third Share of System Costs of 32,329,000
(Union Station Improvements and Equipment Shop) $10,669,000

Total Corridor Costs $133,832,000

Source: RLBA estimates.

Operating Costs and Subsidy Requirement
In addition to the capital expenditures necessary to implement commuter service and to relieve capacity problems, the commuter rail sponsor would be responsible for the system’s ongoing operating cost, only a portion of which would be covered by farebox and other revenues. Major components of operating cost are shown in Table 6 below.
Table 6
Annual Operating Cost: Odessa-Kansas City

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train operations</td>
<td>$1,096,900</td>
</tr>
<tr>
<td>Track access fees and performance payments</td>
<td>1,330,000</td>
</tr>
<tr>
<td>Equipment maintenance</td>
<td>1,161,000</td>
</tr>
<tr>
<td>Insurance</td>
<td>709,000</td>
</tr>
<tr>
<td>Station maintenance and operations</td>
<td>424,000</td>
</tr>
<tr>
<td>General and administrative</td>
<td>1,318,000</td>
</tr>
<tr>
<td><strong>Total operating costs</strong></td>
<td><strong>$6,038,900</strong></td>
</tr>
</tbody>
</table>

Source: RLBA.

Operating costs are estimated for each corridor on a stand-alone basis, i.e., as if commuter service were operating on that corridor only. Thus each bears the full general and administrative expenses related to management, accounting, administration, marketing and other overhead activities. Were service operated in a second or third corridor, general and administrative expenses would not increase proportionately, thus total operating expense of several corridors would be less than the sum of their stand-alone estimates.

Revenues were based on the total daily ridership estimate of 3,346, derived as shown in Table 3, with the fare assumptions used as inputs to the ridership model. After an analysis of fare structures across the country was conducted, fares were set at $3.25 per trip plus an additional $.08 per mile for miles in excess of ten. The gross fare revenue calculated was then reduced by 30 percent to reflect discounts for monthly or multi-ride tickets, seniors, students, disabled and promotions. Annual revenues for the corridor were thus estimated at $2.35 million.

Based upon these estimated revenues of $2.35 million, an annual operating subsidy of approximately $3.69 million would be require to operate commuter rail in this corridor as envisioned. Virtually all passenger transportation systems, including highway and air transportation; receive substantial government subsidy. Commuter rail is no exception. The projected revenues and costs would yield a farebox recovery ratio of 39 percent, which compares reasonably well with recently implemented commuter rail systems.
Warrensburg – Pleasant Hill — Kansas City (Corridor E)

**Corridor Description**

This corridor, identified in the previous report as Corridor E, extends southeast along U.S. Route 50 to Pleasant Hill and Warrensburg. The Lee’s Summit Transit Center, identified in the Metropolitan Transit Initiative-Demand Assessment (MTI-DA) report, is on the corridor. Corridor features include Graceland College, Harry S. Truman Historical Site, Harry S. Truman Library and Museum, University of Missouri – Kansas City, Harry S. Truman Children’s Neurological Center and Cerebral Palsy Foundation, Jackson County Public Hospital and McComas – Lee’s Summit Memorial Airport.

While the corridor extends to Warrensburg, ridership estimates conducted during the Initial Corridor Screening indicated that the initial potentially-feasible segment would be between Pleasant Hill and Kansas City. It is that segment that is addressed below, and the corridor is hereinafter described as Pleasant Hill or Corridor E.

Most of the proposed commuter rail route in this corridor is owned and operated by UP. This 29 mile segment of the Sedalia Subdivision is part of UP’s major route between St. Louis, Missouri and Kansas City, Missouri/Kansas. Missouri and Northern Arkansas Railroad Company (MNA), a regional carrier, uses UP tracks between Pleasant Hill and Rock Creek Junction. Commuter trains would use 6.2 miles of KCT track between Rock Creek Junction and Union Station. The line consists of two main tracks, with train movements governed by a CTC signal system. Corridor E hosts three Amtrak trains at present: Kansas City Mule, St. Louis Mule and Ann Rutledge. Maximum speed on the line is 55 mph for freight and 70 mph for passenger. The initial service plan recommends service between Pleasant Hill and Kansas City, a distance of 35.5 miles with a projected running time of 57.4 minutes.

The preferred route for Corridor E commuter trains between Rock Creek Junction and KCUS would be via the KCT Main Tracks which make a direct connection. An alternate route that could be used would be longer, could increase running time and has a greater potential for delays to passenger trains from freight train operations.

**Missouri Central (Former Rock Island) Alignment**

The Chicago, Rock Island & Pacific Railroad (RI) formerly operated between Leed’s Junction and Pleasant Hill in this corridor, and from Pleasant Hill it extended east through Chilhowee and eventually to St. Louis. When RI was broken up this line was acquired by UP and referred to as the KC Industrial Lead. It was then sold by UP to Missouri Central in 1999. This is a single-track line with no signal system, that has been out of service since the early 1980’s. The line is being operated between St. Louis and Union, Missouri, on the east end, but there are no immediate rehabilitation plans for the west end of the line between Union and Pleasant Hill. While track and the right-of-way remains intact on a portion of this route, some track has been removed and a large portion of the right-of-way has been significantly altered and would make the cost to restore rail service prohibitively expensive. Therefore, because of the cost
and the fact that significant opposition to any resumption of train service on the dormant segment exists among local residents, should commuter rail service ultimately extend beyond Pleasant Hill, the UP Sedalia Subdivision would then be utilized between Pleasant Hill and Warrensburg for a total corridor length of 64.4 miles.

The City of Lee’s Summit, while expressing support for the concept of commuter rail, does not support the use of the Rock Island segment. Concern centers on the prospect of the return of freight service on an upgraded right of way. It is the City's belief that the reintroduced service would negatively impact the neighborhoods that have developed near or adjacent to the line. Reactivation of the Rock Island segment appears unlikely because (1) the alignment would not serve the high potential ridership in Independence, (2) local sentiment weighs heavily against it, (3) the significant cost to reactivate the line would have to be borne in whole before the first train could operate, as opposed to use of the UP line where improvements could be made incrementally as warranted by passenger and freight service levels.

**Stations**

**Station Locations**

Stations are proposed at Pleasant Hill, Lee’s Summit and Independence – Amtrak, as detailed on the next three pages. Additional stations may be identified as implementation planning progresses.

**Land Use**

Proposed station locations in Pleasant Hill are near the downtown central business district, but the relatively small size of the community would limit the potential for large scale development or redevelopment around the commuter rail station. On the other hand, both the Lee’s Summit and Independence Amtrak locations are in areas with significant populations which might be expected to support new development in the areas near the proposed new commuter rail stations that would serve these communities.

**Feeder/distribution System**

KCATA Route #152 provides peak hour express bus service between Kansas City and Lee’s Summit through Raytown, via 350 Highway and I-435. This route could be modified to provide access to the Lee’s Summit commuter rail station from surrounding areas.
Pleasant Hill (5,582 2000 pop.) A refurbished train depot is located near the intersection of Pine Street and South Taylor. A potential site is south of the old depot. The surrounding area is primarily industrial and service oriented with residential development to the north. Land development around this station should generally follow Prototype #1 - Transit Oriented Development (TOD) Within Established Communities.

A second potential site is located on the south side of the tracks to the west of Highway 7 around the Highway 7 access Road. This area is vacant at this time with little development on the south side of the railroad tracks. The area around this station can be developed under Prototype #2 - Fringe Area Park and Ride.

Both locations would provide excellent access to Highway 7. Transit service is not available in the area near Pleasant Hill.
Lee’s Summit (70,700 2000 pop.) The proposed station site is located to just north of Chipman Road and west of Commerce Road. Chipman Road is located along the northern edge of the developed area of Lee’s Summit. The site is vacant, however, a suburban style service employment area is being developed on adjacent land. North of the site is primarily vacant land with extensive residential development to the south of Chipman Road. Access to this location is good from interchanges on US-50 at Chipman Road and from I-470 at Douglas Street.

Land use development around this station should follow Prototype #2 - Fringe Area Park and Ride.

Metroflex Route #252 currently provides service throughout Lee’s Summit on weekdays from 9 AM - 3 PM, in a demand response mode. This service began in June 2001. If its hours of service were to be extended into the AM and PM peak hours, Metroflex Route #252 could be used to provide convenient access to the Lee's Summit commuter rail station to and from adjacent developed areas generally to the south.
Service on Corridor E commuter rail at Independence (113,288 2000 pop) could use the existing Amtrak station. The station is located just east of Chrysler Avenue near the center of town. The Independence CBD is located approximately a mile to the northeast. There appears to be sufficient parking already in place at a nearby business that is no longer in use. The Mormon Auditorium is located one block north of this site.

Land use around this station should be consistent with Transit Oriented Development (TOD) within established communities (Prototype #1).

The Blue (KCATA #285) and Orange (KCATA #292) lines both run very close to the proposed station location, as well as to the Independence Central station a few blocks to the southwest, on the Corridor D rail line. Both the Blue and the Orange bus lines currently operate on hourly headways, which could be reduced to 30 or 15 minutes to provide improved access to the Independence Amtrak station from nearby offices, shops, and the Independence Regional Health Center. Minor reconfiguration of one or both routes may be needed.
In addition, Metroflex Route #252 currently provides service throughout Lee's Summit on weekdays from 9 AM - 3 PM, in a demand response mode. If its hours of service were to cover the AM and PM peak hours, this bus could be used to provide convenient access to and from the Lee's Summit commuter rail station. While there would be additional operating costs if the hours of service for this route are increased, there should not be a change in the number of vehicles required to provide this additional service on this route.

**Service Plan**

Projected running time on the corridor segment recommended for service start-up between Pleasant Hill and Kansas City Union Station would be about 55 minutes. Initially, four trains each way per day would be appropriate in view of the projected 4,390 daily rail trips. Headways of 40 minutes would result in all four inbound trains arriving within a period of two hours. The same pattern could be used in the evening, or departures could be spread out to provide more flexibility for those who work late. For example, the first train would arrive in downtown Kansas City at 6:50 A.M., while the last trainset would arrive at 8:50 A.M. Representative schedules are shown below.

**Schedule: Pleasant Hill – Kansas City**

<table>
<thead>
<tr>
<th>Station</th>
<th>Morning Inbound to Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant Hill</td>
<td>5:55 AM 6:35 AM 7:15 AM 7:55 AM</td>
</tr>
<tr>
<td>Lee's Summit</td>
<td>6:09 AM 6:49 AM 7:29 AM 8:09 AM</td>
</tr>
<tr>
<td>Independence - Amtrak</td>
<td>6:30 AM 7:10 AM 7:50 AM 8:30 AM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>6:50 AM 7:30 AM 8:10 AM 8:50 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station</th>
<th>Evening Outbound from Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant Hill</td>
<td>5:10 PM 5:50 PM 6:30 PM 7:10 PM</td>
</tr>
<tr>
<td>Lee's Summit</td>
<td>4:56 PM 5:36 PM 6:16 PM 6:56 PM</td>
</tr>
<tr>
<td>Independence - Amtrak</td>
<td>4:35 PM 5:15 PM 5:55 PM 6:35 PM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>4:15 PM 4:55 PM 5:35 PM 6:15 PM</td>
</tr>
</tbody>
</table>

**Passenger Equipment**

As with both other corridors studied in this report, each scheduled train at service startup will require a dedicated trainset, because running times are too long for the first inbound train to complete its run to Union Station, discharge passengers and return to Pleasant Hill in time to make another inbound trip during the peak period. Likewise, as demand builds and more scheduled trains are called for, extending the duration of the peak period, it may be possible to "turn back" early trains and make a reverse run to the opposite terminal and make another trip in the peak direction during the peak
period. However, operating trains in the "reverse peak" direction, whether carrying passengers in revenue service or as empty "deadhead" movements, consumes far more rail line capacity and greatly increases potential passenger-freight conflicts, complicating arrangements with the host railroad and likely necessitating additional rail capacity improvements. These are strong arguments for modestly starting service with peak direction trains only.

All trainsets were projected to include a diesel locomotive and five bilevel coaches by contrast with the four which would be needed on Corridor D and the three trainsets on Corridor H, reflecting the differences in projected ridership on the three Corridors. All other equipment considerations, characteristics and constraints are as described in the Corridor D text. Total rolling stock cost, including a spare locomotive and cars and an allowance for spare parts is projected at $59.6 million for this corridor.

**Layover Facilities**
Layover facilities with facilities location and cost identical to those on Corridor D will also be required here.

**Freight Impacts**
Freight traffic is significant at up to 27 trains per day. Two daily Amtrak passenger trains (the “Mules” and the “Ann Rutledge”) in each direction also use the line. This level of traffic is close to the practical capacity of a single track rail line, especially considering the relatively long distance between passing sidings on the segment east of Pleasant Hill. This situation is addressed by the proposed capacity improvement described below.

**Infrastructure Improvements**
The line is in very good condition, in keeping with its status as an important freight route as well as an Amtrak passenger route. Relatively little work is needed to make it suitable for commuter service. Nonetheless, it is assumed a tie installation and track surfacing program would be appropriate prior to starting service, and those improvements are included in the estimated capital cost.

**Capacity Improvements, Corridor E**
**UP Portion, Pleasant Hill-Rock Creek Junction**
Adding commuter trains would impact UP freight service, particularly on the single-track segment between Pleasant Hill and Independence Junction. A project that would clearly enhance capacity and would benefit UP as well as the commuter service would be adding a second main track between Independence Junction and Lee’s Summit. That segment is 11.7 miles long, and adding a second main track is estimated to cost approximately $24 million. An additional project that could be constructed at implementation or subsequently as commuter service requirements increased would
be adding a second main track to the 8.1 miles between Lee’s Summit and Pleasant Hill. That would cost an additional $16.5 million, or $41.5 million for the two projects. It is possible that the commuter sponsor and UP will agree that both segments of second main track should be constructed, perhaps one segment initially and the other upon significant service expansion. Were the service sponsor were to pay an 80 percent share, the sponsor’s capacity cost would be approximately $32 million. Given the uncertain nature of this estimate, it is better expressed as in the range of $25 to $35 million, although the midpoint figure of $30 million is used in the following table.

**Terminal Area**
Terminal area route possibilities and capacity improvement considerations are similar to those noted for Corridor D. The preferred route for Corridor E commuter trains between Rock Creek junction and KCUS would be via the KCT Main Tracks which make a direct connection between those points. A potential capacity improvement related to use of that route would be upgrading the KCT’s signal system to more efficiently handle passenger traffic.

Potential capacity improvements include (1) upgrading the KCT’s signal system (on the lower portion from Rock Creek to the West end of the Sheffield Flyover, a distance of about 2 miles) to more efficiently handle passenger traffic, and (2) constructing 4.3 miles of additional track along the KCT with necessary modifications to the Grand Avenue overpass. These items total about $14 million, and since they would benefit both Corridors D and E, $7 million is allocated to each corridor. If the alternate route via Neff Yard and Union Avenue were used, it is likely that signal modifications would be necessary for expeditious commuter train movement.

**Capital Cost Estimates**
Capital costs of implementing service on this corridor are summarized in Table 7 on the next page.
Table 7
Capital Cost Summary: Pleasant Hill-Kansas City

<table>
<thead>
<tr>
<th>Corridor Costs</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Improvements</td>
<td>2,163,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements</td>
<td>30,000,000</td>
</tr>
<tr>
<td>Stations &amp; Parking</td>
<td>13,350,000</td>
</tr>
<tr>
<td>Layover Facility</td>
<td>1,476,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal Area Improvements</th>
<th>Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Improvements (shared with Corridor D)</td>
<td>174,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements (shared with Corridor D)</td>
<td>7,000,000</td>
</tr>
</tbody>
</table>

**Total Facilities Cost** 54,163,000

**Equipment Cost** 59,600,000

**Subtotal On-Corridor Cost** 113,763,000

**Contingencies (15 percent)** 17,064,000

**Total On-Corridor Costs** 130,827,000

One-Third Share of System Costs of 32,329,000 $10,669,000 (Union Station Improvements and Equipment Shop)

**Total Corridor Costs** $141,496,000

Source: RLBA Estimates.
Operating Costs and Subsidy Requirement

In addition to the capital expenditures necessary to implement commuter service and to relieve capacity problems, the commuter rail sponsor would be responsible for the system’s ongoing operating cost, only a portion of which would be covered by farebox and other revenues. Major components of operating cost are shown in Table 8 below.

Table 8
Annual Operating Cost: Pleasant Hill-Kansas City

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train operations</td>
<td>$1,067,300</td>
</tr>
<tr>
<td>Track access fees and performance payments</td>
<td>1,188,000</td>
</tr>
<tr>
<td>Equipment maintenance</td>
<td>1,234,000</td>
</tr>
<tr>
<td>Insurance</td>
<td>698,000</td>
</tr>
<tr>
<td>Station maintenance and operations</td>
<td>482,000</td>
</tr>
<tr>
<td>General and administrative</td>
<td>1,318,000</td>
</tr>
<tr>
<td><strong>Total operating costs</strong></td>
<td><strong>$5,987,300</strong></td>
</tr>
</tbody>
</table>

Source: RLBA.

Operating costs are estimated for each corridor on a stand-alone basis, i.e., as if commuter service were operating on that corridor only. Thus each bears the full general and administrative expenses related to management, accounting, administration, marketing and other overhead activities. Were service operated in a second or third corridor, general and administrative expenses would not increase proportionately, so total operating expense of several corridors would be less than the sum of their stand-alone estimates.

The revenue estimate was based on the total ridership estimate of 4,434, derived as shown in Table 3 and the fare assumptions used as inputs to the ridership model. Fares were set at $3.25 per trip plus an additional $.08 per mile for miles in excess of ten. The gross fare revenue calculated was then discounted by 30 percent to reflect discounts for monthly or multi-ride tickets, seniors, students, disabled and promotions. Annual corridor revenue is estimated to be $3.27 million.

Based upon estimated revenues of $3.27 million, an annual operating subsidy of approximately $2.72 million would be required to operate commuter rail in this corridor as hypothesized. The projected revenues and costs would yield a farebox recovery ratio of about 55 percent, which compares favorably with other recently implemented commuter rail systems.
Topeka – Lawrence – Kansas City (Corridor H)

Corridor Description
This corridor, identified in the previous report as Corridor H, extends west from Kansas City paralleling the Kansas Turnpike/I-70 through Lawrence to Topeka. The West Wyandotte Transit Center, identified in the MTI-DA report, is on the corridor whose other features include the Capital, University of Kansas, Bland Airport, Spencer Museum of Art, Lawrence Memorial Hospital, Philip Bilard Municipal Airport and Haskell Indian Nation University. The former Sunflower Ammunition Plant, which may be available for redevelopment, is located alongside a rail spur that connects with this route.

While the corridor extends to Topeka, ridership estimates conducted during the Initial Corridor Screening indicated that the initial potentially-feasible segment would be between Lawrence and Kansas City, a distance of about 39.9 miles. It is that segment that is addressed below, and the corridor is hereinafter described as the Lawrence Corridor or Corridor H.

Most of the potential commuter rail route is owned and operated by Burlington Northern Santa Fe. Two BNSF Subdivisions would be used. Between Lawrence and Holliday, Kansas a distance of 26.5 miles, commuter service would operate over the Topeka Subdivision. The line consists of one main track, over which train movements are governed by an Automatic Block Signal (ABS) system, wherein train movement is authorized verbally by the dispatcher and block occupancy is conveyed by wayside signals, supplemented by Automatic Train Stop, a safety feature. Maximum speed is 79 mph for passenger and 70 mph for freight.

Between Holliday and Santa Fe Junction, 11.7 miles of the busy Emporia Subdivision would be used. The segment consists of a mixture of two, three and four main tracks controlled by a CTC signal system. Maximum passenger train speed over the subdivision is 70 mph, however allowable speeds are less in the vicinity of Argentine Yard and Santa Fe Junction. Commuter trains would utilize KCT track for approximately the last mile into Union Station. Running time between Lawrence and Kansas City is estimated at about 62 minutes.

UP’s Kansas Subdivision also serves the corridor, connecting Topeka, Kansas with Kansas City. However, this line lies north of the Kansas River and does not serve the populated portions of the corridor nearly as well as the BNSF line which was selected as the basis of this analysis.

Stations
Station Locations
Stations at Lawrence, Eudora, DeSoto, Edwardsville and Kansas City, Kansas are included at startup, as detailed below.
Lawrence (77,488 2000 pop.) The Amtrak station at the northeast corner of 7th and New York Streets can accommodate passengers using commuter rail trains. Some enhancement of facilities and amenities in the station would be desirable and has been anticipated in the capital cost estimates. Access to the site from Iowa/K-10 is poor, however access via Massachusetts Street is good. City of Lawrence and Douglas County Government Offices are only blocks from this location. The University of Kansas is located approximately one mile distant. Development around this site should follow Prototype #1 - Transit Oriented Development (TOD) Within Established Communities.

Only minor route modifications would be needed in order to put the commuter rail station close to the center of the existing local bus system, which serves local areas southeast, southwest, and west of downtown, on about eight or nine local routes, Monday through Saturday.
Eudora (3,754 2000 pop) A potential station location is at the northern edge of town. On the south side of the railroad tracks, west of Maple Street and north of 6th Street, there is a vacant parcel that would be suitable for a station. Abutting the site is a mixture of residential, commercial and industrial uses. Areas to the north and west along the track are under cultivation. Downtown Eudora is two blocks to the south on Main Street with residential development surrounding downtown to the east, west and south. No transit service is available at this station.

Although land is available for the development of a park and ride facility, development under Prototype #1 - Transit Oriented Development Within Established Communities is tentatively recommended for the area near the Eudora commuter rail station. This recommendation is due both to the proximity of this station to downtown, and to indirect access to major arterial highways.
DeSoto (4,561 2000 pop.)- A potential station site is located on the north side of Beecroft Road at the foot of Ferry Road. Currently the site is developed with several residences, a baseball field and an industrial use. In the northeast section of the town low-density residential development with a mixture of small commercial uses are the primary land uses. The Future Land Use Plan denotes the proposed site for light industrial uses with low to moderate density residential uses to the west and southeast and higher density residential uses to the south of the site. Future commercial development is projected along Lexington Road and to the east along 83rd Street.

Access to and from Highway K-10 to this location is average. But accessibility to K-10, via the interchange at Kill Creek Road, should be enhanced with the designation of the latter for improvement to an arterial.

A second potential station location would be just to the east on the east side of Kill Creek Road, on the north side of West 82nd Street. The area is currently vacant and offers similar access to K-10. However, flood plain constraints may restrict development in this area.

At local discretion, the development of the land around the DeSoto commuter rail station could follow either Prototype #1 - Transit Oriented Development (TOD) Within Established Communities, or Prototype #2 - Fringe Area Park and Ride.
Edwardsville (47,996 2000 pop.) A potential station site is located at the southeast corner of West 43rd Street and K-7 Highway. North of Shawnee and south of Bonner Springs, the site is currently vacant with large parcels of agricultural land surrounding it. The future land use plan indicates that the subject site be commercially developed. It also shows the site surrounded by flood plain to the north and west, low density residential to the southeast and a small office development to the southwest. Additional developments in the area include multiple family and higher density residential areas along K-7 along with some commercial development. There has been significant residential and retail growth along K-7 near the proposed Edwardsville station in the Shawnee area. A commuter rail park and ride station at this location would contribute to its ongoing development.

Transit services are not available at this location.

At this location the development of a major park and ride facility is strongly recommended, following Prototype #2 - Fringe Area Park and Ride.
Kansas City, Kansas (Kansas City, Kansas 148,866 2000 pop.) Between I-635 and 18th Street Expressway (69 Highway), the recommended site is located north of Argentine Blvd. between I-635 and South 42nd Street. It is currently vacant and abuts the railroad track to the north, South 42nd Street to the east, I-635 to the west and a mixture of commercial and residential uses to the south. Residential neighborhoods are located to the southeast, west and southwest of the site. North of the railroad tracks is a large rail intensive industrial area. While the site is located adjacent to I-635, only northbound entrance and southbound exit access is provided at the I-635 and Argentine Blvd. However, other points of access are available at I-635 and Metropolitan Avenue.

KCATA Route #104 provides access to the recommended station site, and KCATA Route #260 provides service near the station site along I-635. Route #260 links Johnson County to the transit hub at 6000 Lamar in Mission, Kansas. Transit access between the proposed commuter rail station and nearby industrial areas could be utilized as a means providing enlarged employment opportunities for some riders of the commuter rail system.

Development of the station should follow Prototype #3 - Outlying Employment Centers.
Land Use
The location proposed for the Lawrence commuter rail station would be in the midst of the large and well established downtown area, with good local bus transit services available. The Lawrence station would also be near Haskell Indian Nations University and the University of Kansas, with potential for trips not only by teachers and students, but also by visitors to sporting events. By contrast, the Eudora and DeSoto communities do not appear to be large enough to support any significant new development near the proposed commuter rail stations.

Commuter rail services could increase the pool of potential industrial workers with access to the Kansas City, Kansas area, furthering its possibilities for additional industrial development.

Feeder/distribution System
Lawrence- Currently, Route 1 of the Lawrence Transit System travels within two blocks of the proposed station at 7th and New York. Additionally, since the proposed station location is in close proximity to downtown and all bus routes go through downtown all routes could be easily accessed. With only minor modifications to existing transit services, transit access to the Lawrence commuter rail station could be provided Monday through Saturday on eight or nine local routes serving the south, southeast, and western parts of Lawrence.

Kansas City, Kansas- The proposed station, offers excellent access to the Johnson County and Unified Government of Wyandotte bus networks, which, with minor alterations, could provide bus connections to the rail station.

KCATA Route #104 provides access to the recommended station site from industrial areas located to the north and west, and KCATA Route #260 provides service near the station site along I-635. Route #260 links the Johnson County Transit (JCT) hub in Mission, KS to the Indian Springs Transit Center north of the Kansas River.

New transit services would shuttle workers between nearby employers and the commuter rail station. These services could be provided or funded by the employers or through existing transit operators.

Service Plan
Projected running time between Lawrence and Kansas City Union Station would be about 62 minutes. As stated above, the initial service plan recommends implementing service between Lawrence and Kansas City. Initially, three trains each way per day would be appropriate in view of the projected 2,238 daily rail trips. Headways of 40 minutes would result in all three inbound trains arriving within a period of one hour and twenty minutes. The same pattern could be used in the evening, or departures could be spread out to provide more flexibility for those who work late. For example, the first
train would arrive in downtown Kansas City at 7:35 A.M., while the last trainset would arrive at 8:55 A.M. Representative schedules are shown below.

**Schedule: Lawrence – Kansas City**

<table>
<thead>
<tr>
<th>Stations</th>
<th>Morning Inbound to Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrence</td>
<td>6:33 AM 7:13 AM 7:53 AM</td>
</tr>
<tr>
<td>Eudora</td>
<td>6:44 AM 7:24 AM 8:04 AM</td>
</tr>
<tr>
<td>De Soto</td>
<td>6:52 AM 7:32 AM 8:12 AM</td>
</tr>
<tr>
<td>Edwardsville</td>
<td>6:54 AM 7:34 AM 8:14 AM</td>
</tr>
<tr>
<td>KCK</td>
<td>7:18 AM 7:58 AM 8:38 AM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>7:35 AM 8:15 AM 8:55 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stations</th>
<th>Evening Outbound from Union Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrence</td>
<td>5:22 PM 6:02 PM 6:42 PM</td>
</tr>
<tr>
<td>Eudora</td>
<td>5:10 PM 5:50 PM 6:30 PM</td>
</tr>
<tr>
<td>De Soto</td>
<td>5:02 PM 5:42 PM 6:22 PM</td>
</tr>
<tr>
<td>Edwardsville</td>
<td>5:00 PM 5:40 PM 6:20 PM</td>
</tr>
<tr>
<td>KCK</td>
<td>4:36 PM 5:16 PM 5:56 PM</td>
</tr>
<tr>
<td>KC Union Station</td>
<td>4:20 PM 5:00 PM 5:40 PM</td>
</tr>
</tbody>
</table>

**Passenger Equipment**
Because the trainsets on this corridor are the smallest of the three corridors their cost is projected at only $41 million. In all other respects, equipment considerations are identical with those already described.

**Layover Facilities**
Layover facilities with the same specifications as the other corridors will also be needed for Corridor H.

**Freight Impacts**
The 26.5 miles of the Topeka Subdivision would be shared with about six daily freight trains together with Amtrak’s Southwest Chief in both directions. The Southwest Chief trains stop at DeSoto (west of Holliday) to add and drop RoadRailer trailers that carry mail and express.
The portion of the Emporia Subdivision to be used by commuter trains also hosts up to 50 freight trains per day, most stopping at Argentine Yard, as well as Amtrak’s Southwest Chief.

**Infrastructure Improvements**

The line is in very good condition, in keeping with its status as an important freight route as well as an Amtrak passenger route. Relatively little work is needed to make it suitable for commuter service. Nonetheless, it is assumed a tie installation and track surfacing program would be appropriate prior to starting service, and those improvements are included in the estimated capital cost.

**Capacity Improvements, Corridor H**

**BNSF, Lawrence-Holliday**

Freight volumes are light over this portion of the Topeka Subdivision and should not be greatly impacted by commuter service. The eastbound Southwest Chief is scheduled to perform its RoadRailer mail and express switching at DeSoto between approximately 6:00 and 8:00 am, placing it in the midst of morning commuter service. This is performed at a two track facility constructed in 2000 about fifteen miles east of Lawrence on the south side of the main track.

A capacity improvement that would eliminate conflicts between the eastbound Chief and commuter trains would be a new double crossover west of the Road Railer facility, at a cost of approximately $1.5 million. It would be of limited benefit to BNSF freight service due to the light level of freight activity on the segment.

**BNSF, Holliday-Santa Fe Junction**

Commuter trains would use the Emporia Subdivision between Holliday and Santa Fe Junction. The line hosts very heavy freight volumes and skirts Argentine Yard, providing access to both the east and west end of that facility. Most freight trains using the line slow down to enter and exit Argentine Yard. Santa Fe Junction, at the segment’s east end, is the connection with KCT trackage for the final 1.4 miles to/from Union Station. This portion of the Emporia Subdivision consists variously of two, three and four main tracks governed by a CTC signal system.

The Argentine Connection project planned by KCT will greatly expedite train movements through this segment by providing a grade-separated connection between the BNSF main tracks near Argentine Yard and the KCT main tracks near Union Station. Eliminating stops for cross-traffic at Santa Fe Junction will eliminate slowing, stopping and re-starting of trains in the area around Argentine Yard. Commuter trains also would use the Argentine Connection and would benefit from the elimination of conflicts, and possibly higher speeds. The cost of using the Argentine Connection will be paid on a per train basis to Westside Intermodal Transportation Company, which was formed by KCT to finance and construct the connection. It should be anticipated that commuter trains also would be assessed a user fee.
Even though the segment between Holiday and Santa Fe Junction boasts excellent, high-capacity infrastructure, BNSF may seek some form of capacity contribution from the commuter service as a part of the “cost of entry” to its facilities. This contribution could take the form of a specific project, such as the provision of signal and second main track projects identified for Corridors D and E. One such project might be additional trackage to improve the flow of trains into, out of and around Argentine Yard. Alternatively, the capacity contribution could be an agreement to participate in future projects or to make a payment toward the (probably already completed) Argentine Connection. An allowance of $20 million (an amount similar to the cost of the capacity projects suggested for the other two corridors) is carried forward in to the corridor’s capital cost estimate to represent potential capital improvements probably required by BNSF.

**Terminal Area**

This route would use only a short segment – about 1.7 miles - of KCT trackage to access Union Station. Current plans do not include a connection from the Argentine Connection to the west end of Union Station trackage. Additional crossovers would be needed in order to provide access from the connection to the station tracks. Cost of two No. 15 Crossovers and associated signal improvements would total $1.8 million.

Depending upon the post-project configuration and use of today’s junction trackage, another option would be for commuter trains to use those ground-level tracks since most freight trains will use the elevated Argentine Connection. Some switch or signal modifications to the post-project track configuration may be necessary; cost would be in the same range as the $1.8 million related to use of the Argentine connection.

With the modifications to Grand Ave on the East Side of Union Station an additional track can be added to the passenger platform. The cost would be $1,500,000 for the third passenger track.

**Capital Cost Estimates**

Capital costs of implementing service on this corridor are summarized in Table 9 below.
### Table 9
#### Capital Costs: Lawrence-Kansas City

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corridor Costs</strong></td>
<td></td>
</tr>
<tr>
<td>Track Improvements</td>
<td>$4,151,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements</td>
<td>1,500,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements to be Negotiated</td>
<td>30,000,000</td>
</tr>
<tr>
<td>Stations &amp; Parking</td>
<td>13,254,000</td>
</tr>
<tr>
<td>Layover Facility</td>
<td>1,476,000</td>
</tr>
<tr>
<td><strong>Total Corridor Facilities Cost</strong></td>
<td>52,281,000</td>
</tr>
<tr>
<td><strong>Terminal Area Improvements</strong></td>
<td></td>
</tr>
<tr>
<td>Track Improvements</td>
<td>1,900,000</td>
</tr>
<tr>
<td>Capacity/Signal Improvements</td>
<td></td>
</tr>
<tr>
<td><strong>Total Corridor Facilities Cost</strong></td>
<td>52,281,000</td>
</tr>
<tr>
<td><strong>Equipment Cost</strong></td>
<td>41,000,000</td>
</tr>
<tr>
<td><strong>Subtotal On-Corridor Cost</strong></td>
<td>93,281,000</td>
</tr>
<tr>
<td><strong>Contingencies (15 percent)</strong></td>
<td>13,992,000</td>
</tr>
<tr>
<td><strong>Total On-Corridor Costs</strong></td>
<td>$107,273,000</td>
</tr>
<tr>
<td>One-Third Share of System Costs of 32,329,000</td>
<td>$10,669,000</td>
</tr>
<tr>
<td>(Union Station Improvements and Equipment Shop)</td>
<td></td>
</tr>
<tr>
<td><strong>Total Corridor Costs</strong></td>
<td>$117,942,000</td>
</tr>
</tbody>
</table>

Source: RLBA Team.

**Operating Costs and Service Subsidy Requirement**

In addition to the capital expenditures necessary to implement commuter service and to relieve capacity problems, the commuter rail sponsor will be responsible for the system’s ongoing operating cost, only a portion of which would be covered by farebox and other revenues. Major components of operating cost are shown in Table 10 below.
## Table 10
### Annual Operating Cost: Lawrence - Kansas City

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train operations</td>
<td>$884,300</td>
</tr>
<tr>
<td>Track access fees and performance payments</td>
<td>1,007,000</td>
</tr>
<tr>
<td>Equipment maintenance</td>
<td>915,000</td>
</tr>
<tr>
<td>Insurance</td>
<td>676,000</td>
</tr>
<tr>
<td>Station maintenance and operations</td>
<td>433,600</td>
</tr>
<tr>
<td>General and administrative</td>
<td>1,318,000</td>
</tr>
<tr>
<td><strong>Total operating costs</strong></td>
<td><strong>$5,233,900</strong></td>
</tr>
</tbody>
</table>

Source: RLBA.

Operating costs are estimated for each corridor on a stand-alone basis, i.e., as if commuter service were operating on that corridor only. Thus each bears the full general and administrative expenses related to management, accounting, administration, marketing and other overhead activities. Were service operated in a second or third corridor, general and administrative expenses would not increase proportionately, so total operating expense of several corridors would be less than the sum of their stand-alone estimates.

The revenue estimate was based on the total daily ridership estimate of 2,238 and the fare assumptions used as inputs to the ridership model. Fares were set at $3.25 per trip plus an additional $.08 per mile for miles in excess of ten. The gross fare revenue calculated was then discounted by 30 percent to reflect discounts for monthly or multi-ride tickets, seniors, students, disabled and promotions. Annual corridor revenue is estimated to be $1.54 million.

Based upon estimated revenues of $1.54 million, an annual operating subsidy of approximately $3.69 would be required to operate commuter rail in this corridor as envisioned. The projected revenues and costs would yield a farebox recovery ratio of about 29 percent, which does not compare favorably with most recently implemented commuter rail systems.