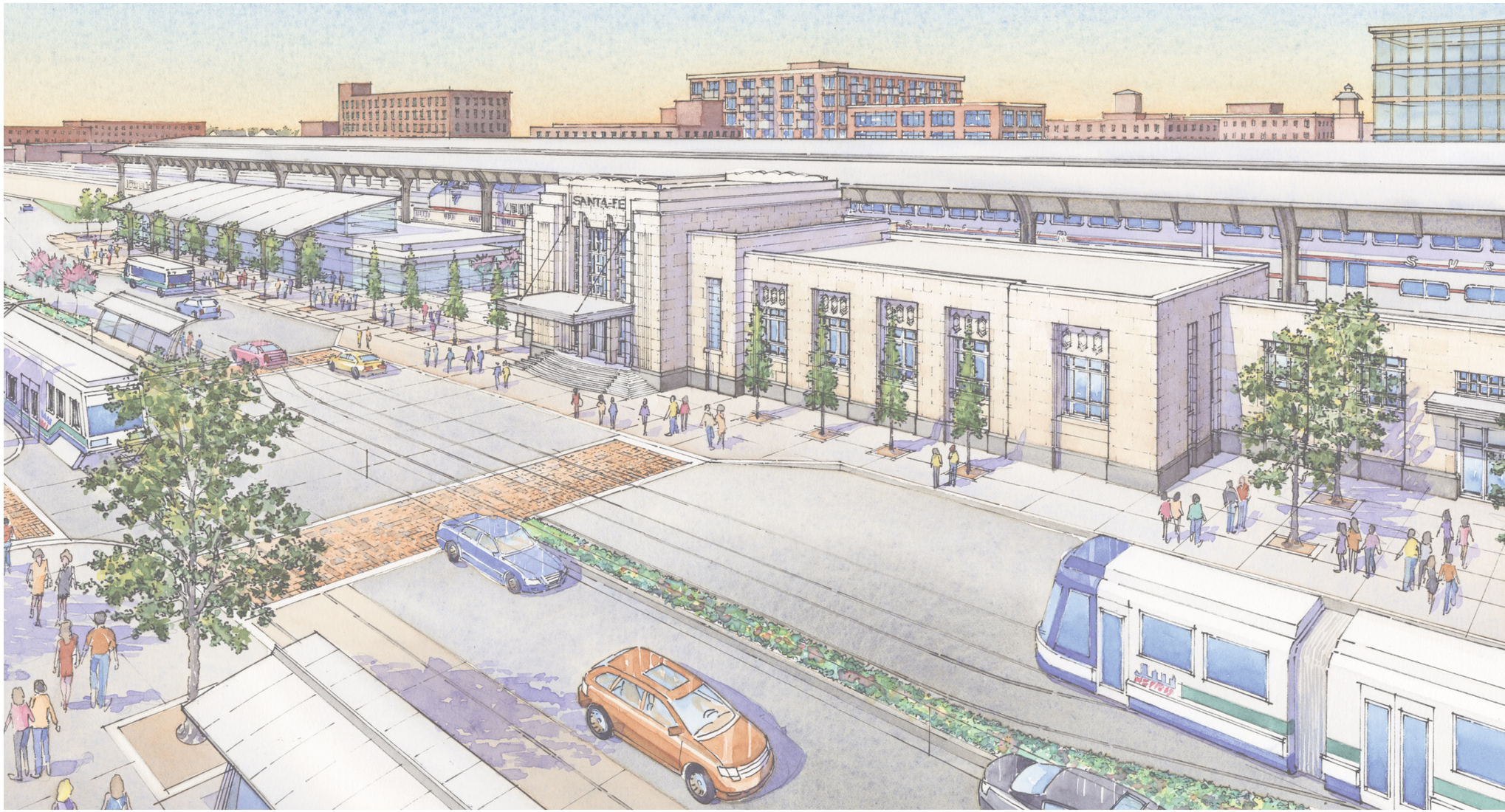
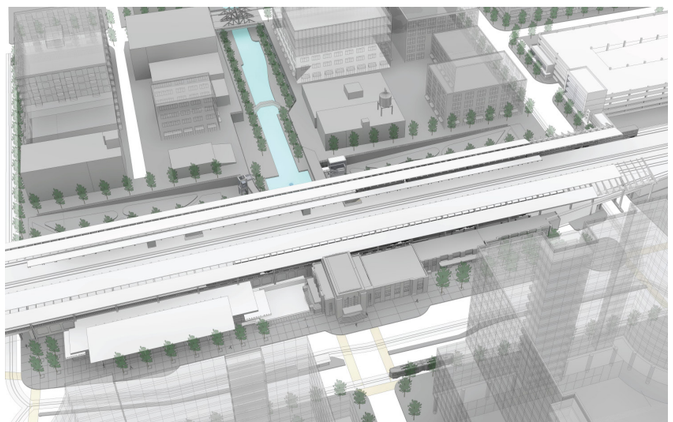
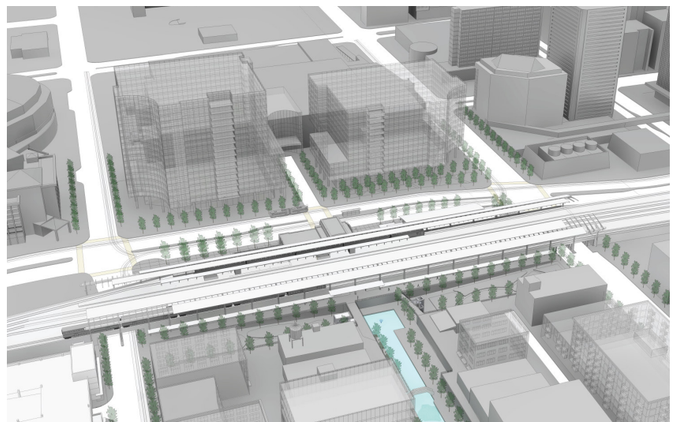
# Intermodal Transportation Hub Master Plan

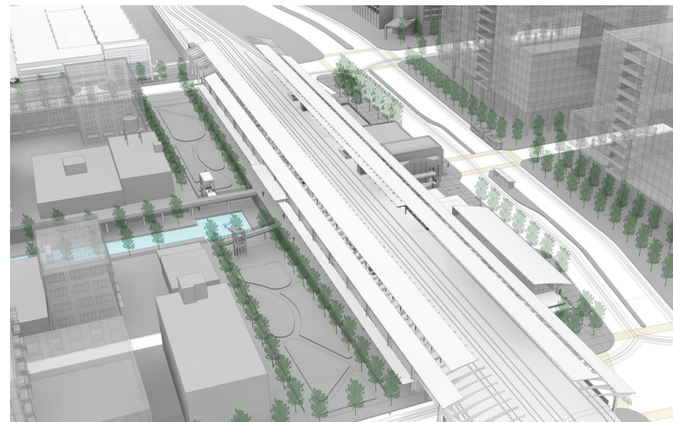
## for Central Oklahoma

June 30, 2011







**Association of Central Oklahoma Governments**

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Connetics
Basile, Bauman & Prost
TAPArchitecture
Traffic Engineering Consultants

# Intermodal Transportation Hub Master Plan for Central Oklahoma

Prepared For: Association of Central Oklahoma Governments

Funded By:
ACOG
City of Oklahoma City
COTPA
ODOT

Association of Central Oklahoma Governments

Central Oklahoma Transportation and Parking Authority


Prepared By:
JACOBS
in association with

Connetics
TAPArchitecture
Basile, Bauman & Prost
Traffic Engineering Consultants



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The Intermodal Transportation Hub Master Plan (the "Plan") is the result of an ongoing partnership among community stakeholders in Central Oklahoma to envision, plan and prepare for a public transit system that promotes mobility, encourages growth and development and enhances the quality of life across the region. While the study area considered in this planning effort was concentrated in downtown Oklahoma City, the conclusions of the Hub Master Plan could have far reaching impacts into the participating communities of Norman, Edmond, Midwest City and others. Representatives from these communities, as well as the local and state transit and rail service providers, participated actively in the study and assisted in identifying critical issues and potential implementation strategies with the planning team. This document represents a summary response to the region's collaborative and collective effort to establish a unified and consistent approach to the potential of an intermodal transportation hub, thereby creating and sustaining an enhanced quality of life and prosperity throughout the Central Oklahoma region.

The consulting team appreciates the work and contributions of the following individuals who were instrumental in the development of this Plan.

**Funding Agencies**

Association of Central Oklahoma Governments
- John Johnson, Executive Director
- Doug Rex, Director of Transportation
- Holly Massie, Project Manager

Central Oklahoma Transportation and Parking Authority
- Rick Cain, Administrator

City of Oklahoma City
- Jim Thompson, Former Assistant City Manager
- Russell Claus, Planning Director
- Randy Entz, Transportation Planner

Oklahoma Department of Transportation
- David Streb, Director of Engineering
- Joe Kyle, Director of Rails Division
- Johnson Bridgwater, Planner

**Consulting Team**

JACOBS
- Allan Zreet, Project Director
- Doug Tennant, Project Manager
- Brad Moulton, Planner

In association with
- Connetics – Chris Adkins
- TAPArchitecture – Anthony McDermid
- Basile, Bauman & Prost – Jim Prost
- Traffic Engineering Consultants - Todd Butler

**Hub Study Advisory Committee**

City of Oklahoma City
- Hon. Pete White, Council member
- Hon. Sam Bowman, Former Council member

City of Norman
- Hon. Rachel Butler, Former Council member

City of Yukon
- Jim Crosby, Former City Manager

City of Edmond
- Shannon Entz, Manager-Community Development

City of Midwest City
- J. Guy Henson, City Manager
- Billy Harless, Community Development Director

OnTrac
- Marion Hutchison, Executive Board Member

Downtown OKC, Inc.
- Jane Jenkins, President

Association of Central Oklahoma Governments
- John G. Johnson, Executive Director

Oklahoma Department of Transportation
- Joe Kyle, Manager-Rail Programs

COTPA Board of Trustees
- Dick Lee, Trustee

Union Pacific Railroad
- Clint Schelbitzki, Director-Public Affairs

Oklahoma Railroad Association
- Lori Peterson, Executive Director

Greater Oklahoma City Chamber of Commerce
- Mark VanLandingham,VP of Government Relations
- Derek Sparks, Mgr. of Government Relations

## Introduction + Background

In 2005, Central Oklahoma embarked upon a new vision for its future – a vision that included a coordinated plan for rail-based transit services across the region. The final Fixed Guideway Study (FGS) for Central Oklahoma included several recommendations. But it's the rail-based transit elements – commuter rail service between downtown Oklahoma City and the communities of Edmond, Norman and Midwest City, a new downtown streetcar system, and a proposed intermodal transportation hub – that captured the attention and imagination of area residents. The development of the FGS provided local leaders with a public process to discuss and understand how rail transit could benefit their communities and, as a byproduct, helped create rail and transit advocacy groups within the region that continue to promote the implementation of the Study today.

During the same period, Oklahoma City leadership began to conceive of a new public works and economic development program that would build the core elements of a modern downtown community to attract the workers, residents and businesses of the 21st century economy. The MAPS 3 sales tax, approved by Oklahoma City voters in December 2008, furthered this downtown momentum and included $130 million for the creation of a new downtown circulator (later determined to be a modern streetcar) and initial planning and development of a new intermodal transportation hub. With this vote, area leaders and residents envisioned the streetcar as the first element of a regional transit system. They also recognized and endorsed planning for a regional transit hub that would serve as the centerpiece of the system, where multiple transportation modes would connect.

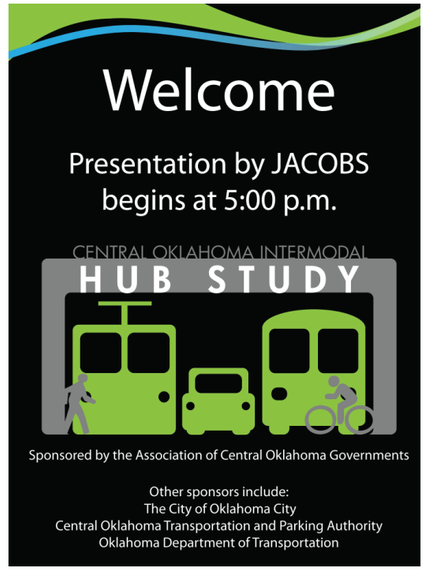
This growing momentum for transit planning and services in Central Oklahoma led to the initiation and development of this Intermodal Transportation Hub Study. The study process was directed and funded by the Association of Central Oklahoma Governments (ACOG), with additional funding and technical support provided by COTPA, the City of Oklahoma City and the Oklahoma Department of Transportation. The purpose of the study was to: (1) identify and evaluate alternative sites for the proposed hub and recommend a preferred location; (2) define the program and parameters for the hub and its support facilities; (3) develop costs for the overall Hub Master Plan and include funding strategies for the facility; and (4) conduct a meaningful and transparent public process.

## Format of the Report

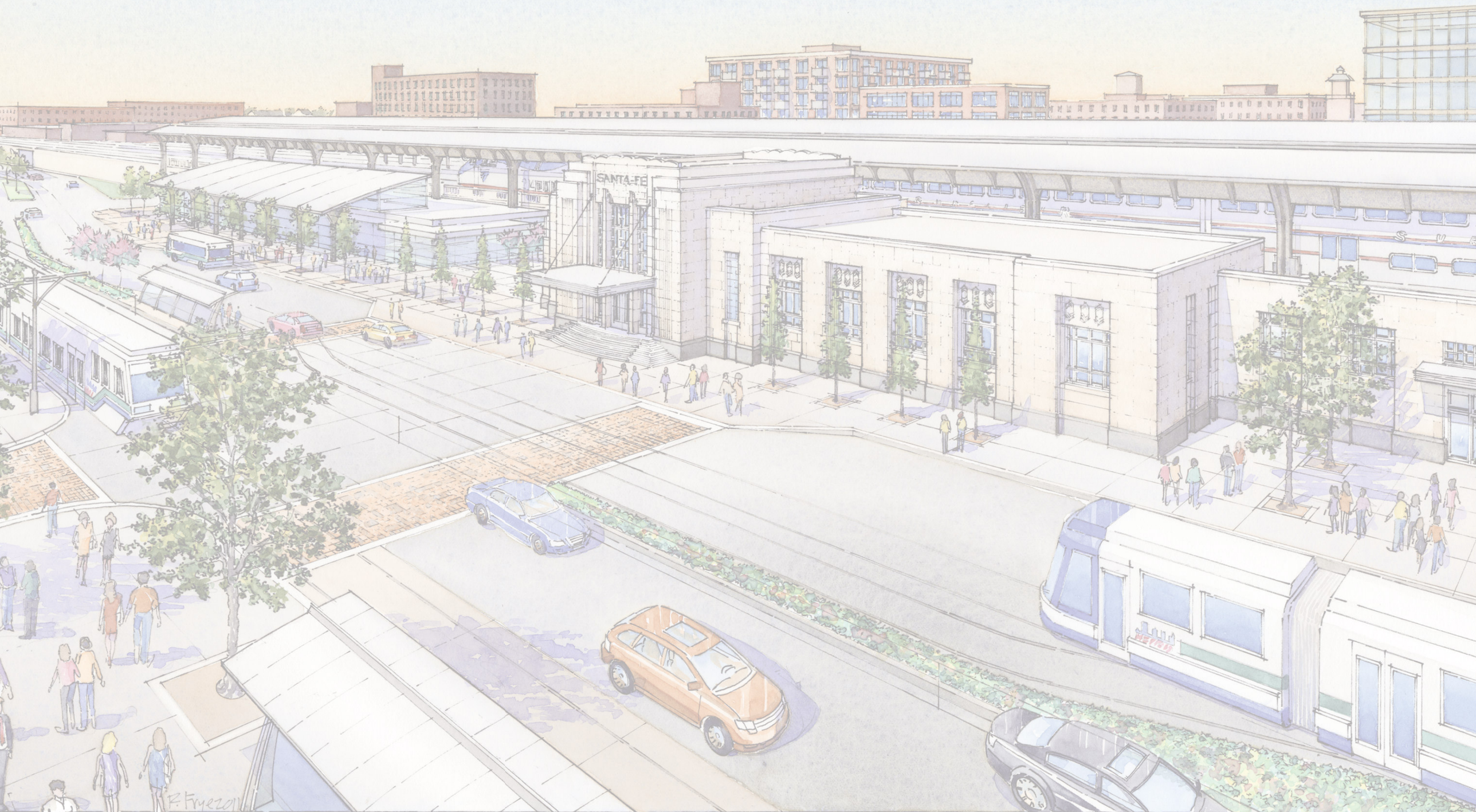
This report provides the graphic and narrative results of the study effort. The intent of this document is to present the major findings of the study that have been reviewed, vetted and agreed-upon through the public process. To that end, the report follows the general work program and process flow utilized with the Hub Study Advisory Committee and the public meetings to demonstrate key findings and conclusions. The more detailed information and research used to analyze competing sites, plans or strategies are included in an Appendix (separate volume) in order to keep the final report as user-friendly as possible.

## The Public Process

Each of the participating funding agencies indicated a strong desire to conduct the study effort within the parameters of a meaningful public process to ensure that all ideas, strategies and conclusions were presented and evaluated in a transparent manner with the citizens of Central Oklahoma. An advisory committee of local leaders and advocates and participating agencies and entities was created to assist the consulting team in the development and review of alternative sites, concepts and strategies for the Hub. Five Advisory Committee meetings were conducted during the planning process in which key issues were identified; alternatives were suggested; concept plans were evaluated; and final strategies and recommendations were confirmed. In addition to these Advisory Committee meetings, three public meetings were conducted to educate and inform the public about the process, the concepts and the preferred and recommended actions. Meetings were conducted at several venues in and around downtown Oklahoma City, with the last meeting to present the preferred Master Plan and implementation strategy held in the Grand Hall of the Santa Fe Depot, the recommended site for the hub. In the end, this public process was a strong contributor to the overall success and feasibility of the Plan and will ultimately help ensure its implementation.



# 1.0 Purpose + Need



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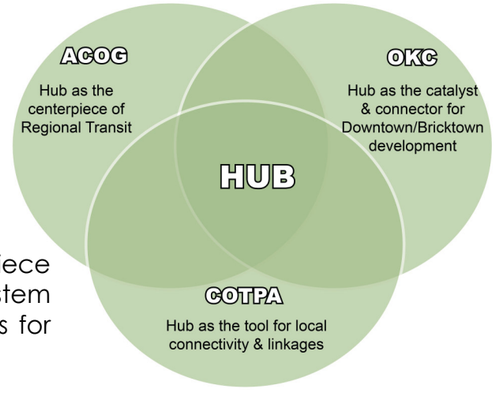
# 1.0 Purpose and Need

## Goals + Objectives

The goal for the Oklahoma City Intermodal Hub is ***to create a plan for a new transportation center and gateway for Oklahoma City and the region that promotes mobility, enhances the image of public transportation and creates a catalyst for economic development.*** This goal is supported jointly by the Association of Central Oklahoma Governments (ACOG), the Central Oklahoma Transportation and Parking Authority (COTPA), the City of Oklahoma City, and the Oklahoma Department of Transportation, each of which contributed financial and technical support and assistance to the development of this plan. While each of these agencies will ultimately have a different role in the development of the hub, their combined leadership and support of the hub is critical to its ultimate success. Additionally, a Hub Study Advisory Committee was created and provided critical input and direction through the course of the planning process. The downtown transit hub will become the single identifiable project that links all transportation modes and will become the marketable vision of the transit system.




The hub serves as the centerpiece of the future regional transit system and accomplishes multiple goals for multiple client groups.

The need for an intermodal hub in Oklahoma City is supported by numerous current and proposed transportation programs in Central Oklahoma. The transit hub will be the primary connective element among all modes of transportation and will be the central focus and identity of the Oklahoma City regional transit system. The proposed Oklahoma City Intermodal Hub will provide interconnectivity between existing and future transit modes and provide passengers with amenities such as enclosed waiting and ticketing, restrooms and retail linked to mixed use development.

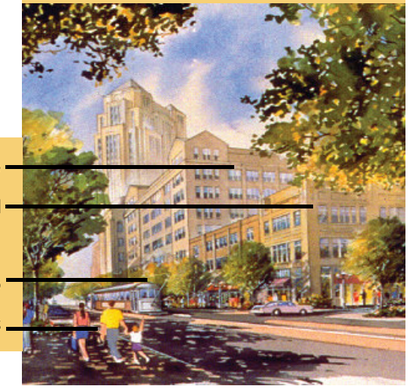
**Modes of Service:**
- *Amtrak*
- *Commuter Rail*
- *Streetcar*
- *Local Fixed Route Bus*
- *Bus Rapid Transit*
- *Intercity Bus*
- *Local Shuttle Services / Taxis*
- *High Speed Rail*
- *Pedestrians / Bicycles*

The need for the facility was documented in the Regional Fixed Guideway Study (FGS), completed in 2006. This study proposed a transit network developed around enhanced bus service, bus rapid transit (BRT), commuter rail and streetcar all connected through a downtown hub. This FGS network was received by the COTPA Board of Trustees and ACOG, the Metropolitan Planning Organization (MPO), as the FGS System Plan for the Central Oklahoma region.

## Transit Oriented Development

The integration of transit and land use has become increasingly important in the design of our cities and the quality of life in our communities. Transit opens land for new development, changes movement patterns and exposure of existing developments, and provides a tool for the advancement of economic development. The linkage between transit, land use and density is critical to the economic success, neighborhood integration, and ability to animate the intermodal hub area. The intermodal hub must have attributes and urban form that balance the urban environment with needs of pedestrians, motorists, bicyclists, and transit riders while promoting a vital public realm. The intermodal hub location must be able to support the development of increased infill density and quality public infrastructure that encourages further economic development.

**Principles of Transit Supportive Development:**
- *Compact Urban Environment*
- *Mix of Land Uses*
- *Destinations within an Easy Walk*
- *Design for the Pedestrian*
- *New Construction or Redevelopment*
- *Quality Public Infrastructure*



## Basis of Design

The program development for the intermodal hub was based on accommodating the modes identified in the *Fixed Guideway Study*, generally consisting of streetcar, enhanced and intercity bus, bus rapid transit (BRT) and commuter rail with the addition of high speed rail and enhancements to the current Amtrak Heartland Flyer service. Consideration was also given to the introduction of longer term modes and expansion of service to add light rail transit in the future as ridership and demographics change.

### Enhanced Bus

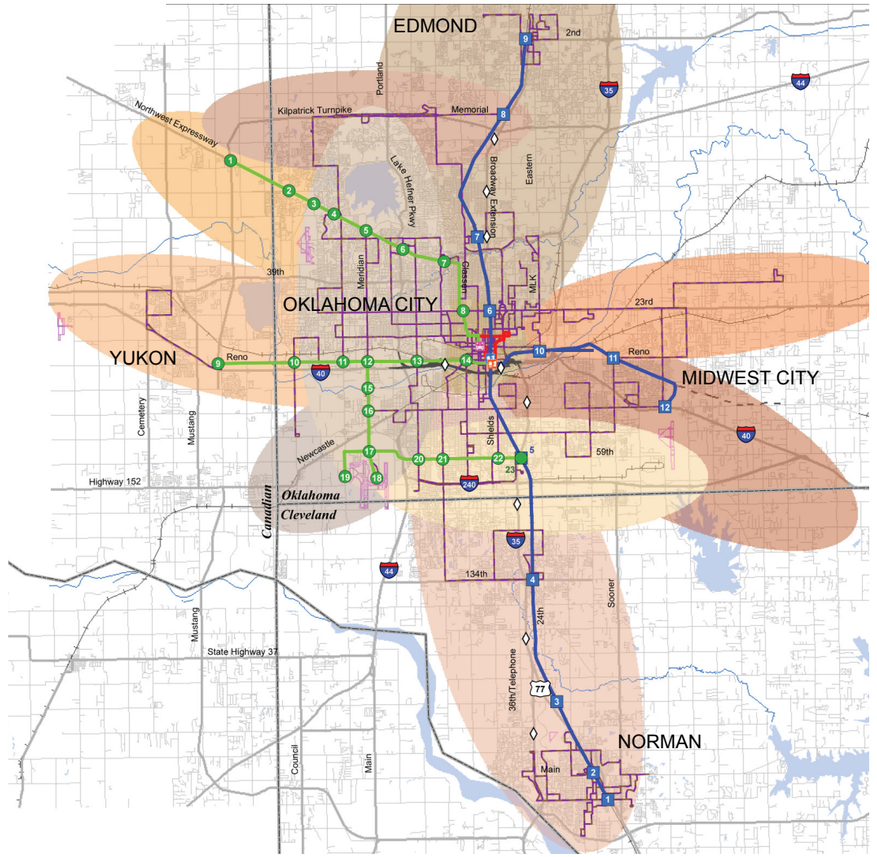
Enhanced bus routes in the *FGS System Plan* provide frequent service connecting transit riders throughout the COTPA service area. Bus routes will be aligned to serve the downtown intermodal hub; however, bus to bus transfers will be accommodated at the existing COTPA Downtown Transit Center. The transit center will be connected to the hub by the streetcar.

### Bus Rapid Transit

Three BRT routes are proposed along arterial roads in Oklahoma City. Two of these routes will serve the Hub; the Meridian (Northwest) Route, serving the northwest, and the Reno Route, serving Yukon and Will Rogers Airport. The third route follows 59th Street. The Meridian Route was initially designated to terminate at the Downtown Transit Center but is recommended to extend to the intermodal hub location. BRT is envisioned to operate on-street at the Hub utilizing designated curb side bus bays.

### Commuter Rail

Commuter rail service is envisioned to provide peak-oriented service from outer suburban communities into downtown Oklahoma City along existing freight routes. The Fixed Guideway Study designated three commuter routes within the BNSF and Union Pacific (UP) corridors; the Edmond corridor, Norman corridor and Midwest City/Tinker AFB corridor. All routes would converge in downtown Oklahoma City and allow transfers between the routes. Headways on each line would be 60-minutes in the peak and 120-minutes in the off-peak for a combined headway of 30-minutes peak and 60-minutes off-peak within each corridor. Based on Advisory Committee and community input, a possible future commuter rail line from the Adventure District (Northeast) to Yukon was added for consideration in the Hub study. A Yukon line was initially considered in the *Fixed Guideway Study* but eliminated and replaced with BRT due to ridership considerations.




**Fixed Guideway Study Transit System Plan Map - Firgure 1.1**

**Legend**

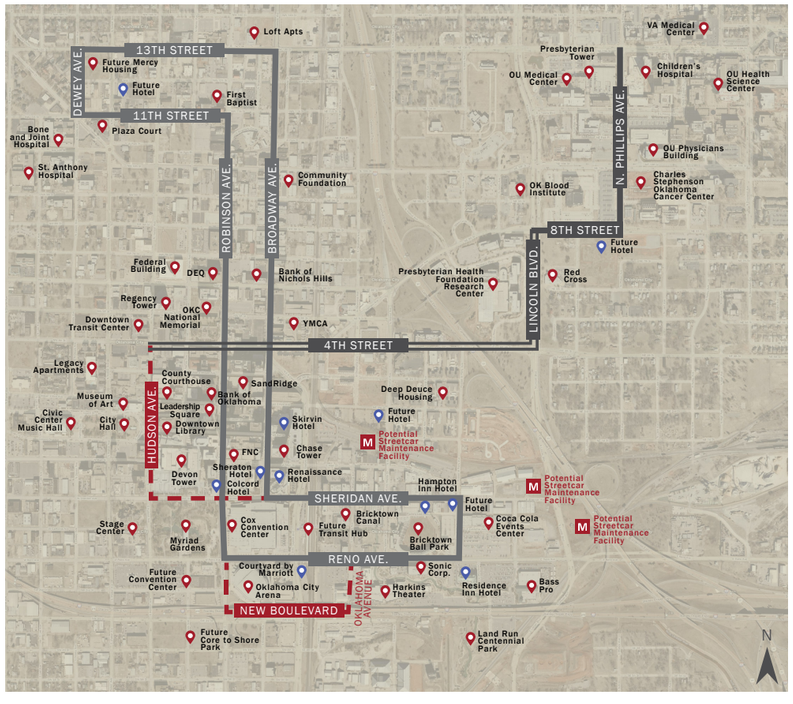
- Commuter Rail Line
- Bus Rapid Transit Line
- Modern Streetcar Route
- Enhanced Bus Service Routes

**Amtrak**

At the request of ODOT Rail Programs Division, Amtrak completed a study in February 1999 that ultimately led to the re-establishment of passenger rail service in Oklahoma after a 20 year absence. The Amtrak study prompted the initiation of Oklahoma's Heartland Flyer Service on June 14, 1999. The Heartland Flyer service operates out of the Santa Fe Station with one train per day running between Oklahoma City and Fort Worth. Extension of the Heartland Flyer service north to Kansas City has been studied and is included in planning for the intermodal hub; however, no commitments to this service have been made at this time.

**Streetcar**

The proposed downtown streetcar will serve as a circulator providing frequent, direct service between the downtown intermodal hub, COTPA Transit Center, the CBD, Bricktown, Midtown, and the Oklahoma Health Sciences Center. The Downtown Circulator Alternatives Analysis , conducted by COTPA, included an 18 month planning process to identify the key characteristics of a streetcar system and concluded with the recommendation of a Locally Preferred Alternative (LPA) shown in Figure 1.2. This LPA indicates the proposed route for a modern streetcar vehicle that connects Bricktown to Downtown to Midtown in Oklahoma City and then reaches out to connect these downtown subareas to the Oklahoma Health Center, a large medical and research complex north of downtown. The hub study team coordinated closely with the efforts of the Alternatives Analysis Steering Committee and the MAPS 3 Transit Subcommittee to ensure, to the greatest degree possible, that the planning efforts associated with these major transit initiatives and their resulting recommendations were compatible, mutually supportive and beneficial. Ultimately, the LPA alignment and the streetcar program may be modified as needed to provide direct service to the final hub location depending on the further refinement and coordination of these overall transit planning efforts, specifically the planning and phasing options that may be required by the MAPS 3 Streetcar program.




**Streetcar LPA - Figure 1.2**

**High Speed Rail**

After Amtrak initiated the Heartland Flyer Service, ODOT began evaluating potential connections to other regions of the state. A *Passenger Rail Feasibility Study* was conducted by the ODOT Rail Programs Division assessing the feasibility of high speed passenger rail service in Oklahoma. The findings of the initial ODOT *Passenger Rail Feasibility Study* indicated that expanded passenger rail services would benefit both residents of Oklahoma and passengers traveling on the national passenger rail system. Initial efforts were directed toward Oklahoma City and Tulsa because of the increasing awareness that an adequate ridership base would be required to establish a sustainable service that could be expanded into other areas of the State. [1]

[1] Oklahoma City to Tulsa High Speed Rail Corridor Study, The State of Oklahoma, Oklahoma Department of Transportation, 2002


**High Speed Rail - Figure 1.3**

Based on the Passenger Rail Feasibility Study, the Oklahoma Department of Transportation (ODOT) is in the process of developing a *Tier 1 NEPA Environmental Assessment* for environmental analysis of a high speed rail initiative from Oklahoma City to Tulsa, with approximately 106 miles located in Oklahoma, Lincoln, Creek and Tulsa Counties. This section is part of the *South Central Rail* Corridor, one of ten national corridors identified by Congress in 2001 (See Figure 1.3). The South Central Corridor extends from San Antonio, Texas, to Tulsa, passing through Forth Worth and Oklahoma City. High Speed Rail service for the South Central Corridor has been designated as "Emerging High-Speed Rail" and defined as using existing tracks and infrastructure shared with freight service at top speeds of up to 90–110 mph.

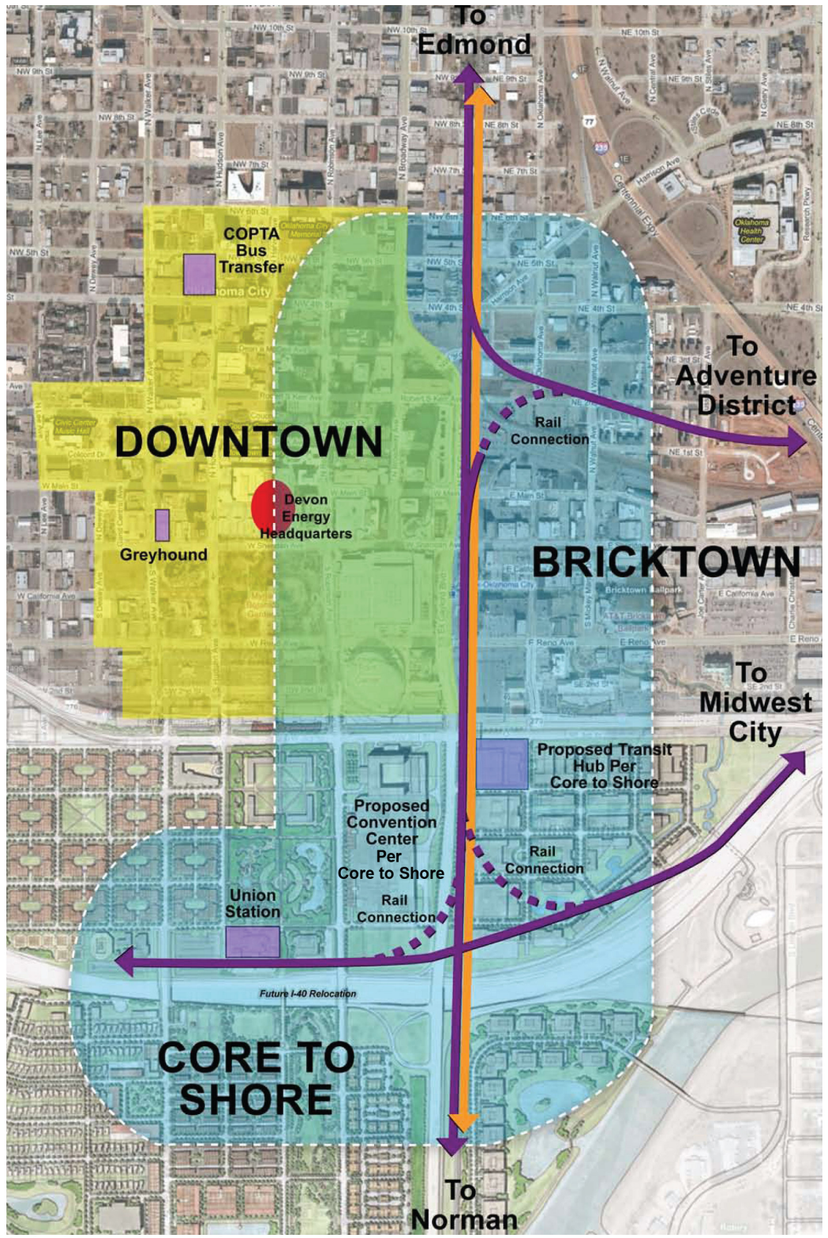
Each of the above referenced studies designated the Santa Fe Station, or adjacent area, as the Oklahoma City connection to the high speed rail system. This location would allow passenger interface with Amtrak and connectivity to other modes within the urban Oklahoma City area.

**Light Rail**
While light rail transit (LRT) is not currently a defined mode in the region's FGS System Plan, it is possible that light rail may replace designated BRT routes in the future as ridership increases along these routes. Accordingly, provisions were made in this study for the accommodation of LRT transfers at the intermodal hub.

## Project Area

The project area was designated as a ½ mile wide corridor centered along the Union Pacific and BNSF freight corridors in the greater downtown Oklahoma City area. This area (shown in Figure 1.4) was designated due to the need to serve the primary transit modes that would utilize these freight corridors as identified in the Fixed Guideway Study, including Amtrak, commuter rail service to Norman, Edmond and Midwest City. Although not mentioned in the Fixed Guideway Study, additional transit modes like High Speed Rail and additional commuter or light rail services to the eastern portions of the Oklahoma City metropolitan area were also considerations in the determination of a proper project area. Section 5.0 of this report (Ridership Analysis) provides further information regarding these additonal modes, including their anticipated ridership, their potential impact on the existing rail network at the alternative hub sites, and how these impacts could influence the evaluation, selection and planning of intermodal hub facility.

Ultimately, one quarter mile on each side of the railroad right-of-way was designated as the logical study area, since this distance represents the commonly-accepted walking distance in urban areas and also constitutes the primary development influence area for the intermodal hub. The project area is bounded by the northern edge of the CBD on the north, the new I-40 corridor on the south, the CBD core on the west and the eastern edge of Bricktown on the east.




**Project Area - Figure 1.4**

# 2.0 Potential Transit Mode Characteristics

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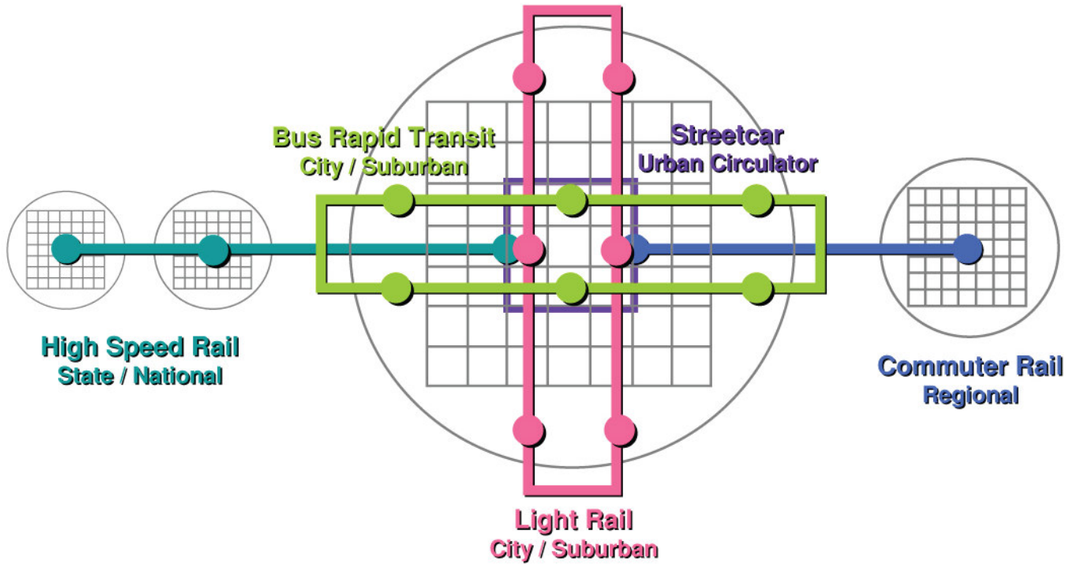
# 2.0 Transit Mode Characteristics

A typical transit system plan generally consists of numerous modes of transportation based on the type of ridership served, operational distance, operational environment (type of right-of-way) and costs. The Fixed Guideway Study included a system plan in which the downtown intermodal hub would be the transfer point between numerous transit modes described in Section 1. The following diagram is intended to represent the relationship between each mode and the overall system plan as it relates to ridership and geographic distance in the typical urban, metropolitan area.




**Transit Mode Diagram - Figure 2.1**

Each mode represented above has operational characteristics that make it applicable to the type of right-of-way, number of passengers carried, speed, distance and density of the area served. The specific characteristics of each proposed transit mode serving the intermodal hub include:

**Streetcar**

*General Purpose of this Mode:* *Urban Circulator*

| | |
|---|---|
| Service Distance: | < 5 miles |
| Station Spacing: | ¼ mile |
| Service Frequency: | 10 – 15 minutes |
| Average Speed: | 8 – 12 MPH |
| Integration: | Street Running |
| Capital Costs: | $20 – 25M / mile |
| Passenger Capacity: | 15 - 30 / vehicle |
| Power Source: | Overhead Electrification / Emerging Battery / Hybrid |

**Bus Rapid Transit (BRT)**

*General Purpose of this Mode:* *Nodal Point to Point Service within urban city*

| | |
|---|---|
| Service Distance: | 5 – 20 miles |
| Station Spacing: | ½ to 2 miles |
| Service Frequency: | 10 – 20 minutes |
| Average Speed: | 15 – 20 MPH |
| Integration: | Street Running (with Traffic) |
| Capital Costs: | $10 – 15M / mile |
| Passenger Capacity | 30 - 40 / vehicle |
| Power Source: | Diesel / CNG / Hybrid |

**Light Rail Transit (LRT)**

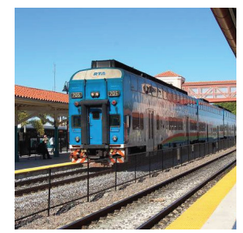
*General Purpose of this Mode:* *Nodal Point to Point Service for higher passenger volumes within the urban city*

| | |
|---|---|
| Service Distance: | 5 – 20 miles |
| Station Spacing: | ½ to 2 miles |
| Service Frequency: | 10 – 20 minutes |
| Average Speed: | 15 – 20 MPH |
| Integration: | Exclusive ROW or Street running |
| Capital Costs: | $40 – 80M / mile |
| Passenger Capacity | 40 - 90 / vehicle |
| Power Source: | Overhead electrification |

**Commuter Rail**

*General Purpose of this Mode:* *Connects suburbs to the urban core, potential Intercity service also*

| | |
|---|---|
| Service Distance: | 20 – 80 miles |
| Station Spacing: | 2 to 10 miles |
| Service Frequency: | 30 – 60 minutes |
| Average Speed: | 30 MPH |
| Integration: | Exclusive ROW, Compatible w/ Freight |
| Capital Costs: | $15 – 20M / mile |
| Passenger Capacity | 120 - 180 / vehicle |
| Power Source: | Diesel-electric |



**High Speed Rail**

*General Purpose of this Mode:* *City to City Service within broader region*

| | |
|---|---|
| Service Distance: | 100+ miles |
| Station Spacing: | 20 to 50 miles |
| Service Frequency: | 1 - 4 hours |
| Average Speed: | 60 – 90 MPH |
| Integration: | Exclusive ROW, Shared w/ Freight |
| Capital Costs: | $80 – 160M / Mile |
| Passenger Capacity | 40 - 90 / vehicle |
| Power Source: | Overhead electrification or Diesel-electric |

# 3.0 Tier 1 Site Alternatives

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# 3.0 Tier 1 Site Alternatives

A formal site selection process was developed for identification of a preferred site for the intermodal hub. This "tiered" ranking and selection process included: (1) the development of Tier 1 and Tier 2 evaluation criteria; (2) the analysis and ranking of Tier 1 sites; (3) a shortlist of candidate sites that are recommended for further consideration into Tier 2; and (4) the final analysis and ranking of Tier 2 sites and a recommendation for the preferred site. The Tier 1 evaluation process was intended to reduce the site options for consideration at the Tier 2 level to a maximum of three sites for more detailed evaluation against the project program requirements.

## Evaluation Methodology and Scoring Measures

A Tier 1 evaluation methodology was developed around the following framework components for which a ranking system was applied.

- **Transportation Accommodation:** ability to provide a balance of access by all modes including streetcar, BRT, bike, and commuter and high speed regional rail
- **Civic Presence / Visibility:** ability to anchor a neighborhood or district by creating a sense of place and forming a gateway to the city
- **Economic Development:** ability to provide a combination of development potential on vacant or under utilized parcels in a desirable, walkable location
- **Auto / Pedestrian Access:** ability of the street system to provide a walkable environment while providing capacity for automobile drop-off and parking

A scoring methodology and measures were then applied to each component as follows:

**(-) Poor**: Does not meet minimum requirements for respective framework component without significant infrastructure modifications

**(o) Good**: Meets minimum requirements or allows for future accommodation of framework component with minor modifications

**(+) Excellent**: Provides current accommodation of framework component without need for significant alterations or improvements

Each component was assigned a ranking, and the resulting average score was created for each site. Sites receiving a score of good or excellent advanced to the Tier 2 evaluation.

## Tier 1 Sites

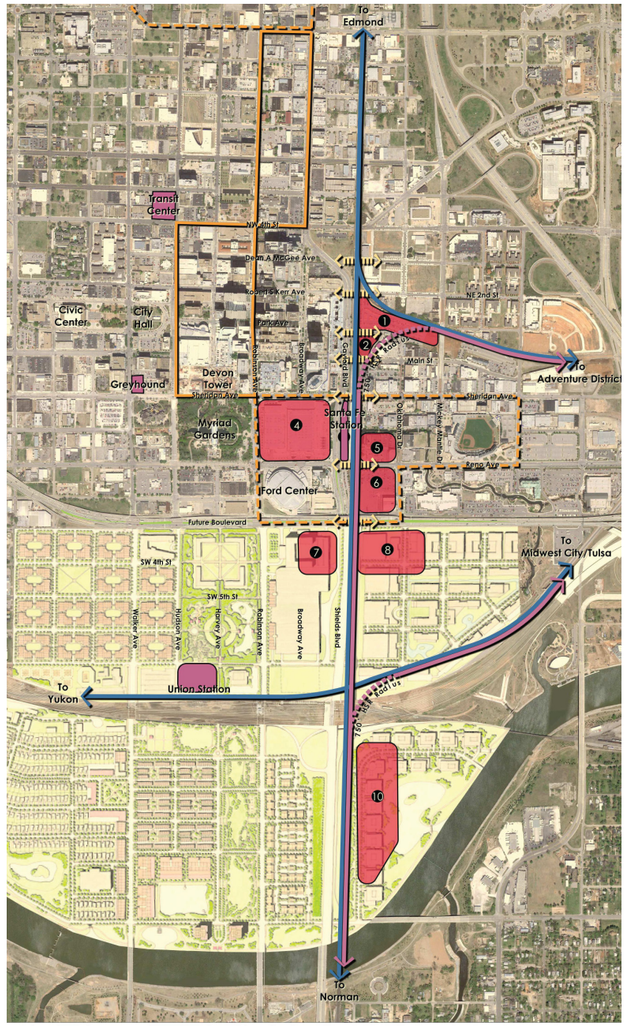
Based on input received from the project Advisory Committee and initial public meeting, ten potential sites were selected for evaluation at the Tier 1 level. The site locations are listed below and illustrated graphically in Figure 3.1.

1. North Bricktown Parking Lot
2. Buffalo Statue Site
3. Santa Fe Station
4. Cox Convention Center
5. Bricktown Parking Lot North of Reno
6. Bricktown Parking Lot South of Reno
7. East of future MAPS 3 Central Park
8. Lumber Yard Site
9. Union Station
10. Pull-a Part Site

## Sites Advancing to Tier 2

The ten Tier 1 sites were evaluated and the results were presented to the Advisory Committee and public for input (see Figure 3.2 on next page for ranking results). After detailed review with the Advisory Committee, the following recommendations were made:

- Combine Sites 1 and 2 into a single "site" for Tier 2 screening
- Combine Sites 3, 5 and 6 into a single "site" for Tier 2 screening
- Carry Site 8 into Tier 2 screening due to its ability to accomodate potential high speed rail routes




**Tier 1 Sites - Figure 3.1**

## Summary of Tier 1 Evaluation Comments and Findings

Figure 3.2 illustrates the final rankings and scoring for each of the ten sites evaluated during the Tier 1 process. These sites were considered based on the evaluation methodology offered by the study team and presented to the Advisory Committee. Based on the evaluation process, sites 1,2,3,5 and 6 received positive rankings, and these sites were clearly favored as potential Tier 2 sites after review by the Advisory Committee. More detailed discussion of each site(s) advancing to Tier 2 screening is offered below:

- **Combine Sites 1 & 2 into a single "site"**: Both Site 1 and 2 received favorable rankings and scoring due to their proximity and access to surface streets and their potential impact on future economic development and redevelopment opportunities in the adjacent areas. The sites, however, received less favorable rankings in terms of their ability to accommodate the anticipated transit modes due to their location at the far north end of the potential high speed rail alignment proposed in the most current ODOT HSR environmental study. Finally, while these sites have frontage along Main Street in Bricktown, thus affording a measure of "civic presence" for a future hub, the size and configuration of each individual site was deemed insufficient for either site to stand on its own, thus Sites 1 and 2 were combined and advanced.

- **Combine Sites 3, 5 & 6 into a single "site":** The proximity of each of these sites along the main rail line and their ability to accommodate anticipated transit modes and other modes and activities was the single strongest attribute. The Santa Fe station (site 3) was clearly a highly ranked location, with the only drawback being the size of the site and whether it can accommodate the entire hub program. Accordingly, the highest ranking nearby sites (sites 5 and 6) were evaluated as potential companion sites to Santa Fe, and upon further review and evaluation, the combined site of 3, 5 and 6 was advanced into Tier 2 evaluation.

- **Carry Site 8 into Tier 2:** While site 8 did not rank highly in any of the evaluation criteria, the site was advanced into Tier 2 evaluation as a precautionary measure related to the possible High Speed Rail southern route alternative by ODOT. ODOT's upcoming environmental study of possible high speed route alternatives between Tulsa and Oklahoma City will help determine if the southern HSR route is feasible. If this study indicates that this route could be the preferred alignment, it was recommended that the Tier 2 evaluation consider this site and the implications and advantages of a hub in this location, mainly for its ability to accommodate this potential high speed rail alignment and service in the future.

| Tier 1 Framework Components | Transit Accommodation (Modal Access) | Civic Presence/ Visibility | Economic Development Opportunity | Auto/ Pedestrian Access | Notes | Average [1] Score |
|---|---|---|---|---|---|---|
| **Site Location** | | | | | | |
| **1. North Bricktown Parking Lot** | - | 0 | + | + | Limited visibility & access w/o connection to 2nd Ave. Location may interfere w / future rail turnout. May not accommodate future HSR. Adjacent land uses transit supportive. | 0/+ |
| **2. "Buffalo Statue" site** | - | 0 | + | + | Good rail access. Good connection to Santa Fe garage. Size may require combination with Site 1. May interfere w / future rail turnout. Adjacent land uses transit supportive. | 0/+ |
| **3. Santa Fe Station** | + | + | 0 | + | Good rail access. Convention Center not a current compatible land use - potential for future economic development only. Other adjacent land uses transit supportive. | + |
| **4. Cox Convention Center (Redevelop east "end")** | - | 0 | - | + | Street separation from rail adjacency. Requires reuse of Convention Center which may impact timing. Adjacent land uses transit supportive. May provide future expansion for Site 3 including TOD. Only works in combination with Site 3. | 0 |
| **5. Bricktown Parking Lot North of Reno @ RR** | 0 | + | 0 | + | Good rail access. Good visibility/access from Bricktown. Downtown separated visually. Good auto/pedestrian access. Adjacent land uses transit supportive - potential for infill development. Current use surface parking. | 0/+ |
| **6. Bricktown Parking Lot South of Reno @ RR** | 0 | + | + | + | Good rail access. Good visibility/access from Bricktown. Downtown separated visually. Good auto/pedestrian access. Adjacent land uses transit supportive - potential for infill development. Current use surface parking. | + |
| **7. East Side of "Central Park" (OGE Substation)** | - | 0 | 0 | 0 | Street separation from rail adjacency. Good auto access from proposed blvd. Poor pedestrian access from downtown. Proposed Convention Center site | 0 |
| **8. "Lumber Yard" site** | 0 | 0 | 0 | - | Good rail access. Poor visibility. Limited pedestrian access from downtown. Poor auto access due to future Blvd. depression. Potential Convention Center site. | 0 |
| **9. Union Station** | - | 0 | 0 | - | Insufficient ROW for passenger rail functions. Poor pedestrian access from downtown. Auto access indirect. | 0/- |
| **10. "Pull-a-Part" site** | 0 | - | - | - | Potential remote HSR site for South Central corridor to Tulsa. Poor visibility and access. Remote to other transit modes. Adjacent land uses not transit supportive. | - |

(1) Sites with average score of good or higher (0/+ and +) are recommened to advance to Tier 2 Evaluation

(2) Presents potential for combined site

**Tier 1 Scoring - Figure 3.2**

# 4.0 Ridership Analysis

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# 4.0 Ridership Analysis

Connetics Transportation Group (CTG) completed travel demand model runs to determine potential passenger trip activity for the Tier 2 site alternatives for the Intermodal Transportation Hub Study. Results presented below assume Year 2035 land use inputs and all travel forecasting was done with the Oklahoma City Area Regional Transportation Study (OCARTS) travel demand model. Modeled scenarios included:

- Combined hub sites 1and 2 (North Bricktown and the Buffalo Statue sites)
- Combined hub sites 3, 5 and 6 (Santa Fe Station, Bricktown parking site north of Reno Avenue, and Bricktown parking site south of Reno Avenue)
- Hub site 8 (Lumber Yard site)

## Background Transit Network

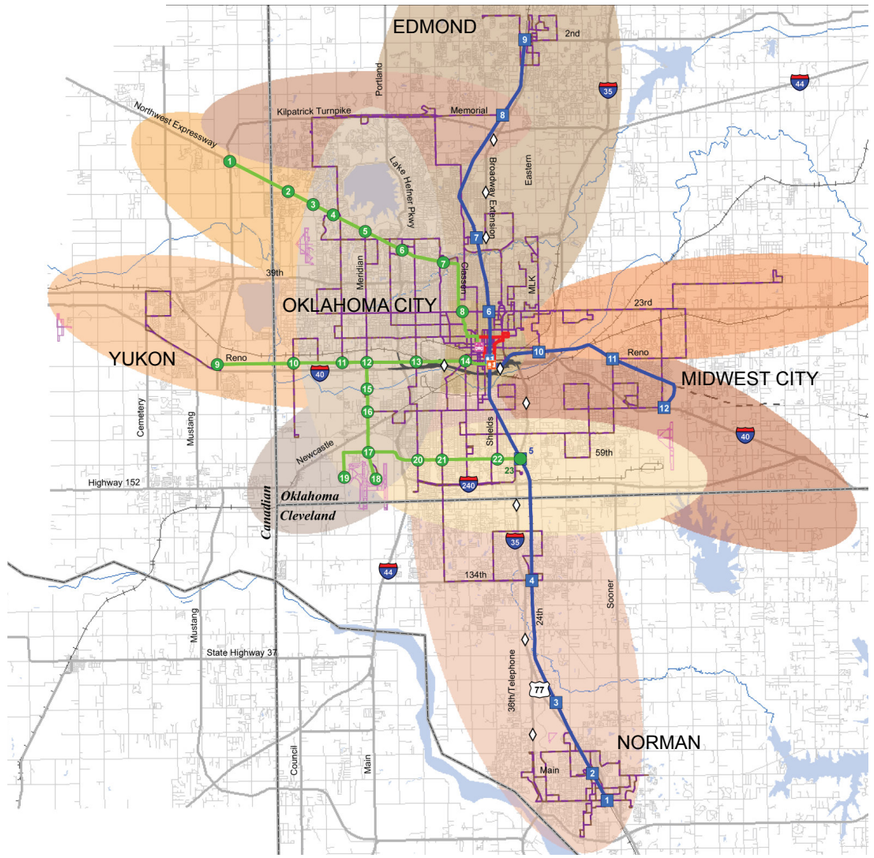
In general, all initial hub model runs were based on the system plan that emerged from the regional *Fixed Guideway Study* (June 2006). High capacity lines are illustrated in Figure 4.1 and include the commuter lines: Edmond to Norman, Edmond to Midwest City/Tinker and Norman to Midwest City/Tinker. In additon, several proposed bus rapid transit (BRT) lines were included, such as Reno Avenue through Downtown Oklahoma City (OKC), Will Rogers Airport to Downtown OKC via Reno Avenue, Northwest Expressway to Downtown OKC, and Will Rogers Airport to Interstate 35 interchange area at SW 54th Street via SW 54th Street.

No changes were assumed for local and express bus service patterns. Forecasts were based on year 2035 demographic inputs and the region's present plus committed highway network. No changes were assumed to downtown bus operating patterns. Thus, all radial routes remain coded to and from the existing downtown transit center. Bus travel time computations were re-calibrated to be more reflective of existing schedules. The recalibration was done with the OCARTS 2005 validation model and carried forward to the 2035 forecasts.

Service frequencies for **Commuter Rail** lines were assumed as follows:

- Commuter Rail; Edmond – Norman, 60 peak/120 off-peak
- Commuter Rail; Edmond – Midwest City/Tinker, 60 peak/120 off-peak
- Commuter Rail; Norman – Midwest City/Tinker, 60 peak/120 off-peak

Utilizing the FGS system plan described herein resulted in a combined 30-minute peak/60-minute off-peak service frequency at each hub location. Fares for all high-capacity lines were assumed to be the same as existing express bus service.




**Fixed Guideway Study - Transit System Plan Map - Figure 4.1**

**Legend**

- 1 – 9 Commuter Rail; Edmond – Norman
- 9 – 12 Commuter Rail; Edmond – Midwest City/Tinker
- 1 – 12 Commuter Rail; Norman – Midwest City/Tinker
- 9 – 14 Bus Rapid Transit; Reno – Downtown Oklahoma City
- 19 – 14 Bus Rapid Transit; Will Rogers Airport – Downtown OKC via Reno
- 1 – 8 Bus Rapid Transit; Northwest Expressway – Downtown Oklahoma City
- 17 – 22 Bus Rapid Transit; Will Rogers Airport – I-35/SW 54th Street via SW 54th Street
- Modern Streetcar
- Enhanced Bus Service Routes

Service frequencies for **Bus Rapid Transit** (BRT) lines were assumed as follows:

- Bus Rapid Transit; Reno – Downtown OKC, 60 peak/120 off-peak
- Bus Rapid Transit; Will Rogers Airport – Downtown OKC via Reno, 60 peak/120 off-peak
- Bus Rapid Transit; Northwest Expressway – Downtown OKC, 30 peak/60 off-peak
- Bus Rapid Transit; Will Rogers Airport – I-35/SW54th Street via SW54th Street, 30 peak/60 off-peak

Finally, the background transit network includes a downtown circulator streetcar system. The streetcar line was assumed to operate on 10-minute peak and 15-minute midday headways. The assumed alignment and station locations were assumed to be consistent with the approved locally preferred alternative (see Figure 1.2). Fares for the downtown streetcar were assumed to be the same as local buses.

**Passenger Activity at the Hub Sites**
Projected person trip activity for the modeled Tier 1 hub sites are presented below in Table 4.1(Year 2035 Forecasts).

This table breaks out weekday person trips by mode of access. Weekday totals reflect the number of passengers that would be boarding or alighting commuter rail trains at a given hub site on a typical weekday. Walk trips are persons that are anticipated to enter or leave a hub site by walking (i.e., on foot). Drive trips are persons anticipated to drive to or from a hub Site. Transfer trips are passengers that transfer to/from another mode (e.g., riding the bus to a hub site and then transferring to one of the commuter rail lines or vice-versa).

Overall, model results suggest that passenger activity is highest under the scenario for hub sites 3, 5 & 6 (Santa Fe/ Bricktown, North or South of Reno). For this combined location, the model's estimate of daily passenger activity (i.e., boardings, alightings and transfers) totaled 1,910 for a typical weekday in the horizon year 2035. Of that total, some 60 persons would be expected to drive and park at the site. Another 300 people would be transferring between CRT lines and other transit services (e.g., local bus, BRT, Streetcar).

| Tier 1 Hub Sites | Location | Modes of Access/Egress | | | Weekday Total | Parking Spaces |
|---|---|---|---|---|---|---|
| | | Walk | Drive | Transfer | | |
| 1&2 | North Bricktown (10, Buffalo Statue (2) | 1,470 | 60 | 260 | 1,790 | 40-60 |
| 3, 5, & 6 | Santa Fe Station (3), Bricktown North(5), or South (6) of Reno | 1,540 | 60 | 300 | 1,910 | 40-60 |
| 8 | Lumber Yard (8) | 1,210 | 60 | 250 | 1,510 | 40-60 |

**Estimated Passenger Activity for Select Tier 1 Hub Sites (2035 Persons Trips) - Table 4.1**

In general, mode of access results for walk tend to reflect each site's proximity to the downtown core. For example, the modeled scenario for sites 3, 5 & 6 resulted with 1,540 person trips on a typical weekday. The scenario representing hub site 8 is a bit further away from the downtown core and walk access activity drops off to 1,210 per day.

**Bus Connectivity at the Hub Sites**
The level of circulation to and from the modeled hub sites merits further mention in these results. As previously noted, the existing (2005) bus network has been used as the background transit network. Thus, a majority of buses operate to and from the existing downtown transit center. In general, the level of transit access for circulation to and from each hub site varies depending on the location of the hub site, the number of bus connections, walk access and proximity to the downtown core.

From Table 4.1 above, the scenario for hub sites 3, 5 & 6 has the highest bus-rail transfers (300 per day). This is due in part to peak period bus connectivity. Table 4.2 summarizes the number of hourly bus connections at each hub site. The hub site 3, 5 & 6 scenario had the highest bus connectivity with 15 buses per hour during peak periods. Generally, this level of service would require six bus bays or pull-in, pull-out lanes and, depending on the service plans, bus lanes could be situated in a number of ways (e.g., side-by-side, each side of the street, along east-west or north-south streets, etc.).

| Tier 1 Hub Sites | Location | Pk Busses per Hour |
|---|---|---|
| 1&2 | North Bricktown (10, Buffalo Statue (2) | 8.0 |
| 3, 5, & 6 | Santa Fe Station (3), Bricktown North(5), or South (6) of Reno | 15.0 |
| 8 | Lumber Yard (8) | 11.0 |

**Peak Bus Connectivity Assumptions by Site Location - Table 4.2**

**Commuter Rail Ridership and Peak Period Line Loads**
Table 4.3 shows the estimated 2035 daily boardings for each line and for each of the hub site scenarios. It is important to note that this reflects total boardings at all stations along the specified line and does not reflect ridership activity at the hub. Passenger activity at specific hub sites was summarized earlier in Table 4.1.

Total boardings range from a low of 6,150 per day (hub site 8) to a high of 6,430 per day (hub sites 3, 5 & 6). Of the three modeled lines, the Norman-Edmond Line attracts the most boardings. This is the case across all hub scenarios. However, daily boardings for the Norman - Midwest City Line are roughly equivalent.

Peak period line loads measure passenger accumulation and therefore is used to approximate train consist (number of vehicles) requirements. In general, peak period line loads did not vary by hub site. The model's estimate was 500 passengers for a 5.5 hour peak period (i.e., AM plus PM). This estimate is for both the Edmond-Norman line and the Norman-Midwest City/Tinker line; that is 500 passengers accumulate for each line for the modeled 5.5-hour period. Hourly, this would be approximately 90 to 125 passengers and suggests single car consists would be sufficient. Note that designing for 2-car consists would be desirable given that these are model estimates and would accommodate future growth.

The total daily ridership of approximately 6,200 patrons is fairly typical for a relatively new commuter rail system operating over similar distances. This number can be compared to the Dallas/Fort Worth Trinity Railway Express (8,100 daily riders), Seattle Sounder (8,700 daily riders), Salt Lake City Frontrunner (5,400 daily riders) and Sacramento/San Jose Capital Corridor (5,300 daily riders). [2]

[2] APTA Ridership Report Statistics 3rd Quarter 2010

| Tier 1 Hub Sites | Location | Daily Commuter Rail Boardings by Line | | | Total Boardings |
|---|---|---|---|---|---|
| | | Norman - Edmond | Norman - MWC | Edmond - MWC | |
| 1&2 | North Bricktown (10, Buffalo Statue (2) | 2,520 | 2,250 | 1,430 | 6,200 |
| 3, 5, & 6 | Santa Fe Station (3), Bricktown North(5), or South (6) of Reno | 2,650 | 2,280 | 1,500 | 6,430 |
| 8 | Lumber Yard (8) | 2,530 | 2,220 | 1,400 | 6,150 |

**Estimated Daily Commuter Rail Boardings by Line (Systemwide 2035) - Table 4.3**

### Amtrak Ridership

The OCARTS model cannot be used to estimate Amtrak ridership because the service extends beyond the boundaries of the regional model. The Amtrak Fact Sheet indicates FY 2010 boardings and alightings on the Heartland Flyer as:

- 14,119 at the Norman Station
- 55,230 at the Oklahoma City Station (Santa Fe Depot)

Assuming annualizing factors between 280 and 300 yields roughly 40 to 50 passengers per day at the Norman Station and 180 to 200 passengers per day at the Santa Fe Depot in Oklahoma City. Future forecasts cannot be done without additional information.

### High Speed Rail Ridership

As with Amtrak, the OCARTS model cannot be used to estimate ridership for high speed rail because such a service would extend beyond the boundaries of the regional model. However, a November 2009 report by the Oklahoma Department of Transportation (ODOT)[3] was reviewed, and year 2023 estimates were about 500,000 riders annually between Tulsa and Oklahoma City. Assuming annualization factors between 280 and 300 suggests about 1600 to 1800 passengers per day. The November 2009 report proposed four stations at Downtown Oklahoma City, Edmond Park and Ride (PnR) , Sapulpa (PnR) and Tulsa. Ridership estimates in this report, however, were not specified at the station level. As such, making an estimate for the Oklahoma City and Edmond Stations cannot be done without additional information.

[3] Oklahoma Portion of the South Central High Speed Rail Corridor, Service Development Plan, The State of Oklahoma, Oklahoma Department of Transportation, November 2009.

### Other Factors Influencing Model Results

It is important to note that these results are heavily influenced by the background transit networks that have been applied to these model runs. Feeder bus routes (i.e., local routes) to outlying commuter rail and BRT stations have not been designed in the model coding. The addition of feeder bus routes could boost fixed guideway ridership and thus boost passenger activity at each hub site. Bus routing in the downtown network has also remained unchanged. Modifications to downtown bus routing could improve transit accessibility to and from each hub site.

In addition, fixed guideway station locations and travel times are based on rather general assumptions at this time. Fixed guideway ridership could also potentially be boosted with modified station assumptions, faster fixed guideway travel time, and introducing rail bias to the model.

### Potential Model Variable Modifications

These forecasts were made using the new OCARTS regional travel demand model (TDM). To our knowledge, this is the first transit-related application of the new TDM. Some modifications were made to improve performance (e.g., re-calibration of bus speeds, path processes, etc.).

During a cursory review of the model, potential model variable adjustments were identified that may impact ridership results for the hub. These are discussed in the Ridership Report in Appendix 1.

# 5.0 Fixed Guideway Operations Analysis

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# 5.0 Fixed Guideway Operations Analysis

**Introduction**

The Fixed Guideway Study (FGS) provided the planning foundation for a future regional public transportation system for Central Oklahoma. The resulting System Plan was based on a horizon year of 2030 and included recommendations for commuter rail, modern streetcar, bus rapid transit and enhanced bus services, and an intermodal transportation hub. The conclusions of the FGS formed the basis for initial evaluation of future transit ridership, hub capacity and hub operations. In recent years, Central Oklahoma residents have become energized about the possibilities of regional public transportation as a means to improve mobility for all citizens, provide a catalyst for greater economic development, improve livability, and reduce auto emissions that affect air quality. As a result, ACOG partnered with community and private sector leaders to begin a visioning process known as the Regional Transit Dialogue (RTD). The RTD process examined local desire for enhanced regional public transportation and explored potential governance, funding and coordination strategies. These efforts will continue in the future in order to fine tune and build upon the accomplishments of the first RTD phase.

In the development of the hub operations plan, it became clear in the public discussions and further dialogue with the Hub Study Advisory Committee that the hub study should expand on the limits and directions offered in the Fixed Guideway Study by incorporating additional modes developed under other studies (Amtrak and high speed rail), as well as other potential modes and routes that emanated in the Regional Transit Dialogue discussions and recommendations. Accordingly, these future modes, as well as their additional patronage, were considered in the hub operations plan in order to ensure that the hub location chosen could accommodate all needs far into the future. This "future proofing" of the hub operations included expanded ridership assumptions to accommodate the higher levels of commuter service with additional lines and modes. The nature and impact of these expanded services are documented in this section. When added to the baseline riderships and patronage generated by the FGS conclusions, this operations analysis will help to ensure that the hub facility will be sized and planned to provide adequate service well beyond the timelines included in the FGS and the region's 2030 Transportation Plan.

**Fixed Guideway Components**

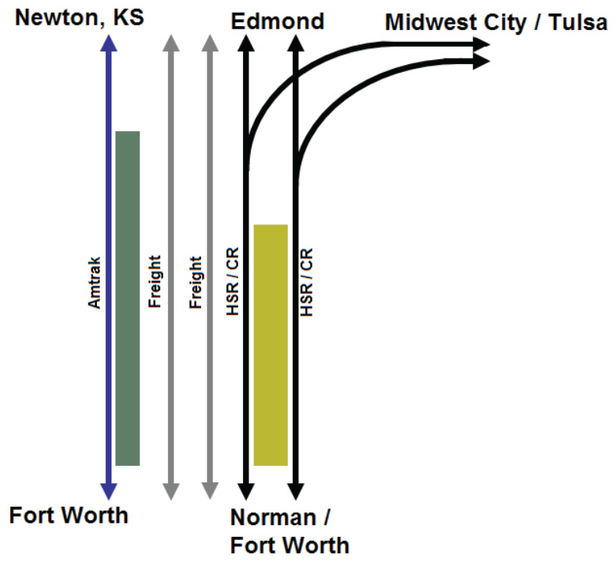
The primary focus of the operational analysis is based on the fixed guideway components operating in the BNSF corridor. The need for this corridor to accommodate freight, commuter rail and high speed rail will ultimately limit the passenger capacity of the hub. As a result, a detailed operations plan was developed to fully understand the capacity of this corridor as well as its relationship to other modes outside the corridor. The following assembly of modes provides the basis for development of the operations analysis.

- Amtrak Heartland Flyer – Between Oklahoma City and Fort Worth (1 or perhaps 2 round trips daily)
- High Speed Rail – Between Tulsa and Fort Worth via OKC (6 round trips daily)
- BNSF Freight – Long distance and local trains through the terminal on two tracks reserved for exclusive freight use
- Local Passenger Rail – Up to four coordinated services through and to the hub
  - Edmond-Norman (11 weekday round trips)
  - Norman-Midwest City / Tinker AFB (11 weekday round trips)
  - Edmond-Midwest City / Tinker AFB (11 weekday round trips)
  - Adventure District-Yukon (12 weekday round trips)

  Note: All local passenger trains would be routed through the hub en-route to another outlying terminal. Owing to the track configuration at the hub, Edmond-Midwest City trains would need to change direction in the station. All other services would simply stop at the hub near the midpoint of their scheduled trip.
- Proposed streetcar and future light rail modes are assumed to be located outside of the existing BNSF corridor and operate independently.

Based on the current BNSF right-of-way and elevated trackway structure through downtown Oklahoma City, 5 tracks and 2 platforms can be accommodated without significant infrastructure modifications to widen the trackway. The operations analysis is based on maximizing the use of the existing right-of-way by developing the most efficient track arrangements and sharing platforms between commuter rail and high speed rail. The base track configuration for the hub includes:

- two through tracks sharing an island platform for use by local trains and HSR,
- one through track and platform for the exclusive use of Amtrak's Heartland Flyer
- two through tracks for BNSF freight trains with no passenger platforms




**Platform Diagram - Figure 5.1**

**Commuter Rail Service**

The current scheduling paradigm for local commuter service plans are for hourly peak service on all branches with bi-hourly off peak service. Plans call for local trains originating in Edmond, Norman and Midwest City to alternate destinations providing frequent and attractive service to downtown through the hub. Based on projections in the Fixed Guideway Study, three local suburban communities are likely to warrant commuter rail service in the future. While each of these commuter rail corridors are expected to yield varying degrees of demand for passenger rail service, the overall demand generated by the Edmond, Norman and Midwest City areas is the basis for the commuter rail service components of the hub analysis.

**Integrated Station Schedule**

In order to fully understand the relationship between arriving and departing trains on each of the commuter rail and high speed rail lines, a sketch level scheduling and capacity study was developed. The study is based on the current scheduling paradigm discussed above and proposed track layout to determine if all proposed services could be accommodated in the five track station and what level of service defines a "tipping point' requiring additional tracks to further expand service.

| Running Times | | Approx Miles | Travel Time | MPH |
|---|---|---|---|---|
| Edmond | OKC | 13.91 | 20:36 | 40.5 |
| Norman | OKC | 17.81 | 23:06 | 46.3 |
| MWC Tinker | OKC | 9.63 | 17:12 | 33.6 |
| Northeast Lake | OKC | 5.78 | 10:19 | 33.6 |
| Yukon | OKC | 13.7 | 22:06 | 37.2 |

| From | To | Miles | Time | Series |
|---|---|---|---|---|
| Edmond | Norman | 31.72 | 44:42 | 200 |
| Edmond | MWC/Tinker | 23.54 | 47:48 | 100 |
| Norman | MWC/Tinker | 27.44 | 41:18 | 300 |
| Yukon | Adventure District | 19.48 | 33:25 | 200 |

| Commuter Rail Turn Times | |
|---|---|
| Preferred | 10:00 |
| Minimum | 09:00 |

**High Speed Rail**

| NB from Fort Worth via Norman | | SB from Tulsa Via MWC | |
|---|---|---|---|
| 902 | 6:00 | 901 | 7:15 |
| 904 | 9:30 | 903 | 10:45 |
| 906 | 13:30 | 905 | 14:45 |
| 908 | 15:50 | 907 | 17:05 |
| 910 | 18:40 | 909 | 18:30 |
| 912 | 22:00 | 911 | 21:50 |

**Amtrak Heartland Flyer**

| | | | |
|---|---|---|---|
| 0:00 | | | 0:00 |
| Read Dow | MP | Station | Read Up |
| 8:25 | 0:00 | OKC | 21:39 |
| 8:49 | 0:00 | Norman | 21:04 |

| | | 401 | 201 | 901 | 403 | 101 | 301 | 405 | 203 | 821 | 103 | 303 | 205 | 407 | 105 | 305 | 903 | 207 | 409 | 107 | 307 | 209 | 411 | 109 | 309 | 905 | 211 | 413 | 111 | 311 | 415 | 213 | 113 | 313 | 907 | 417 | 215 | 115 | 315 | 419 | 909 | 217 | 421 | 117 | 317 | 219 | 423 | 911 | 119 | 319 | 221 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *South and Westbound* | J | A | Q | K | X | Y | J | C | N | Y | Z | B | K | C | A | Q | B | K | C | A | B | K | C | A | Q | B | K | C | A | J | X | A | B | Q | K | Z | B | C | J | Q | A | K | B | C | A | K | Q | B | C | A |
| Dept | Northeast Lake | 6:44 | | | 7:14 | | | 8:12 | | | | | | 9:04 | | | | | 11:04 | | | | 13:04 | | | | | 15:04 | | | 16:04 | | | | | 17:04 | | | | 18:04 | | | 19:04 | | | | 21:04 | | | | |
| Dept | Edmond | | 6:39 | | | | 7:09 | | 7:39 | | | 8:09 | 8:39 | | | 9:39 | | 10:39 | | | 11:39 | 12:39 | | | 13:39 | | 14:39 | | | 15:39 | | 16:09 | | 16:39 | | | 17:09 | | 17:39 | | | 18:39 | | | 19:39 | 20:39 | | | | 21:39 | 22:49 |
| Dept | Midwest City / Tinker | | | | 7:17 | | | | | | 8:19 | | | | 9:47 | | | | | 11:47 | | | | 13:47 | | | | 15:47 | | | | | 16:49 | | | | 17:47 | | | | | 19:47 | | | | | 21:47 | | | |
| Arrv | **Oklahoma City** | **6:55** | **7:00** | **7:15** | **7:25** | **7:35** | **7:30** | **8:23** | **8:00** | | **8:37** | **8:30** | **9:00** | **9:15** | **10:05** | **10:00** | **10:45** | **11:00** | **11:15** | **12:05** | **12:00** | **13:00** | **13:15** | **14:05** | **14:00** | **14:45** | **15:00** | **15:15** | **16:05** | **16:00** | **16:15** | **16:30** | **17:07** | **17:00** | **17:05** | **17:15** | **17:30** | **18:05** | **18:00** | **18:15** | **18:30** | **19:00** | **19:15** | **20:05** | **20:00** | **21:00** | **21:15** | **21:50** | **22:05** | **22:00** | **23:10** |
| Dept | | 6:56 | 7:01 | 7:17 | 7:26 | 7:36 | **7:40** | 8:24 | 8:01 | **8:25** | 8:38 | **8:40** | 9:01 | 9:16 | 10:06 | **10:10** | 10:47 | 11:01 | 11:16 | 12:06 | **12:10** | 13:01 | 13:16 | 14:06 | **14:10** | 14:47 | 15:01 | 15:16 | 16:06 | **16:10** | 16:16 | 16:31 | 17:08 | **17:10** | 17:07 | 17:16 | 17:31 | 18:06 | **18:10** | 18:16 | 18:32 | 19:01 | 19:16 | 20:06 | **20:10** | 21:01 | 21:16 | 21:52 | 22:06 | **22:10** | 23:11 |
| Arrv | Midwest City / Tinker | | | | | | 7:57 | | | | | 8:57 | | | | 10:27 | | | | | 12:27 | | | | 14:27 | | | | | 16:27 | | | | 17:27 | | | | 18:27 | | | | | 20:27 | | | | | | 22:27 | | |
| Arrv | Norman | | 7:24 | 7:35 | | 7:58 | | | 8:24 | 8:49 | 9:00 | | 9:24 | | 10:28 | | **11:05** | 11:24 | | 12:28 | | 13:24 | | 14:28 | | 15:24 | | 16:28 | | | 16:54 | 17:30 | | 17:25 | | 17:54 | 18:28 | | | 18:50 | 19:24 | | 20:28 | | 21:24 | | 22:10 | 22:28 | | 23:34 |
| Arrv | Yukon | 7:18 | | | 7:48 | | | 8:46 | | | | | | 9:38 | | | | | 11:38 | | | | 13:38 | | | | | 15:38 | | | 16:38 | | | | | 17:38 | | | | 18:38 | | | 19:38 | | | | 21:38 | | | | |
| | | | | | | | | HOUSE | | | | HOUSE | HOUSE | | | | | | | | | | | | | | | | | | | | | | | | | HOUSE | | | | HOUSE | | | | | | | | | | | |

| | | 902 | 400 | 100 | 300 | 200 | 402 | 102 | 302 | 404 | 202 | 104 | 304 | 904 | 204 | 406 | 106 | 306 | 206 | 408 | 108 | 308 | 906 | 208 | 410 | 110 | 310 | 908 | 210 | 412 | 112 | 312 | 212 | 414 | 114 | 314 | 214 | 416 | 910 | 116 | 316 | 216 | 418 | 118 | 318 | 822 | 0.92 | 218 | 420 | 120 | 320 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *North and Eastbound* | Q | K | B | C | Z | J | A | B | K | X | C | A | Q | B | K | C | A | B | K | C | A | Q | B | K | C | A | Q | B | K | Y | Z | C | J | X | Y | A | K | Q | B | C | A | K | B | C | | Q | A | K | B | C |
| Dept | Yukon | | 6:30 | | | | 7:28 | | | 7:52 | | | | | | 9:52 | | | | 11:52 | | | | | 13:52 | | | | | 15:52 | | | | 16:52 | | | | 17:52 | | | | 19:52 | | | | | | | 21:52 | | |
| Dept | Norman | 5:42 | | 6:41 | | 7:06 | | 7:41 | | | 8:08 | 8:41 | | 9:12 | 9:36 | | 10:41 | | | 11:36 | | 12:41 | | 13:12 | 13:36 | | 14:41 | | 15:32 | 15:36 | | 16:11 | | 16:38 | | 17:11 | | 17:41 | | 18:22 | 18:41 | | 19:41 | | 20:41 | | 21:04 | 21:42 | 21:46 | | 22:41 | |
| Dept | Midwest City / Tinker | | | | 6:42 | | | | 7:42 | | | | 8:42 | | | | | 10:42 | | | | 12:42 | | | | | 14:42 | | | | | 16:12 | | | | 17:12 | | | | | 18:42 | | | | 20:42 | | | | | 22:42 |
| Arrv | **Oklahoma City** | **6:00** | **6:53** | **7:05** | **7:00** | **7:30** | **7:51** | **8:05** | **8:00** | **8:15** | **8:32** | **9:05** | **9:00** | **9:30** | **10:00** | **10:15** | **11:05** | **11:00** | **12:00** | **12:15** | **13:05** | **13:00** | **13:30** | **14:00** | **14:15** | **15:05** | **15:00** | **15:50** | **16:00** | **16:15** | **16:35** | **16:30** | **17:02** | **17:15** | **17:35** | **17:30** | **18:05** | **18:15** | **18:40** | **19:05** | **19:00** | **20:05** | **20:15** | **21:05** | **21:00** | **21:39** | **22:00** | **22:10** | **22:15** | **23:05** | **23:00** |
| Dept | | 6:02 | 6:54 | 7:06 | **7:10** | 7:31 | 7:52 | 8:06 | **8:10** | 8:16 | 8:33 | 9:06 | **9:10** | 9:32 | 10:01 | 10:16 | 11:06 | **11:10** | 12:01 | 12:16 | 13:06 | **13:10** | 13:32 | 14:01 | 14:16 | 15:06 | **15:10** | 15:52 | 16:01 | 16:16 | 16:36 | **16:40** | 17:03 | 17:16 | 17:36 | **17:40** | 18:06 | 18:16 | 18:42 | 19:06 | **19:10** | 20:06 | 20:16 | 21:06 | **21:10** | | 22:02 | 22:11 | 22:16 | 23:06 | **23:10** |
| Arrv | Midwest City / Tinker | | | 7:23 | | | | 8:23 | | | | 9:23 | | | | | 11:23 | | | | 13:23 | | | | | 15:23 | | | | | 16:53 | | | | 17:53 | | | | | 19:23 | | | | 21:23 | | | | | 23:23 | |
| Arrv | Edmond | | | | 7:30 | 7:51 | | | 8:30 | | 8:53 | | 9:30 | | 10:21 | | | 11:30 | 12:21 | | | 13:30 | | 14:21 | | | 15:30 | | 16:21 | | | 17:00 | 17:23 | | | 18:00 | 18:26 | | | | 19:30 | 20:26 | | | 21:30 | | | 22:31 | | | 23:30 |
| Arrv | Northeast Lake | | 7:04 | | | | 8:02 | | | 8:26 | | | | | | 10:26 | | | | 12:26 | | | | | 14:26 | | | | | 16:26 | | | | 17:26 | | | 18:26 | | | | | 20:26 | | | | | | 22:26 | | | |
| | | | | | | | | | | HOUSE | | | | | | | | | | | | | | | | | | | | | | | | | | HOUSE | HOUSE | | | | | | | | | | | | | HOUSE | HOUSE | |

***Notes*** ***Train 113 / 313*** Train 113 @ 17:07 and 313 @ 17:00 and 21 @ 17:02 conflict with HSR 907 and will need to moved back by ten minutes. This ten minute adjustment may ripple into the rest of the evening service.

**Sketch Schedule - Figure 5.2**

**Assumptions for the Station Schedule**

The study was conducted subject to a variety of assumptions.

- All local and HSR trains are restricted to the two track center island platform.
- Running times are based on the 2006 Fixed Guideway Study Ridership and Operations Report and 2011 Ridership Analysis update.
- All routes have sufficient capacity that there are no constraining meets or passes affecting local, HSR, or Amtrak services.
- Crossovers and interlockings could be constructed to support the connections required for interline switching at the terminal and the junction to the Midwest City line.
- Local schedules were prepared to maximize regularity and frequency of service.
- Trains moving between Midwest City and Edmond must change ends at the hub and reverse their inbound route for 0.3 miles.
- HSR shares a route with Norman/Midwest City. This route must be clear 15 minutes ahead of scheduled HSR trains.
- All local trains have a minimum stop of one minute at OKC.
- Longer OKC dwells for HSR and trains following HSR (2 minutes).
- Local trains can follow other local trains, HSR and Amtrak trains by 5 minutes without interference.
- For the purposes of the sketch plan, it is assumed that there is sufficient capacity and flexibility to avoid all conflicts with BNSF freight trains.

**Findings of Station Scheduling Analysis**

The station scheduling exercise indicates that:

- It is possible to schedule all 2030 projected local and HSR services through the two track island platform.
- Local service on the four lines can be operated with eight consists (2 cars per line).
- Services to Midwest City, Edmond and Norman are all interlined and require sensitive scheduling to balance customer service.
- Northeast /Yukon service is completely independent of all other services and consequently relatively easy to schedule.
- HSR service marginally affects the schedules of local services along the shared route and through the terminal but can be accommodated with only one adjustment at 5pm.
- The dedicated Amtrak track and platform receives very little traffic and is unused for 13 hours from 8:30 am to 9:30 pm each day.

The schedule of interlined local services for Midwest City, Norman and Edmond is complex but feasible. Scheduling the three services through a two track terminal will require precision in scheduling and operations. This type of scheduling operation is typical for many similar operations in other cities but not desired for optimal operations as dependencies between schedules at the terminal could result in a relatively fragile service that maybe subject to cascading delays.

The complexity of scheduling four lines at one platform can be mitigated by utilizing either of the following alternatives:

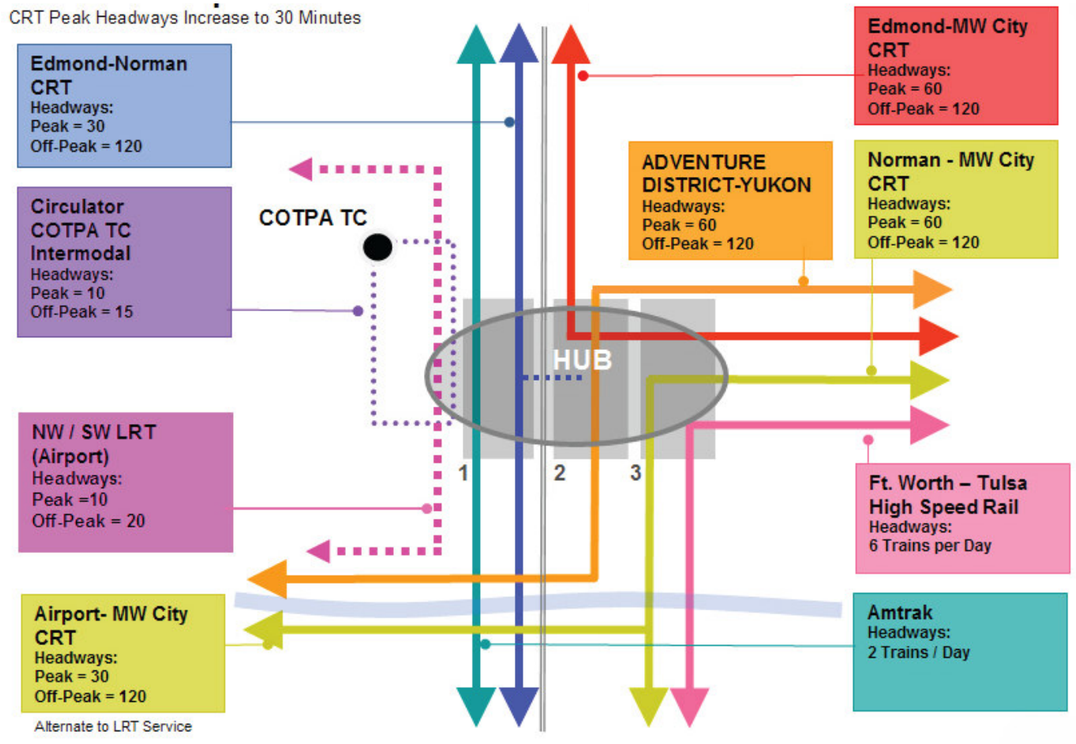
1. Scheduling most (or all) Norman-Edmond trains through the track currently reserved for Amtrak's exclusive use would relieve capacity constraints and yield a service that is much more robust and less subject to cascading delays. Amtrak shares their platform with both commuter and High Speed Rail at many locations in the Northeast Corridor.

2. A third passenger platform with two additional tracks would serve all commuter and high speed rail lines continuing to the east. Shifting the High Speed Rail and Norman to Midwest City line to Platform 3 provides higher operational capacity for Edmond to Midwest City and Adventure District to Yukon on Platform 2. A third platform would also be indicated in the more distant future when additional frequencies are considered for Oklahoma City.

**Findings and Recommendations for Rail Operations Plan at the Hub**

As indicated in the information contained within this section, the introduction of regional transit services and rail traffic at the proposed hub location will have significant impacts in terms of new platforms and the need to appropriately coordinate passenger and freight services through this yard into the future. The analysis is based on the FGS recommendations, as well as additional rail-based transit services that may occur in the future. In this way, the hub location and site has been tested and "future-proofed" in order to ensure that expansions of the future transit system (beyond those contemplated in the FGS) can be accommodated at this hub location.

Figure 5.3 (below) indicates in graphic form the services, lines, headways and other important features of the proposed long term operations plan for the hub. The major findings and recommendations of this operations analysis are included on the next page.




**Hub Operation Plan - Figure 5.3**

Outlined below are the recommendations for future operations of the hub that will now form the basis for the further development of a physical layout and master plan for the hub at the Santa Fe depot site.

- A two platform Commuter Rail / High Speed Rail operation provides effective service for the system at the hub through 2030, with the current Amtrak operation also included in this system analysis.

- As ridership increases and new commuter rail services are added at the hub in the future, shifting the Edmond - Norman Line to the current Amtrak platform will permit less constrained scheduling.

- A future third platform (to the east side of the current elevated guideway at the Santa Fe depot location) may be needed to accommodate expanded passenger service (commuter rail or high speed rail) in the long term future.

- The addition of third platform requires the following actions to be initiated in the short term so that the third platform is not precluded from occurring in the future:
  1. Preserve the ability to widen the railroad bridge spanning the proposed Oklahoma City "boulevard" that is being designed currently; [4]
  2. Coordinate the design of the proposed "boulevard" to ensure that it does not preclude the bridge widening discussed herein;
  3. Acquire or gain control of the rail right-of-way needed to accommodate the high speed rail and commuter rail services at the existing Union Pacific spur and the North Bricktown parking lot;
  4. Design and maintain the proposed public plaza on the east side of the current elevated guideway to allow the addition of the future third platform.

[4] At the time of this study, construction of the I-40 realignment in downtown Oklahoma City was underway, with completion expected in fall 2012. Subsequent to opening the realigned I-40 mainline, the old elevated I-40 structure will be removed and replaced with an at-grade boulevard which will provide direct access to downtown Oklahoma City.

# 6.0 Facility Program

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# 6.0 Facility Program

The Intermodal Hub program was developed based on the project goals and objectives to accommodate passenger boarding, transfers, waiting and transit provider operations. Space requirements include platforms for passenger boarding, parking, common areas including passenger waiting and amenities, facility access, circulation and bus / streetcar boarding areas.

The program was derived from requirements for train lengths and schedules, scheduling of buses, enclosed space based on the number of patrons projected to use the facility, transportation provider requirements and general circulation and access. The general program areas are summarized below. A detailed Facility Program is included in Appendix 2 of this report.

**Commuter Rail Platform**

The commuter rail platform has been sized based on the projected 2035 ridership with assumptions made on the vehicle type and capacity to serve the ridership. Based on the ridership analysis, 6,400 patrons can be expected to use the commuter rail system on a daily basis. The "peak line load" measures passenger accumulation and is used to approximate train consist requirements. The model's estimate is that 500 passengers accumulate for each line for the modeled 5.5-hour period. Hourly, this would be approximately 90 to 125 passengers per line and suggests a single car consists would be sufficient dependant on the vehicle utilized.

Based on an industry review of the most recent commuter rail systems, two types of vehicles are primarily being utilized; the Bombardier, push-pull Bi-Level Coach and the US Railcar Diesel Multiple Unit (DMU) Bi-Level Coach. The difference in these two vehicle types primarily lies in the power equipment used to propel the vehicle. Push-pull requires a locomotive to propel the passenger cars, while the DMU utilizes diesel powered self propelled individual vehicles. The coach capacity for each vehicle type is similar ranging from 150 – 188 seated capacity. The vehicle length is also approximately equal for both vehicles. Based on the peak line load, a single vehicle can meet the initial capacity needs of 125 passengers for the corridor.

Designing the hub for initial capacity would be shortsighted. Therefore, consideration must be given higher future ridership. The most effective form of expansion capability for fixed guideway transit is the addition of vehicles, expanding in a linear fashion as opposed to adding more lanes. The chart below shows the capacity that can be added by providing more vehicles. A detailed Vehicle Capacity Analysis is located in Appendix 3.

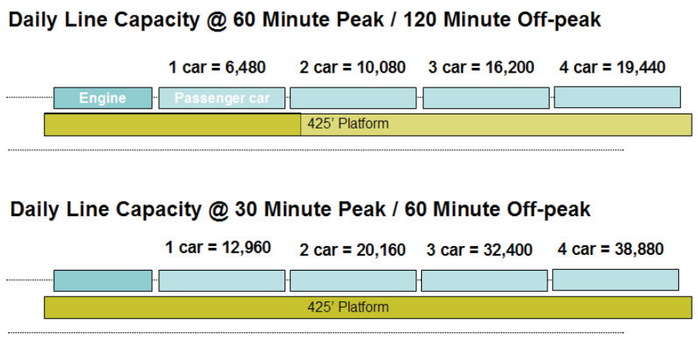
| No. Vehicles | Daily Capacity |
|---|---|
| 1 | 6,480 Passengers (PAX) |
| 2 | 10,080 PAX |
| 3 | 16,200 PAX |
| 4 | 19,440 PAX |

The above capacities can be further increased by decreasing headways (30 minute peak headways vs. 60 minute). The design basis for the commuter rail platform was determined to be three vehicles, which provides 250% of the capacity needed in 2035. A 350 foot platform length will accommodate 3 vehicles and a locomotive with provisions for some flexibility in positioning the train. The platform width was determined to be 26 feet allowing for vertical circulation (elevator and stairs) with adequate space on each side for patron circulation, boarding and alighting.

| | |
|---|---|
| **Commuter Rail** | |
| Daily Boardings (1910 use 2000) | 2,000 Passengers (PAX) |
| 2035 Peak Hour Boarding/Alighting at OKC Hub (2000 x 25%) | 500 PAX |
| Peak Boardings per Train<br>(500 PAX Peak Hr/3 Trains/ 3 per Hour) | 56 PAX |
| **High Speed Rail** | |
| 2035 Daily Boardings | 2,880 PAX |
| Boardings per Train<br>(6 per day / AM Peak) | 480 PAX |
| **Amtrak** | |
| 2035 Daily Boardings | 340 PAX |
| Boardings per Train<br>(2 per day / AM Peak) | 170 PAX |
| Total Peak Boardings at OKC Hub | 706 PAX |

**Peak Hour Ridership - Table 6.1**

Note that as described in Section 5, Fixed Guideway Operations Analysis, the commuter rail service may operate from the same platform as High Speed Rail. The facility implications of the shared platform and operations are discussed in Section 8. In the northeastern United States, the Acela high speed service shares tracks and platforms with commuter rail at most stations.




**Platform Length - Figure 6.1**

### High Speed Rail Platform

The South Central High Speed ail Service Development Plan indicates a need for nine passenger cars and a locomotive. The Northeast Corridor Acela high speed rail service operates using 87' Bombardier passenger cars, and a 70' powercar (locomotive). Each passenger car seats approximately 50. Using a similar vehicle type would result in a total passenger capacity of 450 with a total length of 853'. A 900' platform will be adequate to support high speed rail service at the intermodal hub.

| |
|---|
| **Commuter Rail** |
| 350' x 26' Platform (3 car train) |
| **High Speed Rail** |
| 900' x 26' Platform (Possibly Shared with Commuter Rail) |
| **Amtrak** |
| 1200' x 20' Platform (Existing) |

**Platform Requirements - Table 6.2**

### Transit Hall

The Transit Hall includes the common areas that accommodate all passenger services, operations support and passenger amenities. This program component will provide the linkages between modes and support all passenger operations. The primary functional elements for this area include the following:

- Waiting
- Patron Restrooms
- Retail
- Security Office
- Information / Customer Service Desk
- Visitor Center
- Circulation
- Amtrak Ticketing and Operations
- Commuter Rail Ticketing and Operations
- High Speed Rail Ticketing and Operations

The total enclosed area for the Transit Hall is approximately 30,000 square feet. This area was determined based on transit provider needs, waiting area based on the number of passengers anticipated in the peak period, and circulation space for transfers between modes. A detailed analysis of the space requirements is shown in the Facility Program. A total of approximately 700 passengers are expected to occupy the hub in the peak hour based on ridership projections as shown in Table 6.1 on the preceeding page and as detailed in Appendix 3 (see Peak Boardings category).

### Bus / BRT Boarding

Local bus service will be one of the primary distribution systems of the Intermodal hub. Six bus bays will be required to accommodate 15 buses per hour serving the facility. Bus bays are anticipated to be located curb side immediately adjacent to the facility.

### Streetcar Stop

The alignment of the proposed streetcar circulator is anticipated to utilize Sheridan and Reno. The flexibility of the streetcar operation should allow stops at several locations depending on the site location and configuration. A single streetcar stop location is anticipated to serve the Intermodal Hub with space for layover of one vehicle.

### Intercity Bus

Provisions have been made in the program to accommodate intercity bus operators such as Greyhound. Intercity bus providers in Oklahoma City currently operate out of privately owned facilities; however, this mode could be an integral part of the hub in the future. Accommodations have been made for 8 bus bays and passenger operations space of

approximately 14,000 square feet. It is anticipated that this facility would be adjacent to, but not necessarily integral to, the hub depending on the final hub site selection.

**Parking**

The primary function of an intermodal terminal is mode to mode transfers. While transit use is the primary function, parking must also be considered a mode, especially for regional service such as Amtrak, High Speed Rail, and to some extent, Commuter Rail, where patrons may not be able to access these facilities by other modes. Based on ridership projections and assumptions made on percentage of automobile access by riders, 833 parking spaces have been programmed for the facility. This parking may be phased in as individual transit modes are introduced into the facility. Detailed parking calculations are included in Appendix 4.

| | |
|---|---|
| **Commuter Rail** | |
| (Per Ridership Model) | 64 Spaces |
| **High Speed Rail** | |
| Based on 50% of Daily Riders (340 x .50) | 179 Spaces |
| **Amtrak** | |
| Based on 50% of Daily Riders | 586 Spaces |
| Total Parking Requirement | 833 Spaces |

**Parking Requirements - Table 6.3**

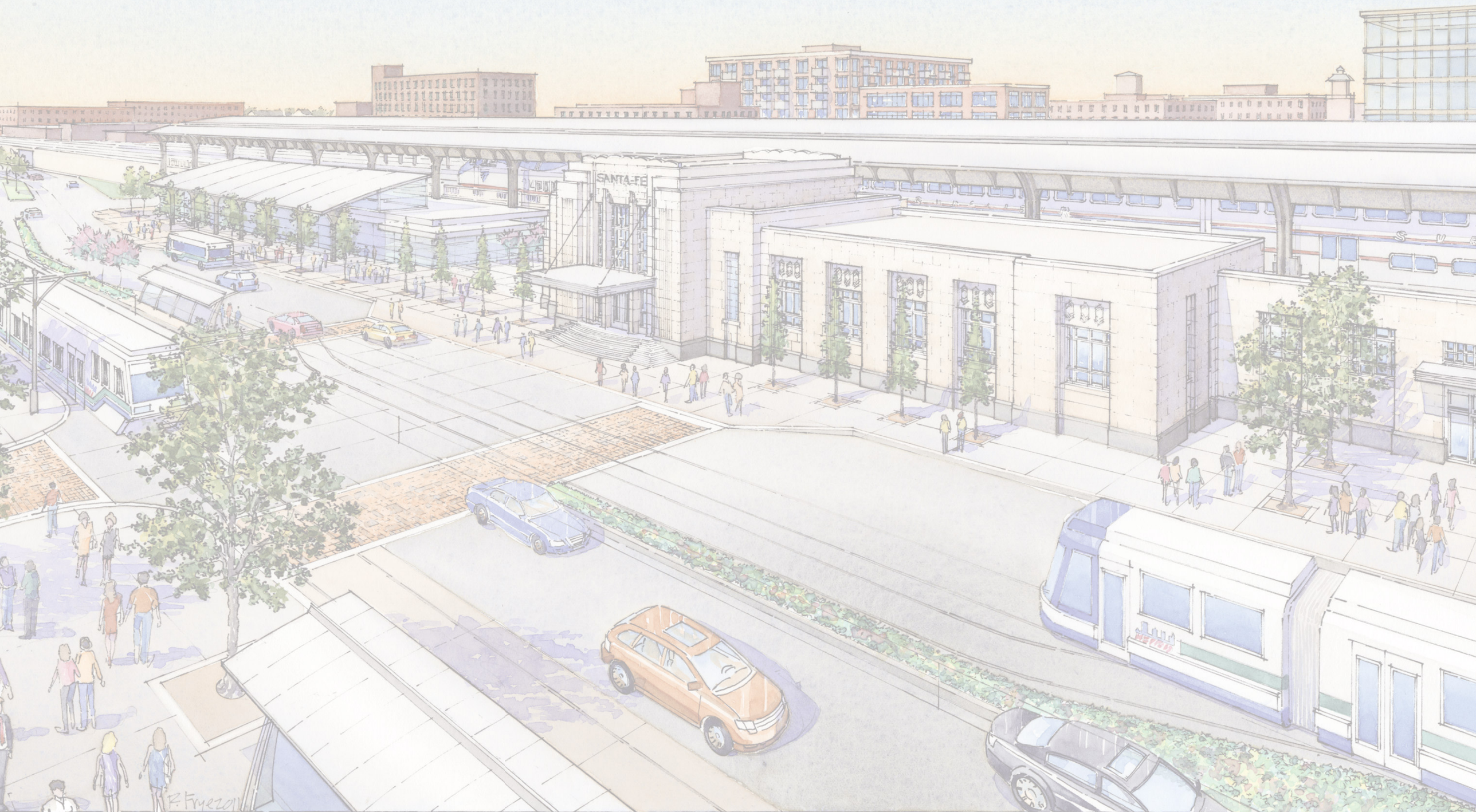
**Taxi / Shuttles**

Curbside space will be required for passenger drop-off and pickup by taxis and private shuttles such as hotel and limousine service. Two spaces will be allocated for this use. Should high capacity taxi service be desired, an off-site staging area may be required.

**Bike Station**

E.K. Gaylord Boulevard is proposed for streetscape improvements associated with the Project 180 downtown streetscaping program. As such, a bike lane is planned along with other improvements that will facilitate bike usage in the downtown area. Accordingly, bike storage facilities, and possibly a bike rental and repair shop, should be a component of the facility.

# 7.0 Tier 2 Site Evaluation



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# 7.0 Tier 2 Site Evaluation

The Tier 2 evaluation process was developed to identify a preferred site from the three short listed Tier 1 sites. The criteria focused on the site's ability to accommodate the physical requirements of the program and also included economic development, urban form and environmental factors that could impact development. Conceptual layouts were developed at each site to test the site geometry and related infrastructure against the program.

**Tier 2 Evaluation Methodology**

- **Multimodal Access**: The site's ability to provide access by all modes, including streetcar, BRT, local and intercity bus, bike, and commuter and high speed rail services.
- **Site Configuration**: The ability of the site to accommodate the necessary program components including platforms, facility requirements, parking and access.
- **Economic Development**: The site's ability to enhance the development potential on adjacent vacant or underutilized parcels in a desirable, walkable location.
- **Urban Form**: The site's conformance with the appropriate density, walkable environment and transit supportive zoning that encourage an active urban space.
- **Environmental**: The site's ability to minimize displacements, noise impacts and historic property impacts through the development of the hub.

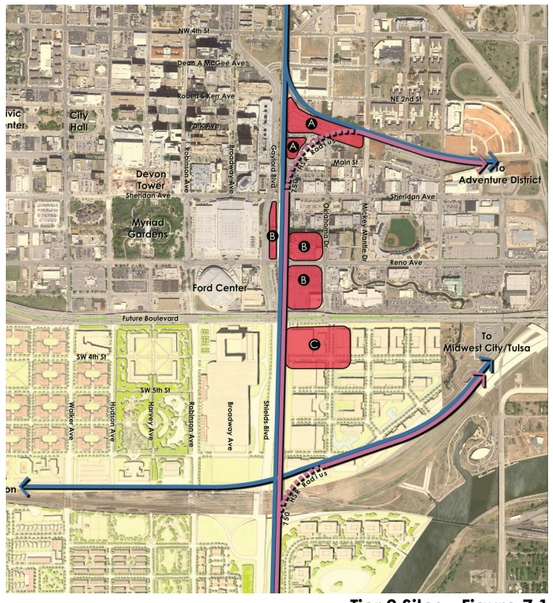
**Tier 2 Summary Rankings**

Figure 7.2 (below) presents the summary of Tier 2 rankings, indicating that Site B (Santa Fe site) clearly achieved the highest score. The Advisory Committee and the public endorsed this site selection due to the following attributes:

- Provides adequate transit capacity through 2030 and beyond
- Enhances development opportunities for Downtown and Bricktown
- Possesses a notable civic presence, history, and visibility within the region
- Creates a new pedestrian linkage that ties Downtown to Bricktown

| Evaluation Criteria | A | B | C |
|---|---|---|---|
| Multimodal Access | 11 | 24 | 15 |
| Site Configuration | 7 | 17 | 11 |
| Economic Development | 5 | 14 | 8 |
| Urban Form | 15 | 22 | 15 |
| Environmental | 17 | 17 | 18 |
| Total | 55 | 94 | 67 |

Tier 2 Rankings - Figure 7.2




Tier 2 Sites - Figure 7.1

**Site A Evaluation**

Site A includes the combination of Sites 1 and 2 from the Tier 1 evaluation. During the analysis and operation planning process it was determined that in order to link commuter rail and high speed rail service to the east, right-of-way would have to be dedicated through this site. This right-of-way would connect the existing Union Pacific corridor to the existing elevated guideway and BNSF right-of-way in order to provide the rail connection to Midwest City and Tulsa. The 750 foot track radius required for this right-of -way to make the connection bifurcates the site posing several challenges to accommodating the program. The track curvature would also force the majority of the proposed passenger platforms either north or south of the central portions of the site creating additional challenges of linking the platforms to the hub facility. Due to these significant obstacles to developing a feasible site plan and the apparent operational infeasibility of the site, a layout and site plan was not developed for this site. Furthermore, as was anticipated during the evaluation, the overall ranking for this site was quite low, scoring a 55 out of a possible 105 total points. The detailed evaluation of Site A is included in Appendix 5.


Site A Concept Plan - Figure 7.3

**Site B Evaluation**

Site B includes the combination of Sites 3, 5 and 6 from the Tier 1 evaluation. The initial evaluations indicated that the re-purposing and reinvigoration of the Santa Fe depot facility would not only accommodate much of the anticipated building program for the hub (i.e. square footage for passengers, transit hall, Amtrak, common spaces, etc.) but also provide a literal and figurative link to the proud history of rail transportation in the Oklahoma territory. While the site proved to accommodate the facility program and allow for future expansion of the elevated guideway without requiring additional property, it was determined that additional property would be needed for the parking needs of the hub and the other intercity bus services that were desired as a part of the program. It was determined that both sites 5 and 6 could accommodate these program requirements, but the preferred location was site 6 due to its size and ability to provide additional development opportunities in the area. Other attributes of this site include a strong civic presence along Gaylord Boulevard, good roadway access, and strong economic development potential through urban infill. The location also provided the opportunity for new pedestrian access from downtown and Bricktown with the hub acting as a connector between the two districts. By extending the existing below grade pedestrian underpass within the current Santa Fe depot facility through the elevated guideway and then punching through the railroad "wall" at the western end of the Bricktown canal, the hub facility could encourage and enliven the activity between Bricktown and the downtown area, which has been an urban design goal for the City for several years. Figure 7.4 provides a concept plan on how the facility could be planned at these sites.


**Site B Concept Plan - Figure 7.4**

As presented in Figure 7.4, this site combination provided the majority of the passenger functions at the Santa Fe Terminal site, two passenger platforms within the existing 180' elevated guideway structure, and parking east of the guideway south of Reno Avenue. Due to its ability to meet the criteria, the overall ranking for this site was 94 out of a possible 105 total points. The detailed evaluation is included in Appendix 5.

**Site C Evaluation**

Site C is located immediately south of I-40 at the commonly referred to "lumber yard" site. The area around this location will undergo extensive modifications with the removal of the I-40 overpass and the introduction of a new boulevard in its place. Due to clearances at the railroad's elevated guideway, the new boulevard will be depressed at the intersection of EK Gaylord and Reno, creating a depressed roadway from Gaylord east to Oklahoma Avenue. The elevated guideway at this location is approximately 60 feet in width as opposed to 180 feet further north at Site B; therefore, the guideway will be required to be widened to accommodate two platforms. While the site will accommodate the program requirements as illustrated in the concept diagram, accessibility to and visibility of the site were viewed as significant negative factors. The site is also removed from the primary bus routes and proposed streetcar route. Because of these drawbacks, the overall ranking for this site was 67, and the detailed evaluation is included in Appendix 5.


**Site C Concept Plan - Figure 7.5**

# 8.0 Traffic Impacts

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# 8.0 Traffic Impacts

**Traffic Impacts**

The traffic impacts of the proposed intermodal hub were reviewed with respect to the expected increase in traffic due to the attraction of the facility. The hub is proposed to provide interconnectivity between several different modes of transportation including commuter rail, streetcar, BRT, local and intercity bus, local shuttle services and future high speed rail. Associated with the new hub is a proposed new 850 space parking garage, street car station, and pick-up and drop-off facilities for taxis and buses. The study includes a review of the traffic operations of E.K. Gaylord between the proposed new Boulevard and Sheridan Avenue and of Reno Avenue between E.K. Gaylord and Oklahoma Avenue. The results of the reviews are to be used to determine the traffic impacts of the new hub and develop improvement scenarios, if necessary, for the safe and efficient movement of traffic.

The reviews conducted for the intermodal hub included the utilization of the projected future 2025 background traffic data previously developed for the Downtown Oklahoma City Comprehensive Traffic Study as completed in 2009. The background traffic within the study area is indicated in Table 8.1.

The traffic volumes expected to be generated by the new hub facility were determined utilizing the trip rate information for the category "light rail transit station with parking" land use as included in Volume 2 of the Institute of Transportation Engineers Trip Generation, 8th Edition report. The trip rates of this land use were determined utilizing the number of parking spaces located within the adjacent parking facility as the variable. Based on the proposed hub plan, a parking garage is to be constructed just east of E.K. Gaylord on the south side of Reno. The new parking facility is proposed to contain a total of 850 parking spaces to be used primarily by traffic generated by the new hub. To determine the trip total to apply to the hub, it was calculated that on average the parking garage would have an occupancy rate of 60 percent. The resultant number of vehicle trip ends for an average weekday and associated a.m. and p.m. peak hour periods are summarized in Table 8.1.

This traffic was distributed among the intersections within the study area based on the distributions of traffic as determined in the previously mentioned comprehensive traffic study. The resultant distribution of the projected hub generated traffic was then added to the 2025 background traffic to create a total projected 2025 traffic volume associated with the hub and the surrounding area. These traffic volumes were used to conduct the reviews and analyses identified herein and details of these volumes are indicated in Appendix 8.

**Capacity Analysis**

TEC conducted several analyses utilizing the projected traffic volumes. The analyses were conducted using Synchro Professional, Version 7.0, which is a software package for modeling and optimizing traffic signal timings at signalized intersections, and analyzing unsignalized intersections in accordance with the methodology of the latest edition of the Highway Capacity Manual.[5]

[5] The Highway Capacity Manual is provided by the Transportation Research Board of the National Research Council, Washington, D.C. The information is widely accepted throughout the U.S. as a guide for defining and solving transportation challenges. The information is approved and distributed by the U.S. Department of Transportation, Federal Highway Administration.

The capacity analysis provides a measure of the amount of traffic that a given facility can accommodate. Traffic facilities generally operate poorly at or near capacity. The analysis is intended to estimate the maximum amount of traffic that can be accommodated by a facility while maintaining prescribed operational qualities. The definition of operational criteria is accomplished using level-of-service (LOS). The concept of LOS is defined as a qualitative measure and describes operational conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels-of-service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from "A" to "F", with LOS "A" representing the best operating conditions and LOS "F" the worst. Normally, levels-of-service "A, B or C" are considered good during peak traffic periods, level-of-service "D" is considered acceptable, level-of-service "E" is considered undesirable, and level-of-service "F" is considered unacceptable.

| Building Type (Land Use) | Approx. Number of Occupied Parking Spaces[2] | Avg. Weekday Veh. Trip Ends | | | Average AM Peak Hour Directional Distribution | | Average AM Peak Hour Directional Volume | | Average PM Peak Hour Directional Distribution | | Average PM Peak Hour Directional Volume | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Per Day (vpd) | Per Peak Hour of Adjacent Street Traffic | | | | | | | | | |
| | | | One Hour Between 7am & 9am (vph) | One Hour Between 4am & 6am (vph) | IN | OUT | IN | OUT | IN | OUT | IN | OUT |
| Trip Rate[1] | | 3.91 | 1.14 | 1.33 | 0.80 | 0.20 | 465 | 116 | 0.58 | 0.42 | 393 | 285 |
| Light Rail Transit | | | | | | | | | | | | |
| Station w/Parking | 510 | 1994 | 581 | 678 | | | | | | | | |

[1] Trip Rates from "TRIP GENERATION", 8th Ed., Vol. 2, Institute of Transportation Engineers.

[2] Assumed the Parking Garage to include 60% occupied parking spaces in garage due to transit riders within the 850 space garage.

**Projected Site Generated Traffic Volumes - Table 8.1**

The average control delay for signalized intersections is estimated for each lane group and aggregated for each approach for the intersection as a whole. The LOS, for this type of traffic control, is directly related to the control delay value. The LOS criteria for signalized intersections are indicated below.

**Signalized Intersections**

| Level-of-Service | Control Delay per Vehicle (seconds/veh) |
|---|---|
| A | ≤10 |
| B | >10-20 |
| C | >20-35 |
| D | >35-55 |
| E | >55-80 |
| F | >80 |

The criteria for stop controlled or unsignalized intersections have different threshold values than do those for signalized intersections. A higher level of control delay has been determined to be acceptable at a signalized intersection for the same LOS. The LOS criteria for unsignalized intersections are indicated below.

**Unsignalized Intersections**

| Level-of-Service | Control Delay per Vehicle (seconds/veh) |
|---|---|
| A | 0-10 |
| B | >10-15 |
| C | >15-25 |
| D | >25-35 |
| E | >35-50 |
| F | >50 |

The results of the capacity analyses conducted are summarized in Table 8.2 and are included in Appendix 6 of this study. The analyses of the signalized intersections included the use of actuated-coordinated traffic control throughout the network. The lane configurations include those as proposed in the Project 180 Downtown Streetscape project except for the street segments along E.K. Gaylord. This street was assumed to be in its current condition, except for the segment between Reno Avenue and Sheridan Avenue. This segment was assumed to be narrowed to two lanes each northbound and southbound. This change reflects the street car station proposed to be provided in the existing outside southbound lane and the pick-up/drop-off lane proposed to be provided in the existing outside northbound lane.

The pedestrian crossing to be located along E.K. Gaylord between Reno Avenue and Sheridan Avenue was analyzed as a signalized crossing. This crossing is intended to serve the pedestrians crossing between the hub transit station and the streetcar station located on the west side of E.K. Gaylord. This crossing could also provide an alternative pedestrian crossing between Bricktown and the west side of E.K. Gaylord.

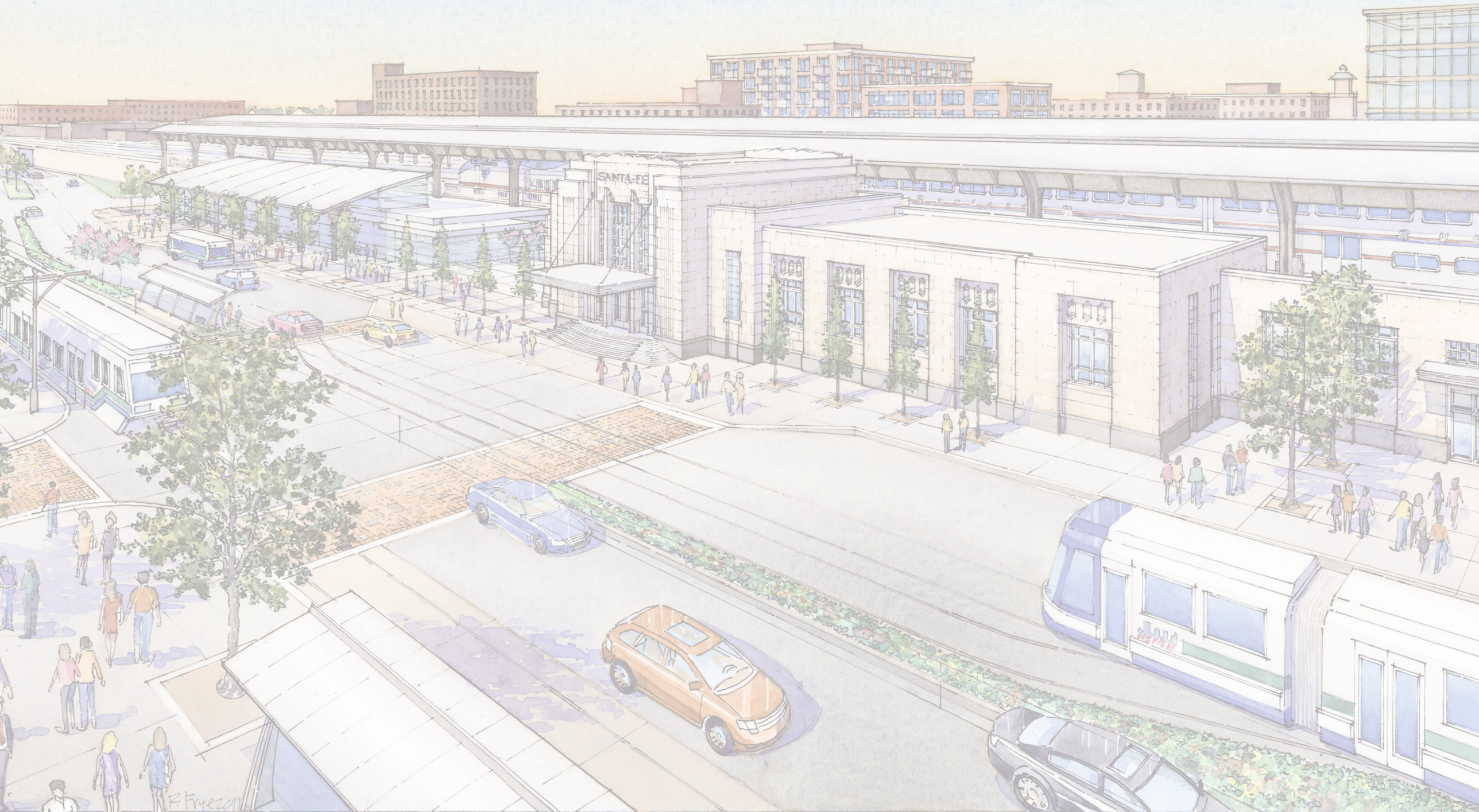
The analysis results indicate the traffic expected to be generated by the proposed downtown intermodal hub is not anticipated to be detrimental to the overall operation of the signalized intersections within the study area. The proposed new signalized pedestrian crossing along E.K. Gaylord is expected to be accommodated without causing undue delays to the traffic when operating in a coordinated fashion. The only facilities of some concern would be the exiting intersection for the proposed new garage, located along Reno Avenue, east of E.K. Gaylord. The northbound movement (traffic exiting garage) could be subjected to very long delays. The delays would be the result of traffic waiting for a gap to enter the traffic stream along Reno Avenue. Therefore, the resultant level-of-service of this intersection is largely due to the amount of through traffic along Reno Avenue. During periods of long delays, some of the exiting traffic could be expected to be diverted to the Oklahoma Avenue exit. Due to this possibility, no further traffic control methods would be recommended initially. The installation of signalized control for this intersection along Reno Avenue would not be recommended due to its close proximity with the intersection of Reno Avenue and Oklahoma Avenue. If, in the future, the delays contained in the analysis results are fully realized, the Reno Avenue exit would be recommended to be channelized to provide right-turn out egress only. All other traffic would then be required to utilize the egress located along Oklahoma Avenue. With less through traffic expected to occur along Oklahoma Avenue, the exiting traffic would be expected to be better served with less delay.

| Intersection | Type of Traffic Control | AM Peak hour | | | | PM Peak Hour | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Critical Approach | | Intersection | | Critical Approach | | Intersection | |
| | | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS | Delay (sec/veh | LOS | Delay (sec/veh) | LOS |
| Existing 2011 Traffic Volumes | | | | | | | | | |
| EK Gaylord and Boulevard | Signalized | 45.9 / NB | D | 33.6 | C | 69.1 / SB | E | 57.0 | E |
| Boulevard and Oklahoma | Signalized | 30.9 / SB | C | 20.9 | C | 40.8 / WB | D | 14.0 | B |
| EK Gaylord and Reno | Signalized | 47.0 / WB | D | 31.7 | C | 54.7 / EB | D | 31.1 | C |
| Reno and Garage Entrance | Unsignalized | 5.2 / WB | A | 3.2 | A | 35.3 / WB | E | 14.7 | B |
| Reno and Garage Exit | Unsignalized | 33.8 / NB | D | 2.2 | A | * / NB | F | * | F |
| Oklahoma and Garage Dr. | Unsignalized | 13.6 / EB | B | 1.3 | A | 16.5 / EB | C | 3.2 | A |
| EK Gaylord and Cox Garage | Signalized | 35.1 / EB | D | 9.7 | A | 43.4 / EB | D | 12.2 | B |
| EK Gaylord and Sheridan | Signalized | * / EB | F | 64.1 | E | * / EB | F | 48.6 | D |

* Trip Rates from "TRIP GENERATION", 8th Ed., Vol. 2, Institute of Transportation Engineers.

**Capacity Analysis Results - Projected 2025 Total Traffic Conditions - Table 8.2**

# 9.0 Intermodal Hub Master Plan




**Intermodal Hub Master Development Plan - Figure 9.1**

# 9.0 Intermodal Hub Master Plan

This section presents a summary of the proposed master plan for the intermodal transportation hub. The plan is based on the conclusions reached in the Tier 1 and Tier 2 evaluations and the comments received during the public involvement process, and includes the following elements:

- Master Development Plan and Functional Components of the Hub
- Phasing Plan for the Hub
- Estimated Project Costs for the Hub

Each of these major components is identified and detailed in the following pages in order to provide both narrative and graphic descriptions of the Plan and how it could be implemented in phases.

**Intermodal Transportation Hub Master Development Plan**

Figure 9.1 (on facing page) graphically illustrates the proposed master development plan for the intermodal hub in downtown Oklahoma City. Based on the analysis conducted by the consulting team and the review and consideration of the Advisory Committee and the public, the proposed hub is recommended to be located on the property currently occupied by the historic Santa Fe depot (Site B in the Tier 2 evaluation rankings). This site, the proposed master development plan, and the surrounding redevelopment opportunities that it promotes, provides the maximum potential benefit to the region when viewed in the context of the hub's role as the "centerpiece" of the regional transit system. The key attributes of master plan include:

- ***The Hub promotes multi-modal mobility***. Not only does the hub address long term transit needs for fixed guideway services within the rail yard, it also accommodates pedestrians, bicyclists, local and intercity bus riders, and future downtown streetcar users. E.K. Gaylord Boulevard becomes a pedestrian and transit-friendly street, accommodating all modes and integrating each of them into the activity and framework of the overall hub site plan.

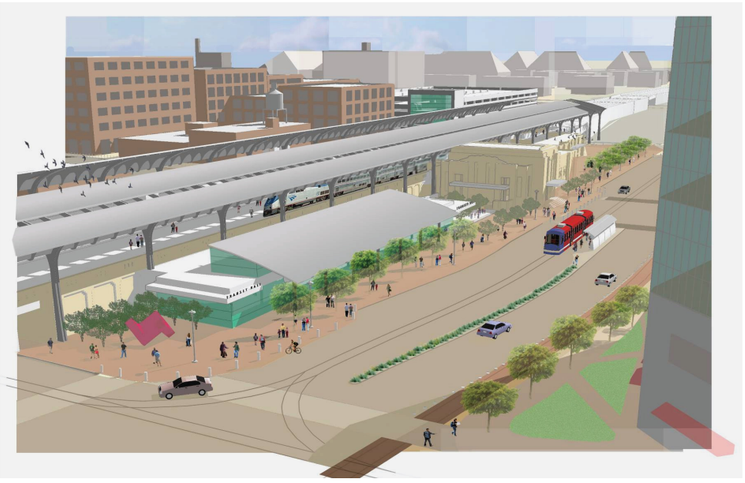
- ***The Hub serves as a catalyst for economic development.*** With almost 2,000 customers boarding and alighting at the hub daily, the redevelopment opportunities for nearby properties will be greatly enhanced as the hub becomes the focal point for regional commuters and travelers (Amtrak, High Speed Rail). Retail storefronts, professional offices, and ancillary downtown uses will feed off the additional consumer traffic, and the Bricktown Canal's western end will become activated with new patrons as the hub's design (i.e. underground tunnel) becomes a new "portal" connecting Bricktown to Downtown.

- ***The Hub enhances the image of pubic transit in the region.*** Santa Fe depot's role as a central element in the hub master plan represents a unique design opportunity for the City. The history of the Santa Fe depot alone conjures up nostalgic connections to the great history of rail in the region, and the design of the hub seeks to respect this context while also providing a new image of modern transportation. The hub's platform canopies metaphorically reach across the railroad to not only connect Bricktown and Downtown, but also to link the region's history with its future, creating an iconic and lasting image for the City and the region.

- ***The Hub creates a new gateway into Downtown and Bricktown for the region***. The proposed underground tunnel or "portal" that is proposed within the master plan provides an important urban design element for the community. This portal creates both a literal and figurative "connection" across and through the elevated railroad guideway that has separated Downtown from Bricktown for years. With arching canopies above and pedestrian connectors below, the hub master plan provides the critical urban design linkages that will activate the surrounding properties and provide economic benefits to the region beyond just those realized through enhanced mobility. The hub will truly become the new gateway to Central Oklahoma.

**Description of the Functional Components of the Hub**

The following pages present a more detailed examination of the functional components of the Hub plan, including the primary hub program areas (the boarding platforms, the Transit Hall, etc.) and the ancillary public spaces that serve to activate and enliven the areas adjacent to and connected to the hub (i.e. the Gaylord Plaza, the Bricktown Plaza, etc). Narrative descriptions, plan images and perspective renderings are offered to provide more detail on these key components of the facility and how they interact to create an exciting "home" for the future regional transit network in Central Oklahoma.

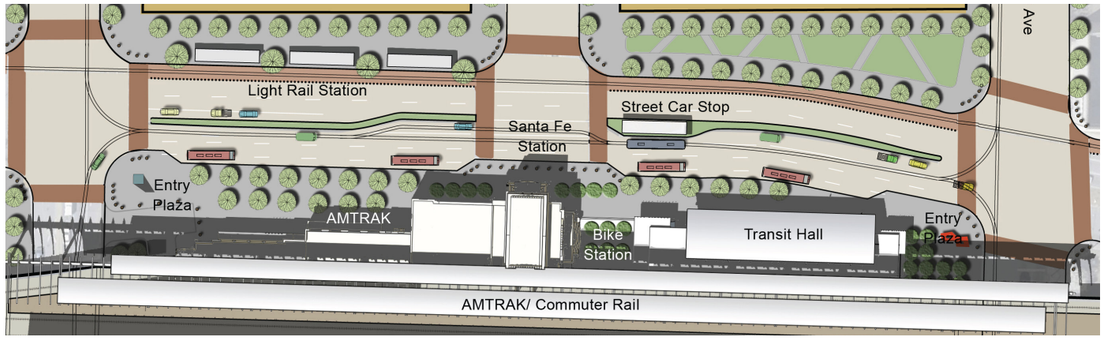


**Intermodal Hub Concept - Figure 9.2**

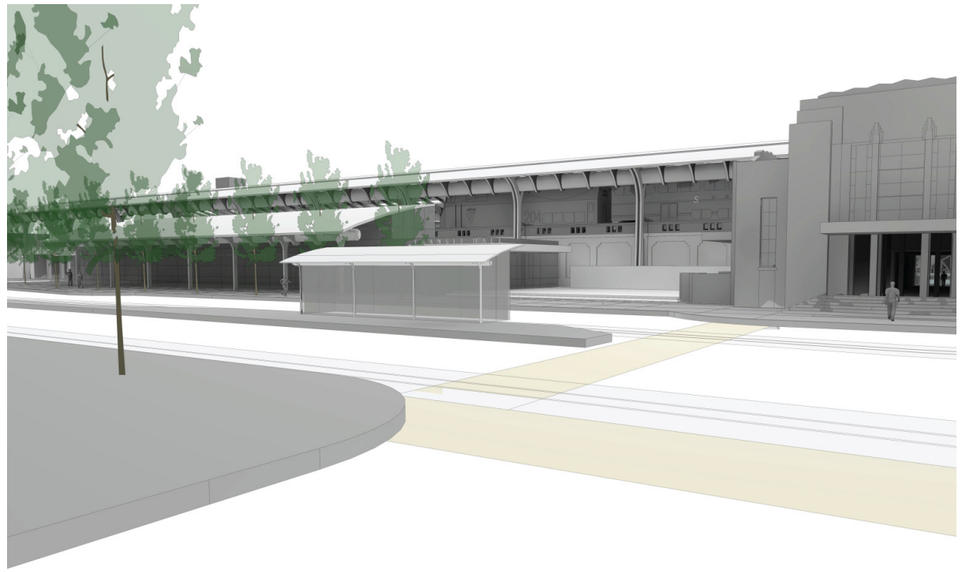
## Gaylord Plaza

The proposed hub master plan provides the opportunity for multiple entrances. A proposed new plaza, running along the east side of EK Gaylord Boulevard, will provide an inviting entrance to the hub; a new pedestrian connection to downtown; and efficient bus and streetcar access. The potential redevelopment of the Cox Convention Center site will allow a new mid-block signalized pedestrian crossing at the entrance to the existing Santa Fe Depot building, thus allowing pedestrians to access Bricktown and Downtown through the proposed Grand Hall of the new hub. This pedestrian crossing will also provide access to a proposed streetcar stop in the median of EK Gaylord and future light rail stop on the west side of the street.

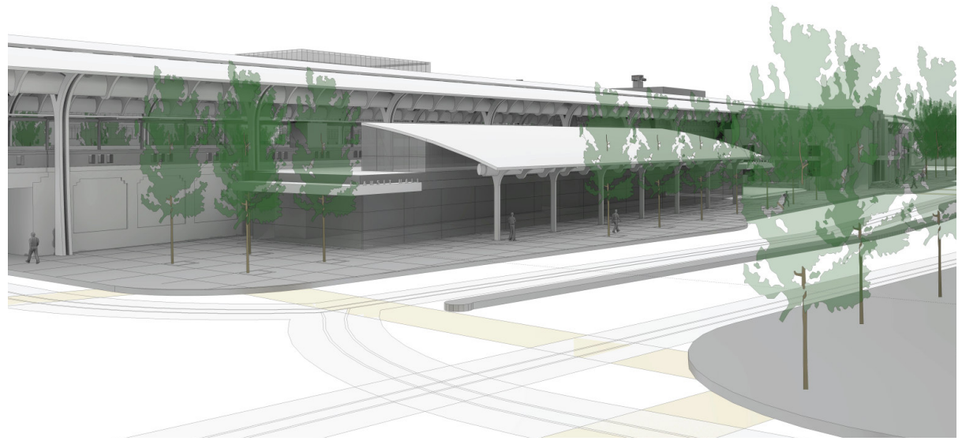
Street trees and quality urban design features within the plaza will provide shade and a more pedestrian oriented environment along this street, and the plaza will provide direct pedestrian access to the Santa Fe building, the Transit Hall, and the future Amtrak terminal. Finally, the plaza will also promote multi-modal mobility by interfacing with the proposed bike lane on EK Gaylord and a new bike station at the hub, which will provide covered bike storage, rental, and possibly a retail and repair shop for downtown bikers.




**Gaylord Plaza Site Plan - Figure 9.3**



**Gaylord Plaza - Figure 9.4**

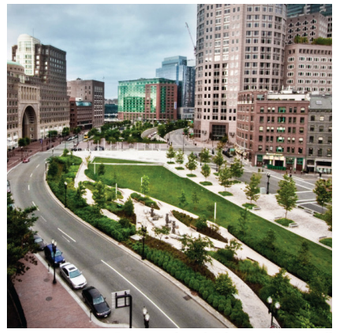


**Gaylord Plaza - Figure 9.5**

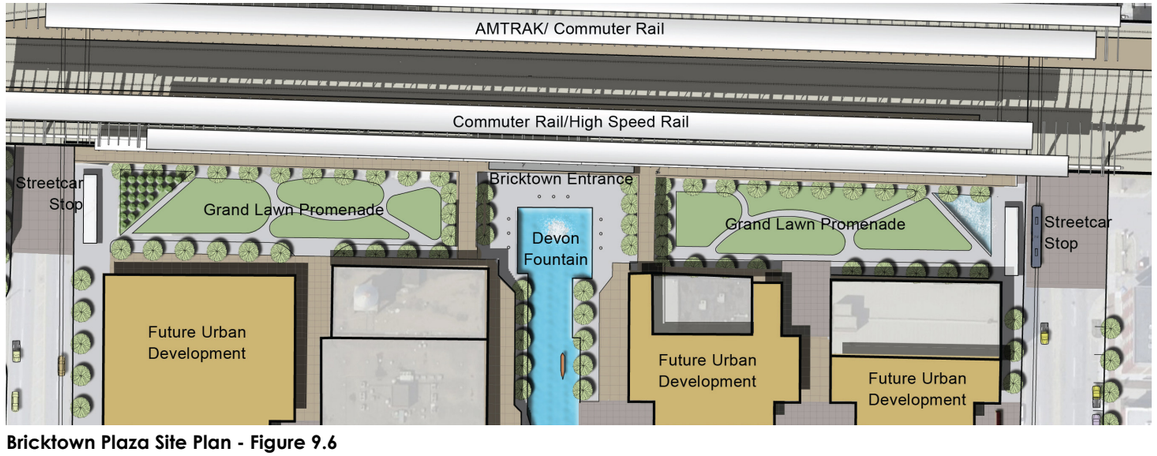
## Bricktown Plaza

The westernmost end of Bricktown terminates at a City-owned public open space that includes a fountain at the end of the canal and a two-level public walkway connecting the canal to Sheridan and Reno Avenues. This urban space, while enhanced with planters, water features and landscaping, is not highly utilized due to the "hidden" nature of the space and the limited activity at the west end of the canal. The master plan proposes to modify this linear urban space to provide a green "lawn" that opens up the area, thus providing a space that is safe and one which can be programmed with activities. This linear green space will provide the linkage between the Bricktown Canal, Sheridan and Reno to the Bricktown entrance of the Intermodal Hub. The green space will terrace down to the canal level, while the upper level walkway will remain to provide the connection to the pedestrian underpass connecting to the hub platforms and Santa Fe building. This upper level walkway is proposed to be extended via two new pedestrian bridges to connect to the upper (street) level terraces at the retail building fronting the canal. This connection to the hub should further activate both the upper and lower levels of the retail building at the west end of the canal. The potential linkage of the canal water taxis to the Intermodal Hub provides the opportunity for another mode of transportation. A passenger could potentially take any surface transportation mode to Oklahoma City and transfer to a water taxi to go to a restaurant or ball game at Bricktown Ball Park.

Existing Conditions @ Plaza

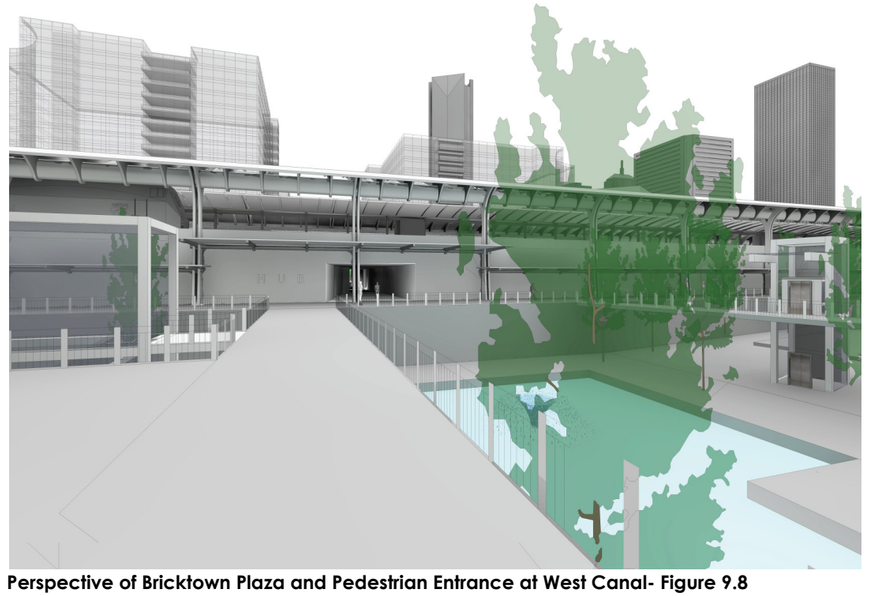


Precedent Plaza "Lawn"




Bricktown Plaza Site Plan - Figure 9.6

Existing Conditions @ Bricktown West Canal - Figure 9.7



Perspective of Bricktown Plaza and Pedestrian Entrance at West Canal- Figure 9.8

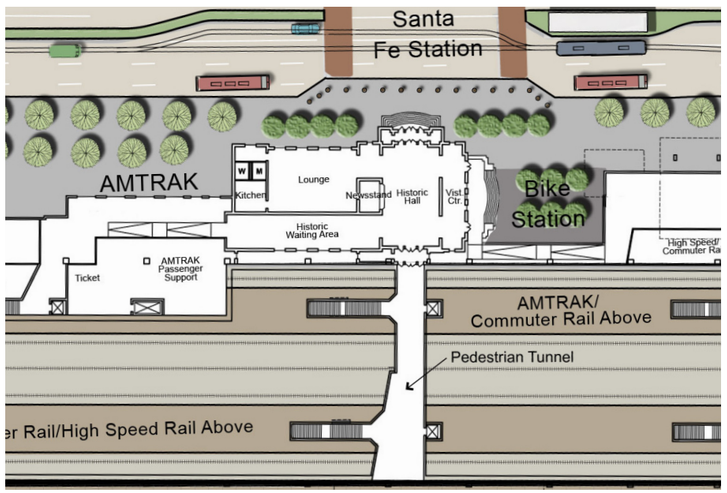
## Santa Fe Depot Building


The historic Santa Fe Depot building initially served as the primary passenger terminal for Oklahoma City, serving the Texas Chief route until 1974 and the Lone Star route until 1979. The depot was privately purchased from the Santa Fe Railway in 1998 and underwent a renovation to make it ADA-compliant using funds provided through the Oklahoma Department of Transportation (ODOT). The renovation also promoted the return of passenger service in 1999. Amtrak currently operates the Heartland Flyer from the Depot with one train per day running between Fort Worth and Oklahoma City. Additional track improvements are planned at the existing track and platform and have been funded by the American Recovery and Reinvestment Act of 2009, but as of September, 2011, they have not yet been constructed.

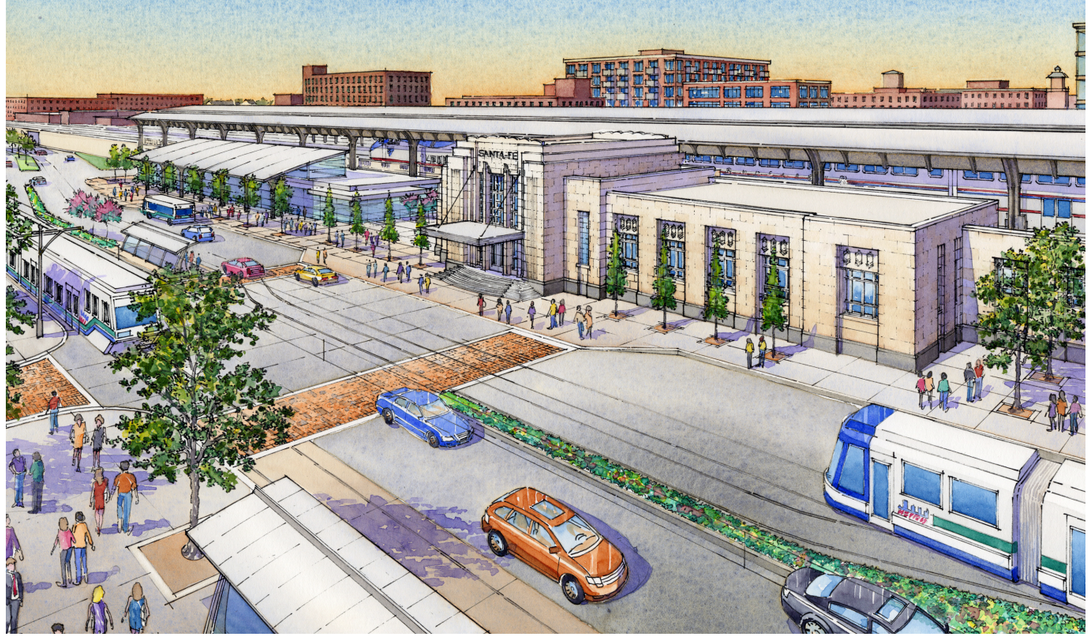
Santa Fe Depot is envisioned to be the public face of the Intermodal Hub, serving as the foyer or Grand Hall and primary public space leading the visitor to Bricktown and Downtown. The existing pedestrian underpass serving the Amtrak platform will be extended through the elevated guideway structure opening to the Bricktown side. This new pedestrian linkage will allow the Intermodal Hub to be the connection linkage between downtown and Bricktown. The existing building will serve as the information center and contain a restaurant or public event space in the space originally set aside as the waiting area. Amtrak will utilize the building's annex for ticketing, baggage and operations offices.

While the Santa Fe Terminal building is not currently on the National Register of Historic Places it is eligible for historic designation at local, state and national levels. As a result, the Secretary of the Interior Standards for Restoration should be followed for building rehabilitation. "Rehabilitation" is defined as "the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values."

Under the Secretary of Interior Standards, new additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment. Early architectural concepts for the hub were developed based on these requirements and reviewed by historic preservation staff with the Oklahoma City Planning Department. Based on staff input, the concepts were modified to detach proposed additions from the original structure in order to preserve the original view corridors of the façade. Further coordination and refinement will be required as the project moves forward.



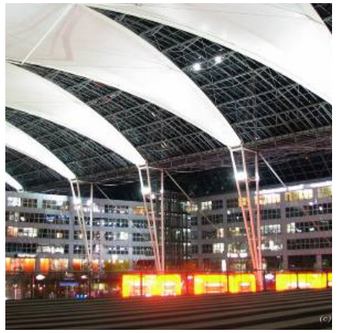

**Santa Fe Building Floor Plan - Figure 9.9**

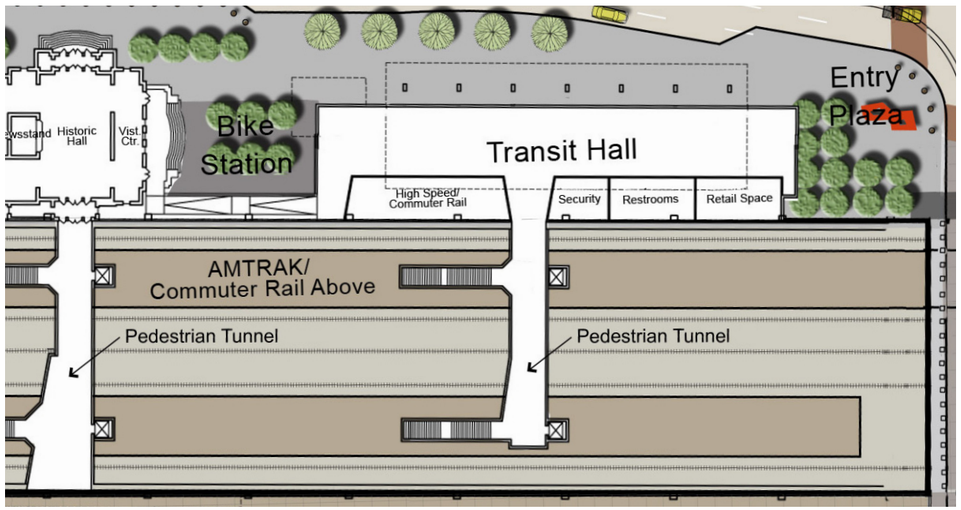



**Santa Fe Building - Figure 9.10**

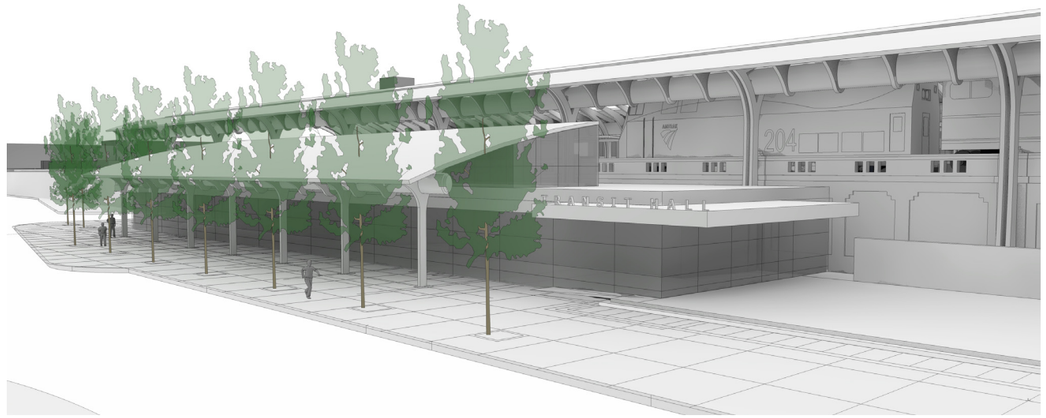
## Transit Hall

The Transit Hall is a proposed new building that will house the commuter rail and high speed rail operations, including ticketing, ticket offices and operations offices. The space will also provide passenger waiting, restrooms, retail and a security office. The building will be connected directly to the commuter rail / high speed rail platform(s) by a new pedestrian underpass (see below - Figure 9.11). The Transit Hall is connected to the Santa Fe building by a covered walkway located adjacent to the Bike Station. While it may be premature to offer architectural styles and concepts for this proposed facility, the master plan recommends that the building be designed to be relatively transparent and "light" in order that the historic nature and features of the Santa Fe depot are not overwhelmed, but also to provide a connective design theme that links our history with our modern future, Downtown with Bricktown, and the future of the region with its urban core. The design of the hall and its accompanying platform canopies and roof structures could also feature another element of "connectiveness" by incorporating broad and sweeping platform canopies that serve to connect the hall to the platforms and also figuratively link Bricktown to Downtown once again.






Transit Hall Floor Plan - Figure 9.11

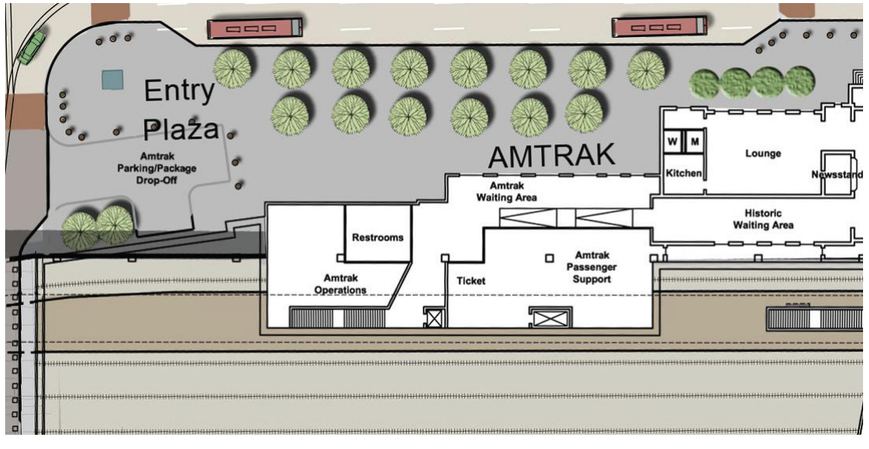


Transit Hall - Figure 9.12

Transit Hall - Figure 9.13

## Amtrak

The master plan envisions that Amtrak will utilize the southern section of the building that was originally designed for passenger and baggage operations. This section of the building extends under the elevated guideway and originally included a baggage elevator connecting to the Amtrak platform above. The existing elevator shaft will be utilized for a new service / baggage elevator. A new passenger elevator and stair will be added providing direct access from Amtrak ticketing to the platform. Approximately 5,400 square feet of space is programmed for the Amtrak operations. The section of the Santa Fe building designated for Amtrak includes 9,800 square feet allowing 4,400 square feet for waiting and circulation.


**Amtrak Floor Plan - Figure 9.14**


**Amtrak - Figure 9.15**

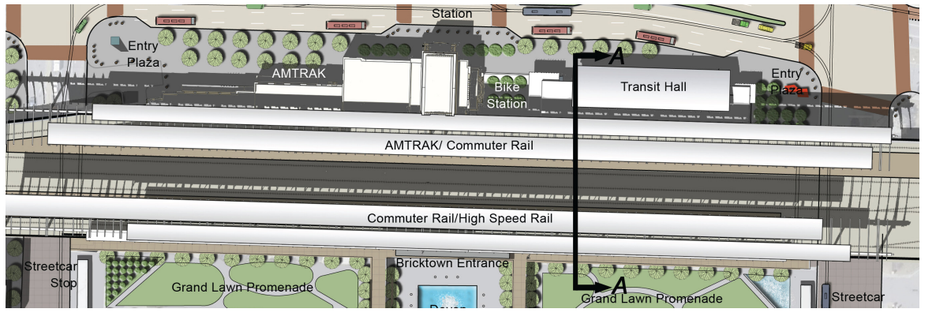
**Amtrak - Figure 9.16**

## Boarding Platforms

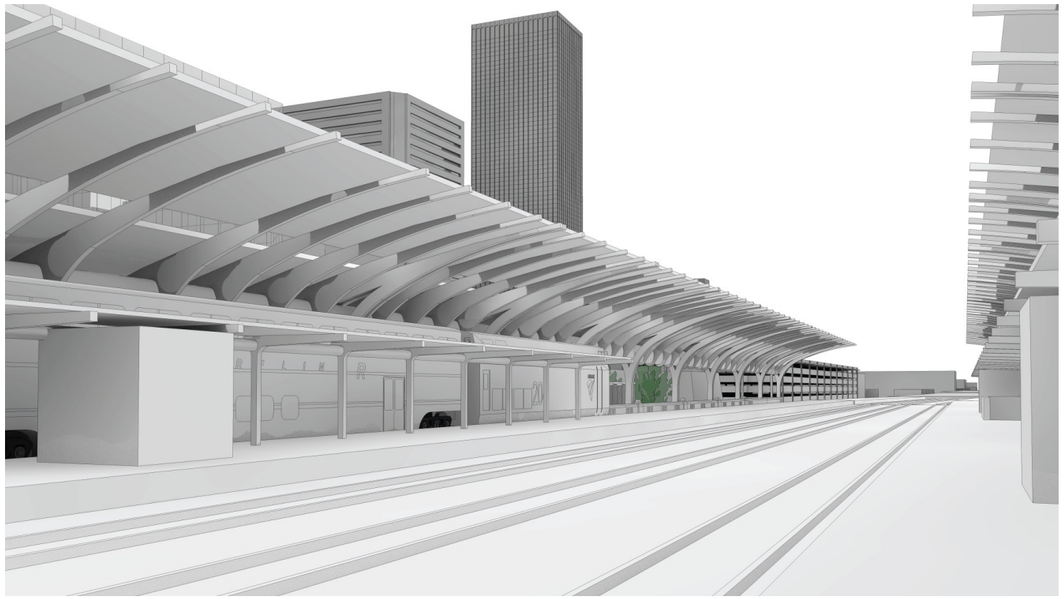

Amtrak currently utilizes the eastern side of their existing platform for boarding and the west side for overnight train storage via a siding track. The boarding function is served by the westernmost of 2 freight mainlines, which limits use of the west mainline while Amtrak is utilizing the platform. Overnight storage requires a backing operation to access the west side of the platform as the siding does not connect south of the platform. ODOT has recently received a grant to extend the partial siding serving the south, which would allow Amtrak to pull into the station from the south and board from the west. This new operation will free up one of the freight main lines currently used for Amtrak.

The Intermodal Hub master plan includes provisions to maintain the existing location of the Amtrak platform and proposes to upgrade the platform for the west side operation. Upgrades include eventual full service operation, with ticketing and baggage services utilizing new elevators and stairs from the Amtrak ticketing and operations area at the Santa Fe building.

The addition of the combined commuter rail and high speed rail platform will represent the first full operation of the facility as a true Intermodal Hub. Based on the Fixed Guideway Operations Analysis described in Section 5, commuter rail and high speed rail will share the same platform. The platform will be 900 feet in length based on high speed rail requirements. Commuter rail will utilize approximately 350 feet of this platform. If commuter rail service precedes high speed rail service, only 350 feet of the platform will be required initially.

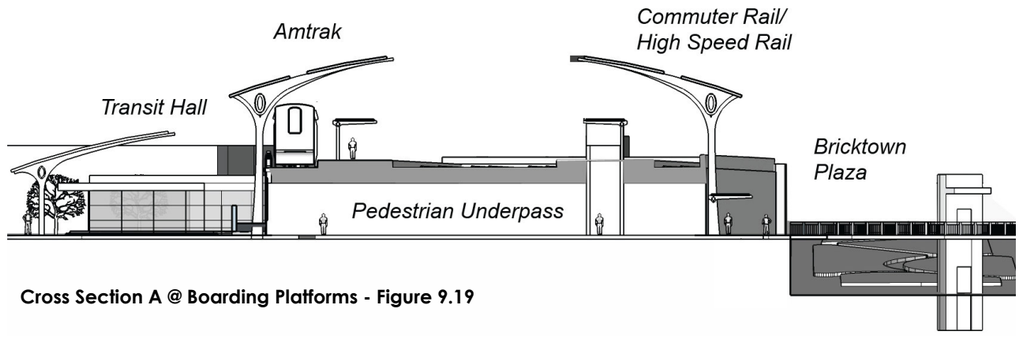



**Boarding Platforms - Figure 9.17**



**Boarding Platforms Perspective- Figure 9.18**

Figures 9.18 and 9.19 illustrate the general nature and design of the platforms proposed at the hub. Each platform is planned to be 26 feet in width, allowing for a 10-foot vertical circulation zone (elevator/stair/escalator) with 6 feet clear and a 2-foot wide warning strip on each side. The proposed 5 track 2 platform configuration proposed in the master plan can be accommodated within the 120 foot elevated guideway width. Based on maintaining the existing 20 foot width of the Amtrak platform, an additional 6 feet of tolerance is provided within the guideway width. This area could be allocated to widening the Amtrak platform if desired.

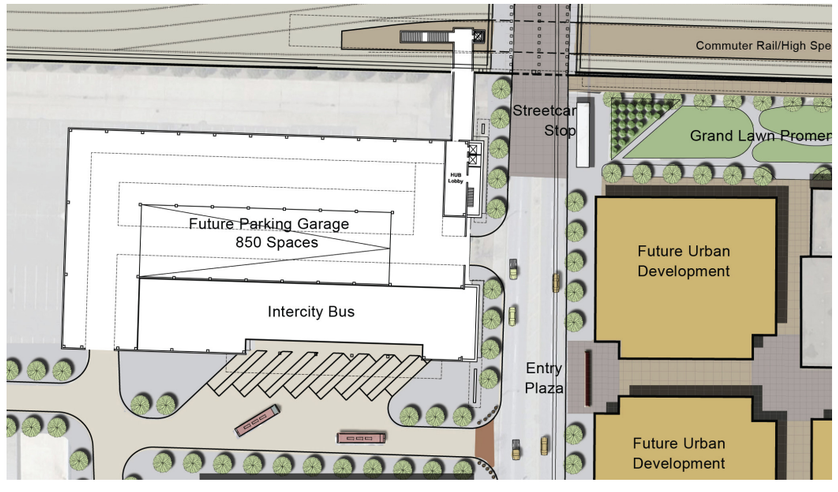



**Cross Section A @ Boarding Platforms - Figure 9.19**

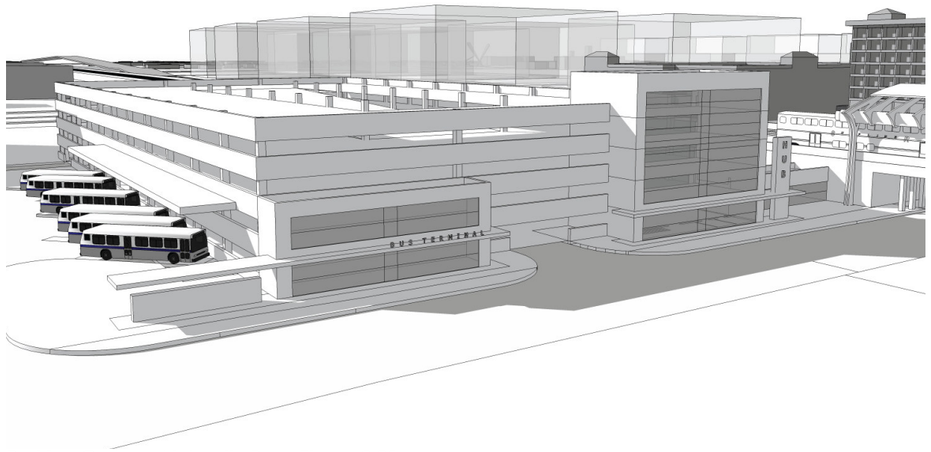
## Parking Garage / Intercity Bus


During the initial phases of the project, parking for commuter rail services and existing Amtrak services can be accommodated using existing surface parking in the site area. As Amtrak service expands and high speed rail is introduced, higher parking demand will require approximately 600 additional spaces. This increased parking requirement will most likely require the transition to structured parking. Structured parking is recommended as it allows higher density development in the area, accommodates other uses at ground level, and provides potential additional capacity for shared parking for entertainment, retail and downtown sports venues. As density in Bricktown increases, a shared parking structure will also allow redevelopment of existing surface lots. The master plan illustrates that this parking facility use is proposed on a redeveloped parcel located just south of Reno Avenue, just east of the railroad's elevated guideway.

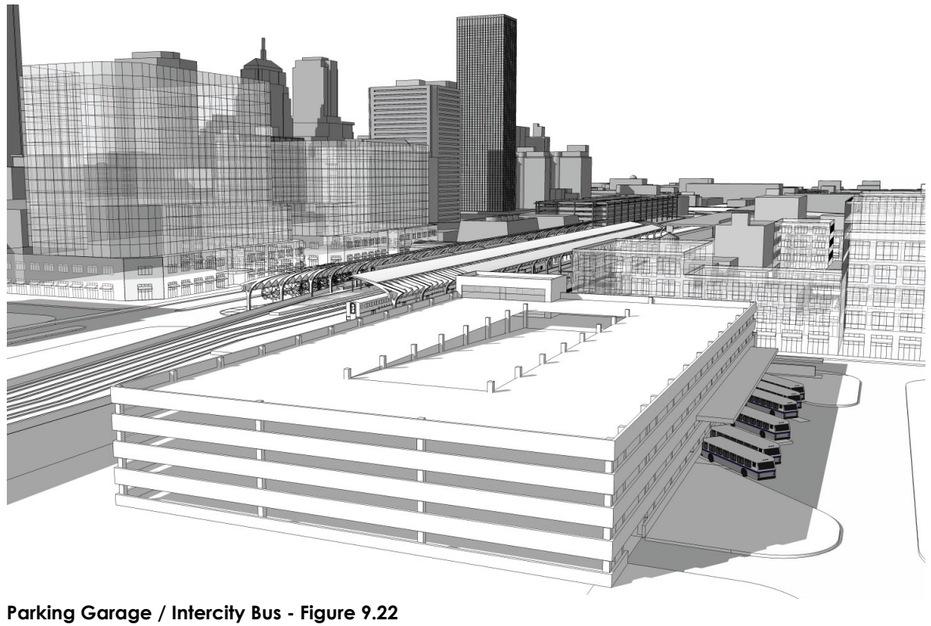
Intercity Bus operations are proposed to be located in the base of the parking structure. Sufficient space has been allocated at the easternmost bay of the garage to accommodate intercity bus ticketing, operations and passenger waiting. The proposed parking structure location south of Reno allows for bus access from the new "boulevard" to the south and Oklahoma Avenue without disrupting traffic in the Bricktown core area. Eight or more bus bays can be accommodated at this location with sufficient space for bus berthing, boarding and circulation.




**Parking Garage / Intercity Bus Site Plan - Figure 9.20**




**Parking Garage / Intercity Bus - Figure 9.21**



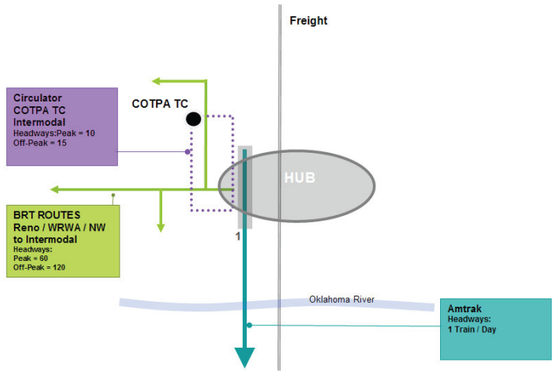
**Parking Garage / Intercity Bus - Figure 9.22**

## Project Phasing

The development and implementation of the intermodal hub will progress over time as planning and implementation of individual transportation modes are advanced and ridership increases due to synergies of multiple modes and higher densities in the hub area. While timelines for implementation of the transit modes are still in development, a sequenced phasing plan has been developed to lay out an orderly thought process of how the Intermodal Hub will develop. A key element to development of the phasing plan is an understanding of the sequencing of fixed guideway operations. A brief description of each mode based on operations follows.

### Phase 1: Property Acquisition / Santa Fe Modifications

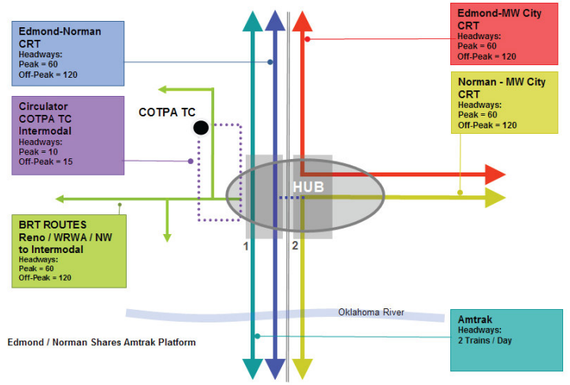
Phase 1 primarily entails securing the property required for the future construction and operation of the full hub buildout. The existing privately owned Santa Fe building and site between Sheridan and Reno would be required. This site could be purchased or secured under a long term lease with the property owner (see Section 10 for additional information). Minor upgrades to the Santa Fe building at this time would provide a civic presence that the future development of the intermodal hub will build on. While this phase of development will primarily serve Amtrak operationally, the initiation of an Edmond to Norman commuter rail operation could be accommodated during this phase. The commuter rail operation could utilize the east side of the Amtrak platform as shown in the Fixed Guideway Operations Analysis, without significant changes to the current facility. Ticketing and passenger information could be initially accommodated in the Santa Fe building. Phase 1 could also include service to the hub by the Downtown Circulator and Bus Rapid Transit through curbside stops.




**Project Phase 1 - Figure 9.23**

### Phase 2a: Initial Commuter Rail Operations

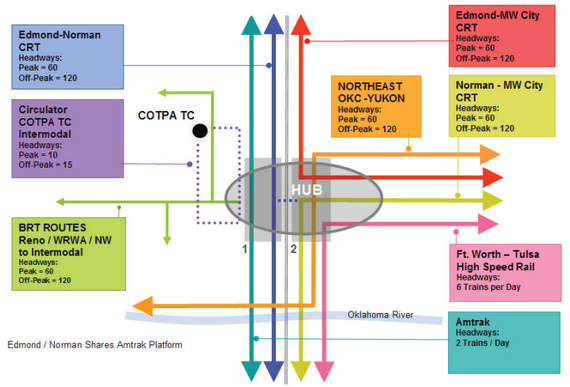
Phase 2A of the hub operation would accommodate expanded Amtrak service to Newton/ Kansas City and expanded or initial commuter rail service with the addition of a second platform. The Edmond / Norman commuter rail route would operate from the Amtrak platform with the Norman / Midwest City and Edmond / Midwest City lines operating from the second platform, which allows track connections to the east. The addition of the second platform would be accompanied by the expansion of the pedestrian underpass to the Bricktown side of the elevated guideway. The second platform would also accommodate the addition of high speed rail if the project is developed during this time frame. During this phase, the pedestrian underpass would be extended to the new platform and the new Bricktown entrance introduced. The Amtrak ticketing and operations space would be added in this phase to accommodate an expanded Amtrak operation. The addition of the Transit Hall could be partially or fully completed dependant on the timing for introduction of high speed rail.




**Project Phase 2a - Figure 9.24**

### Phase 2b: High Speed Rail / Expanded Commuter Rail Service

Phase 2B would expand the initial commuter rail service to include a new line from the Adventure District in northeast Oklahoma City to Yukon. This additional line would be served by the 2nd platform as discussed in the Fixed Guideway Operations Analysis. High speed rail service would most likely be introduced at this time, also operating from the 2nd platform. This phase would include the full buildout of the Transit Hall including new pedestrian access to the Amtrak and commuter rail / high speed rail platform from the Transit Hall waiting area.

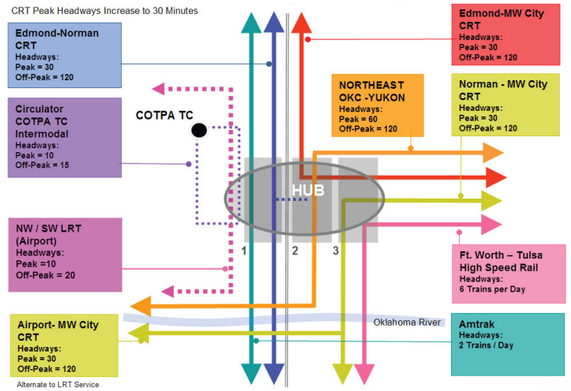



**Project Phase 2b - Figure 9.25**

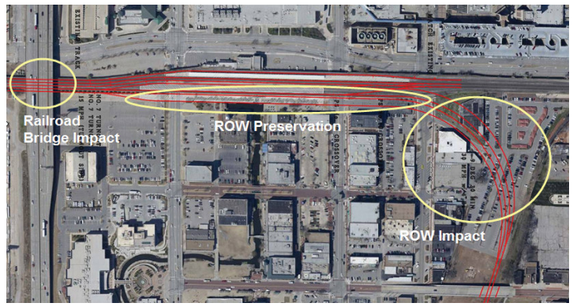
**Phase 3: Expanded Passenger Service**

A key attribute to the Santa Fe site is its ability to accommodate expansion of the guideway to accommodate a third platform should a higher level of service be required in the future. Operationally the expansion to a third platform would be required to increase headways from 60 minutes during peak periods to 30 minutes to accommodate higher ridership. It is envisioned that the addition of light rail service from the northwest to the southeast and out to Will Rogers World Airport could be in operation at this time. An additional commuter rail line could also be added, splitting off the Norman / Midwest City line to serve the Will Rogers Airport area. A key advantage in this master plan is that the City owns the property needed to construct the third platform, east of the guideway between Sheridan and Reno. This property is currently used as an urban green space as discussed previously. The 120 foot' width of the parcel would allow for the needed 60' for the third platform, while still allowing the residual space to remain as open space and serve as a linkage to the Bricktown entrance of the intermodal hub.

It is envisioned that the existing east wall of the guideway would remain, and a retained fill or open elevated structure would be added to accommodate the new platform above. The pedestrian underpass would be extended at this time and include a new Bricktown entrance.

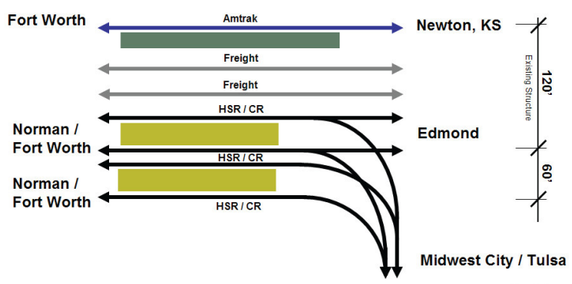



**Project Phase 3 - Figure 9.26**




**Impacts of Third Platform - Figure 9.27**

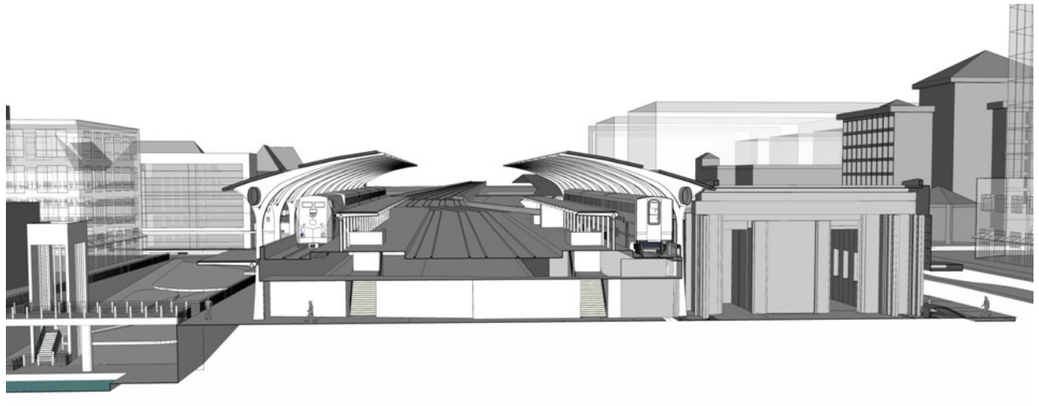
N →



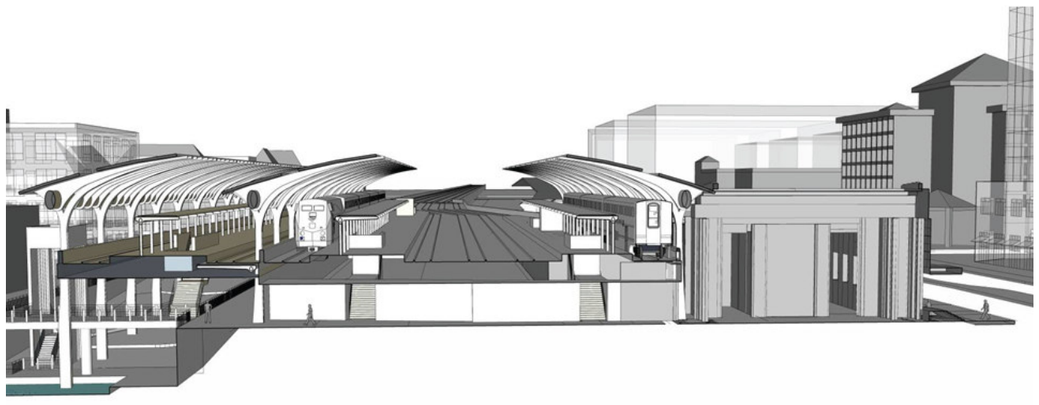

**Third Platform Schematic - Figure 9.28**

N →

to the hub. This future expansion will impact the railroad bridge and potentially the design of the new "boulevard." The design should take into account the future widening of the east side of the bridge for the elevated guideway, since the road may need to be lowered slightly to provide adequate vertical clearance at the widened bridge.

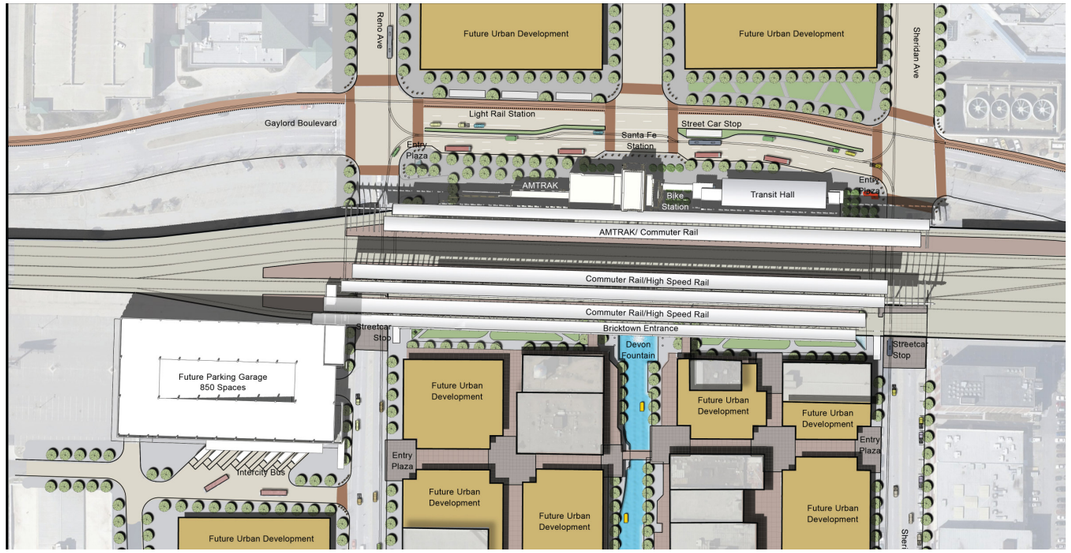


**Cross Section of Two Platform- 5 Track- Figure 9.29**



**Cross Section of Three Platform- 7 Track- Figure 9.30**

Finally, Figure 9.31(below) provides a graphic illustration of the hub's platforms and how they relate to the existing guideway (ROW) and the future bridge impacts over the proposed "boulevard" on the south side of downtown. Close coordination with ODOT (boulevard design) and the City of Oklahoma City (on allowing developments within the urban plaza area east of the guideway) will be needed to ensure the long term capacity for future hub expansions.




**3 Platform / 7 Track Layout (Enlarged) - Figure 9.31**

## Estimate of Probable Facility Costs

An order of magnitude facility cost estimate was developed for the project based on the phasing scenario described in the previous section. The estimate is built on soft costs (real estate acquisition, environmental assessment, design and construction management fees) and hard costs developed by line item unit costs for individual program components. The estimate was developed in 2011 dollars and does not include escalation, financing or agency costs. The estimate assumes that trackwork modifications will be constructed by the operating railroad or operating transit agency entity. Therefore, costs are not included for trackwork. The construction of platforms and the pedestrian tunnel was assumed to be constructed at the same time as trackwork modifications, therefore no costs are included for temporary track relocations related to the construction of these elements.

A summary of the estimated project costs by phase is included in Table 9.1, and the detailed cost estimate is included in Appendix 7. The cost summary includes two hub development scenarios, one with and one without high speed rail. High speed rail costs for platforms, operations space and parking have been removed in Table 9.2 for the purpose of illustrating stand alone costs for the hub components should high speed rail not initially be a service provider. Ideally, costs for common facilities, including the transit hall, platforms and pedestrian access, will be shared by high speed rail and commuter rail.

**Total Project Costs**

| | |
|---|---|
| **Phase 1** | |
| Hard Costs | $4,832,850 |
| Soft Costs | $4,254,041 |
| Phase 1 Total | $9,086,891 |
| | |
| **Phase 2** | |
| Hard Costs | $65,334,411 |
| Soft Costs | $7,302,390 |
| Phase 2 Total | $72,636,802 |
| | |
| **Phase 3** | |
| Hard Costs | $37,273,259 |
| Soft Costs | $4,066,174 |
| Phase 3 Total | $41,339,433 |
| | |
| **Total Project Costs** | **$123,063,126** |

**Costs Summary - Table 9.1**

**Total Project Costs Excluding High Speed Rail**

| | |
|---|---|
| **Phase 1** | |
| Hard Costs | $4,832,850 |
| Soft Costs | $4,254,041 |
| Phase 1 Total | $9,086,891 |
| | |
| **Phase 2** | |
| Hard Costs | $49,306,479 |
| Soft Costs | $5,647,766 |
| Phase 2 Total | $54,954,245 |
| | |
| **Phase 3** | |
| Hard Costs | $35,780,216 |
| Soft Costs | $3,903,296 |
| Phase 3 Total | $39,683,512 |
| | |
| **Total Project Costs** | **$103,724,648** |

**Costs Summary Exclusive of HSR - Table 9.2**

# 10.0 Funding Alternatives

Association of Central
Oklahoma Governments

# 10.0 Funding Alternatives

The financing and funding options and alternative implementation strategies are based on the capital costs and proposed phasing of the project as outlined in Section 9.0. The strategy outlines sources of capital funding and addresses likely operating costs and revenues. Due to the preliminary nature of this study, the strategies presented herein provide an initial outline framework for a financing and funding approach rather than a detailed model of how to fund each program element.

**Project Phasing's Impact on Funding Options**
Based upon the study's phasing plan, Phase 1 will be relatively limited in scope, primarily consisting of acquisition of the Santa Fe terminal and related property, and minor property renovations. It will also include acquisition of the potential site for initial surface parking and subsequent, structured parking as needed. The primary emphasis will be on preservation, renovation and restoration of the Santa Fe Depot for Amtrak and limited commuter rail service. The initial phase of the transit hub would also likely link to the downtown streetcar. This phase would establish project site control and provide a highly visible enhancement of the Santa Fe rail facility. Opportunities may exist for a public-private partnership related to perspective site acquisition and control and the potential for creating a private income generating use of the Santa Fe Depot which could enable the receipt of historic tax credits.

As currently envisioned, Phase 2 of the proposed master plan (including Phases 2A and 2B) consists of major transportation enhancements to service Amtrak, commuter rail, high-speed rail, intercity bus, major pedestrian linkages connecting the central business district and the Bricktown area, and an initial phase of structured parking. It is possible to stage the capital improvements to the transportation hub depending upon the timing of commuter rail expansion, high-speed rail, intercity bus facility needs, and the timing and desirability of the linkages between the CBD/transit hub/Bricktown. Similarly, parking requirements would need to be reevaluated to determine potential phasing of structured parking. Major capital investments, streetscape and pedestrian linkages, enhanced transit services and shared parking opportunities could all help attract related development on adjacent parcels. This phase would also likely coincide with the potential redevelopment of the current Cox Convention Center site.

Phase 3 assumes the significant expansion of transit services and guideway expansion and bridge widening at the hub site. Similarly, additional common passenger boarding areas would be provided for both commuter and high-speed rail, and enhancements of the Bricktown plaza/canopy would also be undertaken. This phase includes significant construction activities and would have implications for the hub operations, particularly the passenger boarding areas and the rail yard. The further enhancement of transit services and the major guideway expansion could open significant adjacent areas for transit related development.

**Uses of Capital Funds**
Phase 1 consists primarily of real estate acquisition and related relocation, environmental clearance, and legal and administrative costs. Preliminary estimates based upon current assessed value total approximately $3.6 million, plus almost $600,000 in design fee/permits. Phase 1 hard costs consist primarily of preservation and renovation of the Santa Fe building and resurfacing 130 existing parking spaces at a cost of $3.4 million, plus a 25% design and 10% construction contingency for total hard cost of $4.8 million and an overall total cost of $9.1 million. Given the current private ownership of the station and parking site, and the potential opportunity for historic tax credits on a private income generating property, these capital costs could potentially be ameliorated through a public-private partnership. While still allowing sufficient site control for the transit hub and retaining necessary development rights for transportation related improvements, capital costs could be significantly reduced and an order of magnitude of $500,000 in historic tax credits created.

An evaluation needs to be conducted of the relative costs, ease of implementation, and subsequent development issues related to acquisition of real property and the Santa Fe Depot building which are currently in private ownership. Estimated Phase 1 costs ($9.1 million) are within the realm of capacity from the local MAPS 3 sales-tax initiatives. However, acquisition costs are always subject to potential significant variation. Fee simple ownership would assure site control and potentially could be used as a future match for federal funds. Alternatively, a cooperative public-private partnership may do much to increase interest and support for future joint development and value capture and may be easier to implement than site and building acquisition. A public-private partnership could potentially provide reduced front end costs and help facilitate future public-private development. A key element will be to provide long-term public sector site control to allow development of the transportation facilities and meet federal funding criteria. This could be implemented through development agreements, easements, provision of air and ground rights requirements, etc.

As noted previously, Phases 2 and 3 have the capability of being constructed in stages. The total cost of Phase 2 is approximately $72.6 million including $7.3 million in design fees and $65.3 million in construction costs. The various construction cost elements of Phases 2A and 2B will also likely be staged based on transit demand or availability of funding. The major components and associated costs (excluding design and construction contingencies) of Phases 2 and 3 are discussed in the following paragraphs.

The largest construction cost component for Phase 2A and 2B is the common passenger boarding area including underpass, access, and canopy, which total approximately $19.1 million. This particular component may be difficult to stage although it is a function of the rail utilization. The next largest cost element is the parking structure which has two components, $1.6 million for 243 commuter rail/Amtrak spaces and $12 million for 586 high speed rail parking spaces. The parking structure clearly would be phased in relationship to provision of services and likely cost allocated to the services generating the parking demand, primarily high speed rail.

The transit hub can provide the linkage between the CBD and Bricktown eliminating the barrier created by the rail line. This phase includes $3.6 million for the Bricktown Plaza/ canopy and an additional $0.9 million for the Gaylord Plaza streetscape. These elements consist of enhanced pedestrian connections and high quality plaza, canal enhancements, and streetscape.

The final component of this phase is the intercity bus terminal at a cost of $1.6 million. This could be staged related to intercity bus facility needs.

Phase 3 consists primarily of the additional cost for the guideway and common passenger area access and canopy improvements. This phase has total cost of $41.3 million including $4.1 million for design fees and approximately $10 million in design and construction contingencies. The various construction elements and their costs, excluding design fees and design and construction contingencies, are noted below. The construction components include the guideway expansion which has a total cost of $13.6 million. The related common passenger boarding area including canopy support and passenger underpass has a cost of $9.5 million. The passenger boarding area costs have been allocated into commuter rail and high-speed rail costs of $1.1 million each. This phase also includes enhancements to the Bricktown Plaza canopy at a cost of $1.8 million.

**Sources of Capital Funds**

A preliminary approach to funding the Intermodal Hub would likely identify a broad bundle of potential funding sources which have a logical relationship to the capital costs. Phase 1 has relatively low funding needs of $9.1 million, and potential funding of Phase I costs could include the following options.

**Public-Private Partnership Funding Options - Phase I**

As noted previously, it may be possible to reduce these costs significantly through the creation of a public-private partnership that would retain necessary transit hub site control but potentially have a major impact on the $4.2 million in soft costs related to site acquisition and control. Similarly, a public-private partnership could create cost sharing opportunities related to the $4.8 million of terminal facility construction costs. In addition, opportunities of generating historic tax credit funds may be created.

**Federal Funding Options - Phase I**

This phase also may be able to take advantage of the federal discretionary transit funding opportunities. Programs like the U. S. Department of Housing and Urban Development and the U.S. Department of Transportation's joint initiative for Sustainable Communities and future rounds of Transportation Investment Generating Economic Recovery (TIGER) funding provide short term targets for the respective client groups (ACOG, ODOT, COTPA and the City of Oklahoma City). Together these programs could have upwards of $625 million available for projects that promote and build long term, multi-modal facilities that have lasting benefits for their communities. Although the timing for a potential TIGER application this year may be aggressive and the future funding of these programs cannot be assured, the respective client entities should undertake the necessary predevelopment planning and environmental clearance activities in order to position themselves to quickly and effectively respond to funding opportunities as they may arise. The creation of a public/private partnership could address the site control issue, enhancing the ability to timely complete the project and leverage significant private funds.

**Public Parking Revenues as Funding Option - Phase I**

Since a large portion of Phase 1 costs relate to site acquisition for future parking facilities, it may be possible to fund a portion of the costs through the city's parking program. This could involve cross collateralization of site acquisition costs and parking facility development to other city parking facilities. Potential general fund revenues and transit formula funds (Federal Transit Administration Section 5309) could also be funding sources. The transit hub capital costs also could be integrated into the downtown circulator and streetcar funding program as a major parking resource and transfer facility.

**Local and Regional Funding Options - Phase I**

As was noted during the planning process, the MAPS 3 referendum included a reference to a $10 million budget for a future transit hub or other commuter rail connections and improvements. This line item and amount in the overall MAPS budget was the subject of considerable discussion in the planning for the hub, but the final disposition of these funds resides solely with the Oklahoma City Mayor and Council. While it is conceivable that this funding could be dedicated to the hub facility, it appears to be imprudent to assume that the entirety of this funding is available.

Another local and regional funding source for the hub includes some type of special district taxes devoted to transit improvements within the region. Capital funds for the transit hub

could be part of any local and or regional public transportation sources. In Oklahoma, this generally includes allocation of general revenues to support transit activities. This spreads the costs across the community and includes both users and non-users. Funds are subject to annual appropriation/budgeting processes and are often in competition with other funding sources. Under Oklahoma enabling legislation, it is possible to create a regional transit authority, funded by dedicated general sales taxes. This process is currently being explored to help finance regional transportation improvements. Various governance models have been explored through the Regional Transit Dialogue process, and it seems possible that some type of "transit district" taxing and funding model may be adopted. This model would create a broad-based tax, which generally produces significant revenues for a relatively low marginal tax rate, but as with any sales tax, revenues can vary dramatically with changes in the national and local economies. With any proposed local funding model, voter approval of the proposal would be required.

A variety of other dedicated local funding sources could also be utilized to fund the transit hub and other transit investments. Potential funding sources, which probably would require an enabling legislation under Oklahoma law, could include: motor vehicle taxes, property taxes, vehicle fees, employee/payroll taxes, car rental fees, vehicle lease fees, parking tags, real fee transfer taxes, mortgage recording taxes, corporate franchise taxes, room/occupancy taxes, business license fees, utility taxes, motor fuel taxes and various "sin" taxes such as cigarettes, alcohol, lottery etc. While this list is comprehensive and all encompassing, it serves to acknowledge that a successful transit funding strategy may require multiple sources and all available and politically-viable options should not be overlooked.

**Potential Funding Strategies for Phases 2A and 2B**

Phase 2 relates to major transportation and transit improvements required for the establishment of a regional rail transit system. The capital costs for the hub could be integrated into the overall capital funding of commuter and/or high speed rail system phased in over time, with the hub costs being funded by the overall system funding and dedicated primarily to the common passenger boarding area and hub terminal costs.This funding option represents a logical opportunity to establish a clear relationship between the hub and the overall region, since the hub would be a key element of any regional transit investments. The proportion of funds allocated to the transit hub would likely be a small proportion of any regional transit funding program. Various approaches to local funding, including dedicated regional funding sources, were previously described in the Phase I funding options.

Phase 2 parking costs are likewise potentially part of the capital costs of the larger transportation investment. Parking also creates a potential revenue stream that could be used as collateral for the hub construction costs. While the hub generates significant parking demands at certain times of the week or day, these parking demands are generally "off peak" for the retail and entertainment uses that dominate the area surrounding the hub. Consequently, the new parking spaces created with the hub development could be "shared," creating a significant revenue stream capable of amortizing a portion of the parking costs. As a major parking facility with opportunities for shared parking utilization, the parking structure also could be funded as part of the city's parking program. This could include cross collateralization of funds generated from existing parking facilities operating at high capacity.

The linkage between the CBD and Bricktown provided by the plaza and streetscape is an element that could conceivably be supported by indirect tax increment funding from the CBD tax increment district, subject to review of availability and suitability of funding. The pedestrian linkage would do much to enhance values within both the downtown and Bricktown area. The linkage also could significantly enhance the utilization of parking between the CBD and Bricktown. In particular, Bricktown has a significant daytime weekday parking surplus which could be better utilized with the enhanced linkage to the downtown. The enhanced linkage could also serve to further reinforce recreation and entertainment relationships between the CBD and Bricktown.

The linkage to the Chesapeake Arena and Bricktown Ballpark would be a further benefit, which could create a justification for city capital funds and or CBD tax increment financing contributions. Pedestrian enhancements to the intermodal hub are eligible capital costs related to federal funding for transit hubs. There are numerous federal programs that potentially could be utilized to help fund Phases 2A and 2B of the hub master plan as part of a larger transportation project. This includes but is not necessarily limited to: Section 5309 bus facilities, Small Starts, New Starts, SGR Bus Initiatives, Livability Expansion Initiatives (alternatives analysis, bus and rail facilities), Sustainability Initiatives (clean fuels bus programs, TIGER III), Livable Communities Program (FTA, HUD, EPA), etc. In this phase, there is also an opportunity for the initial generation of transit related development on adjacent/nearby parcels which would create potential direct tax increment financing revenue opportunities within the CBD tax district.

Finally, the intercity bus terminal could be financed through Section 5309 funds and partially through revenues generated from private sector bus operators making a capital contribution for their facility utilization, as well as potential revenues from retail and other on-site facilities.

**Potential Funding Strategies for Phase 3**

Phase 3 consists primarily of additional guideway costs for expanded transit service and would likely be related to major capital investments and funding of the improved commuter and high-speed rail service. The canopy costs would likely be separately allocated to appropriate commuter and high-speed rail need.

Phase 3 implies a major regional transportation investment, which likely would require the identification of a significant local funding source. Assuming a local funding source, the phase 3 improvements to the hub would merely be a portion of any locally funded regional transit investment. Again, as previously identified a variety of potential dedicated local funding sources could be utilized, with primary funding sources, based upon both on national models and preliminary local initiatives being oriented to a regional sales tax.

Phase 3 also includes additional enhancements to the Bricktown Plaza linkage. This could be a candidate for additional indirect tax return financing revenue. Assuming the project and project area further matures and develops by taking advantage of the high level transit service provided in Phase 3, there would be significant opportunities for transit related developments in the adjacent areas. This could generate opportunities for additional direct CBD district tax increment financing to help pay for area pedestrian amenities, parking and enhanced transit, all of which contribute to value.

**Operating Costs and Revenues**

The financing and funding plan also needs to provide for the operating expenses related to the facility. This would consist of labor to maintain and support the transit hub and operating expenses related to utilities, security maintenance, supplies, reserves for replacements etc. The operating costs would be a function of the space maintained and the allocation of maintenance and security responsibilities between the private sector, the city, and the transit hub operator. Potential revenue sources would likely include transit operator lease income, retail and service operator lease income, and miscellaneous revenues from advertising, sponsorships, franchise and concession fees, etc.

The transit hub would likely be a key component of any regional transit operation and in addition to funds generated by the transit hub itself would be supported by funds allocated to the operation of the transit system. This would likely consist of potential fare box revenue, as well as any local funding appropriations and or dedicated funding source as described under sources of capital funding. Once again the most likely source of transit operating revenues would be a dedicated regional sales tax, which would be part of required voter approval for any regional transportation organization.

There could be FTA reimbursement for bus operating expenses and FRA reimbursement related to rail transit operating expenses, although future funding opportunities may be in flux. Current federal budget constraints and potential long-term funding opportunities may be limited. Various proposals for extension of the surface transportation act over a period of up to six years currently generally range from maintaining funding at current levels to reducing funding by one third. There appears to be a growing emphasis on privatization, innovative funding/financing (alternative delivery and operating systems, infrastructure banks, TIFIA, etc.) and value capture. Operating and capital funding (see the following paragraph) may be strong candidates for these funding and financing approaches. It is likely that the transit operator would pay a portion of the operating costs as well as a potential capital cost recovery factor related to the local share of any federal grants.
Depending on the nature of the design, joint development income from cost sharing, value capture, air rights leases, ground leases, allocation of parking revenue, project participation revenues etc. could be generated. Although these revenues are more related to the capital development versus the operation of the transit hub, the timing of the generation of these revenues and the creation of potential long-term revenue streams may make them more suited to support for operating funds. They could also be utilized to amortize the costs of any transit hub capital funding debt. Ongoing maintenance and security could also be supported by a benefit assessment or business improvement district.

# Reference Documents

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   Prepared for: Oklahoma Department of Transportation
   Prepared by: Carter Burgess

2. High Speed Rail Initiative - Environmental Corridor Analysis, September 2009
   Prepared for: Oklahoma Department of Transportation
   Prepared by: Able Consulting

3. Tier One Environmental Assessment - North Section of the South Central High Speed Rail Corridor in Oklahoma, September 2009
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   Prepared by: Able Consulting

4. Service Development Plan for the Oklahoma Portion of the South Central High Speed Rail Corridor - November 2009
   Prepared for: Oklahoma Department of Transportation
   Prepared by: Oklahoma Department of Transportation with assistance provided by JACOBS

5. Fixed Guideway Study - Operating Plans and Ridership Forecasting Report, March 2006
   Prepared for: Central Oklahoma Transportation and Parking Authority
   Prepared by: JACOBS Carter Burgess