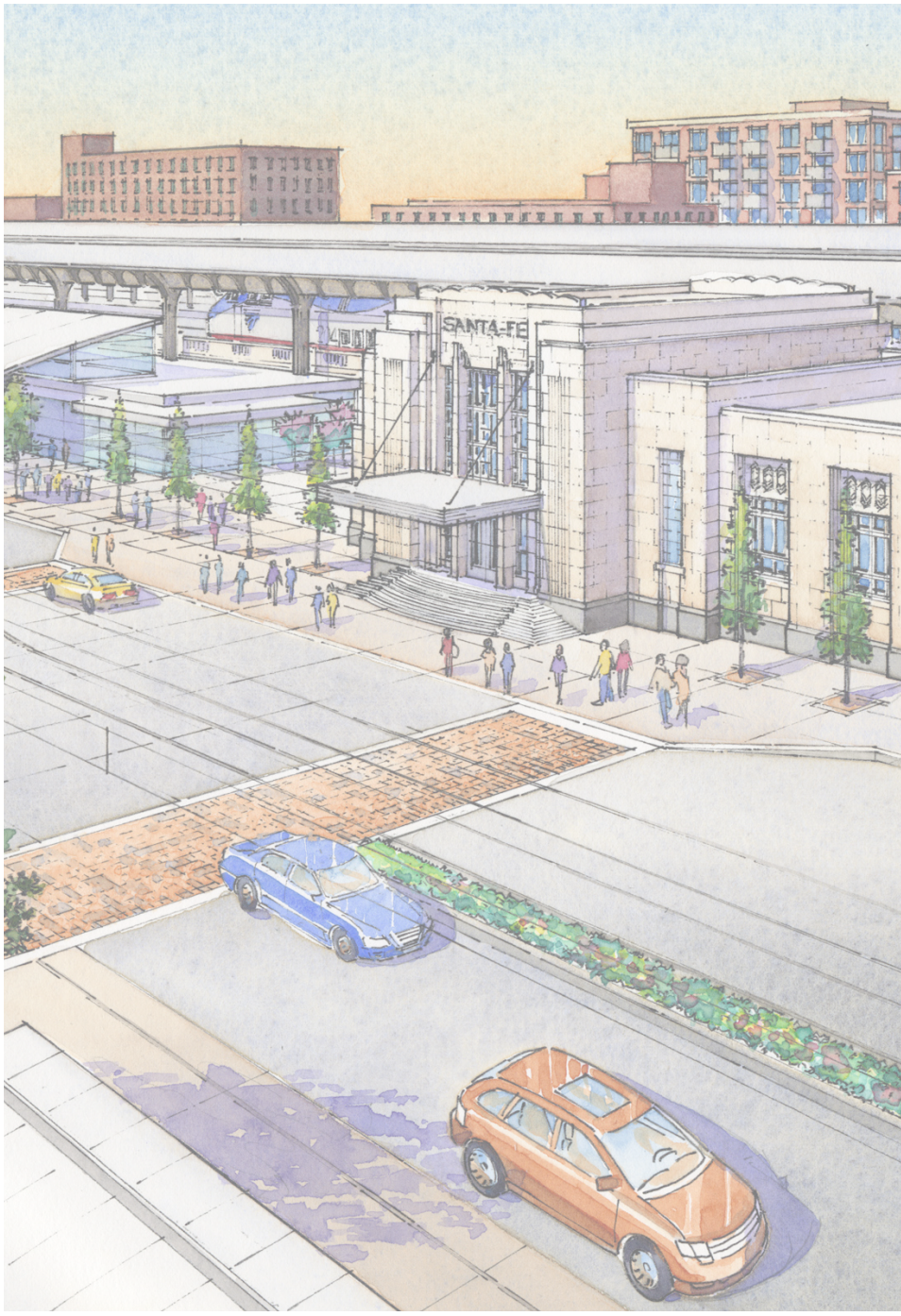
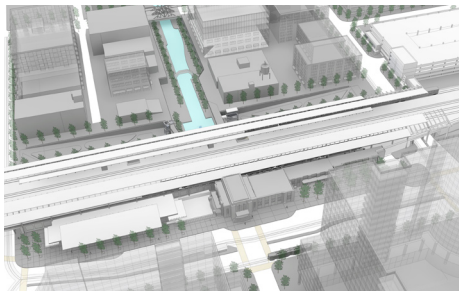
Intermodal Transportation Hub Master Plan

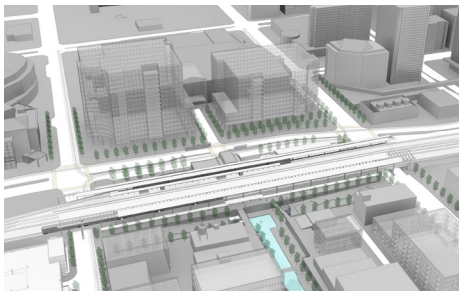
for Central Oklahoma

June 30, 2011

Appendix







Association of Central Oklahoma Governments

JACOBS™
in association with
Connetics
Basile, Bauman & Prost
TAPArchitecture
Traffic Engineering Consultants

Index

1.0 Ridership Report

Date: April 15, 2011

To: Allan Zreet, Jacobs

From: Chris Adkins, CTG

CC: Doug Tennant, Jacobs, Mike McAnelly, Jacobs, Jim Baker, CTG

Re: Modeling Results for the Tier 1 HUB Sites

Connetics Transportation Group (CTG) has completed travel demand model runs to determine potential passenger trip activity at eight alternative sites for the Intermodal Transportation Hub Study. Figure 1 illustrates sites that have been identified in the Tier 1 Site selection process. All sites are located along the BNSF railroad alignment. Results presented in this memo assume Year 2035 land use inputs and all travel forecasting was done with the OCARTS travel demand model. Modeled scenarios included:

- Combined HUB Sites 1&2; North Bricktown (site 1), Buffalo Statue (site 2)
- Combined HUB Sites 3, 5&6; Santa Fe Station (site 3), Bricktown, North (site 5) or South (site 6) of Reno
- Combined HUB Sites 7&8; Central Park (site 7), Lumber Yard (site 8)

Note: HUB sites 7 & 8 were analyzed in terms of ridership to determine if any ridership variance would be found between the two sites. At the conclusion of the ridership modeling, Site 7 was dropped from further evaluation. The ridership numbers and conclusions related to the "Combined HUB Sites 7 & 8" referenced in this report are applicable only to Site 8.

Background Transit Network

In general, all HUB model runs are based on the system plan that emerged from COTPA's Fixed Guideway Study (June 2006). High capacity lines are illustrated in Figure 2 and include:

- Commuter Rail; Edmond – Norman
- Commuter Rail; Edmond – Midwest City/Tinker
- Commuter Rail; Norman – Midwest City/Tinker

- Bus Rapid Transit; Reno – Downtown Oklahoma City
- Bus Rapid Transit; Will Rogers Airport – Downtown OKC via Reno
- Bus Rapid Transit; Northwest Expressway – Downtown Oklahoma City
- Bus Rapid Transit; Will Rogers Airport – I-35/SW54th Street via SW54th Street

No changes were assumed for local and express bus service patterns. Forecasts are 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

The above rail plan results 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 service.

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 are shown in Figure 3. Fares for the downtown streetcar were assumed to be the same as local buses.

Figure 1
Tier 1 HUB Site Locations

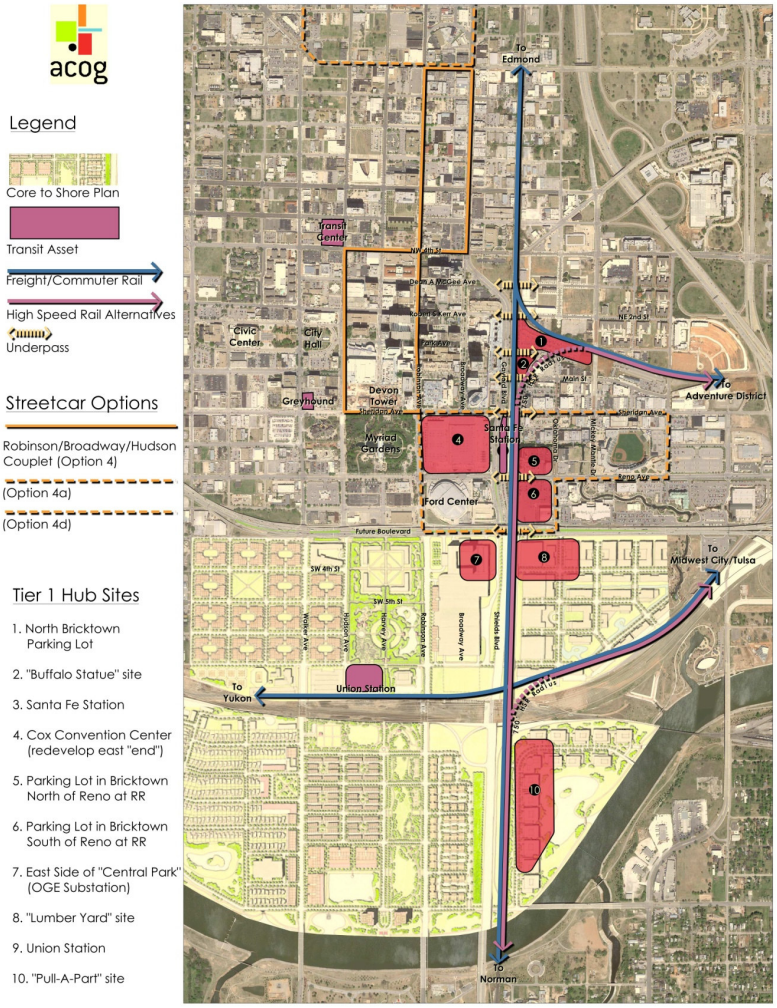


Figure 2
System Plan from COTPA's Fixed Guideway Study

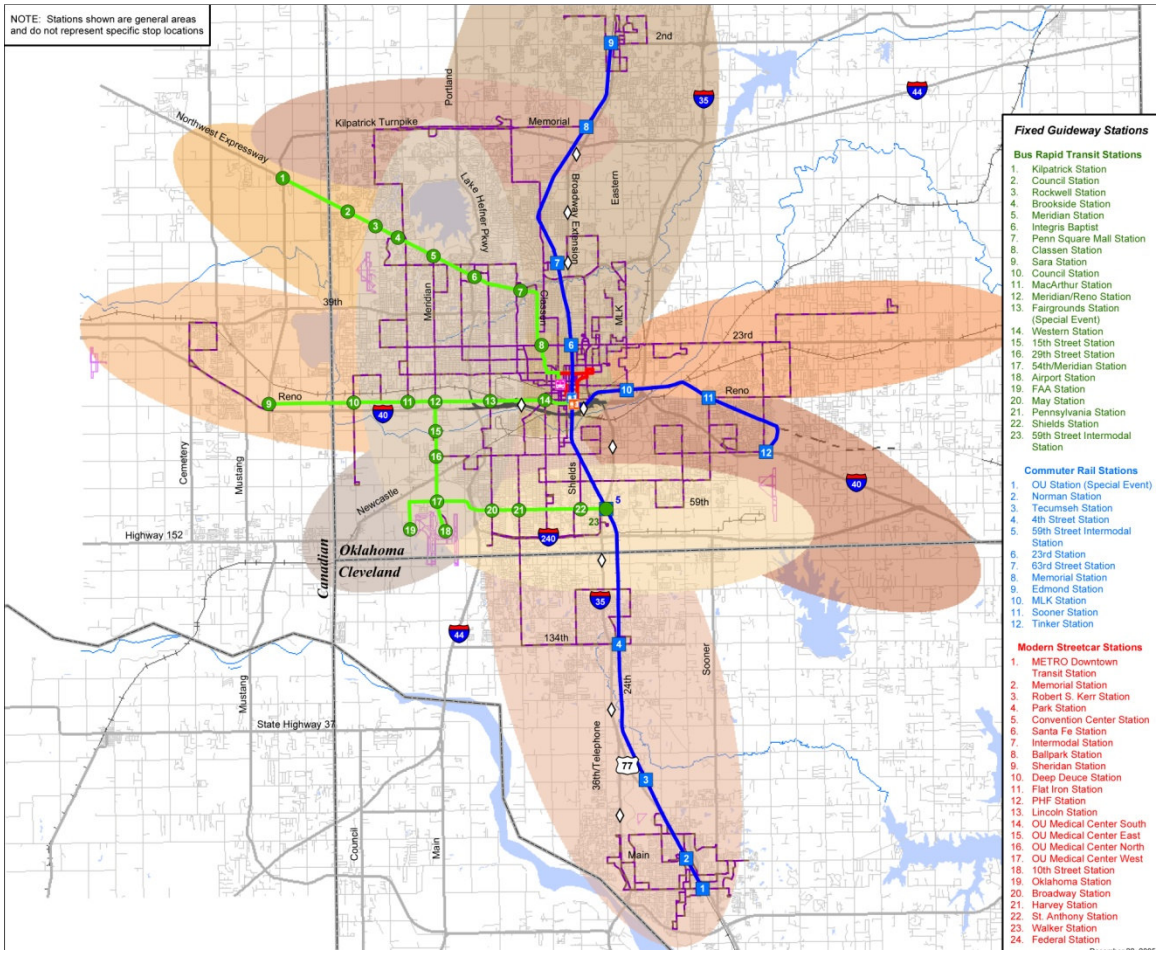
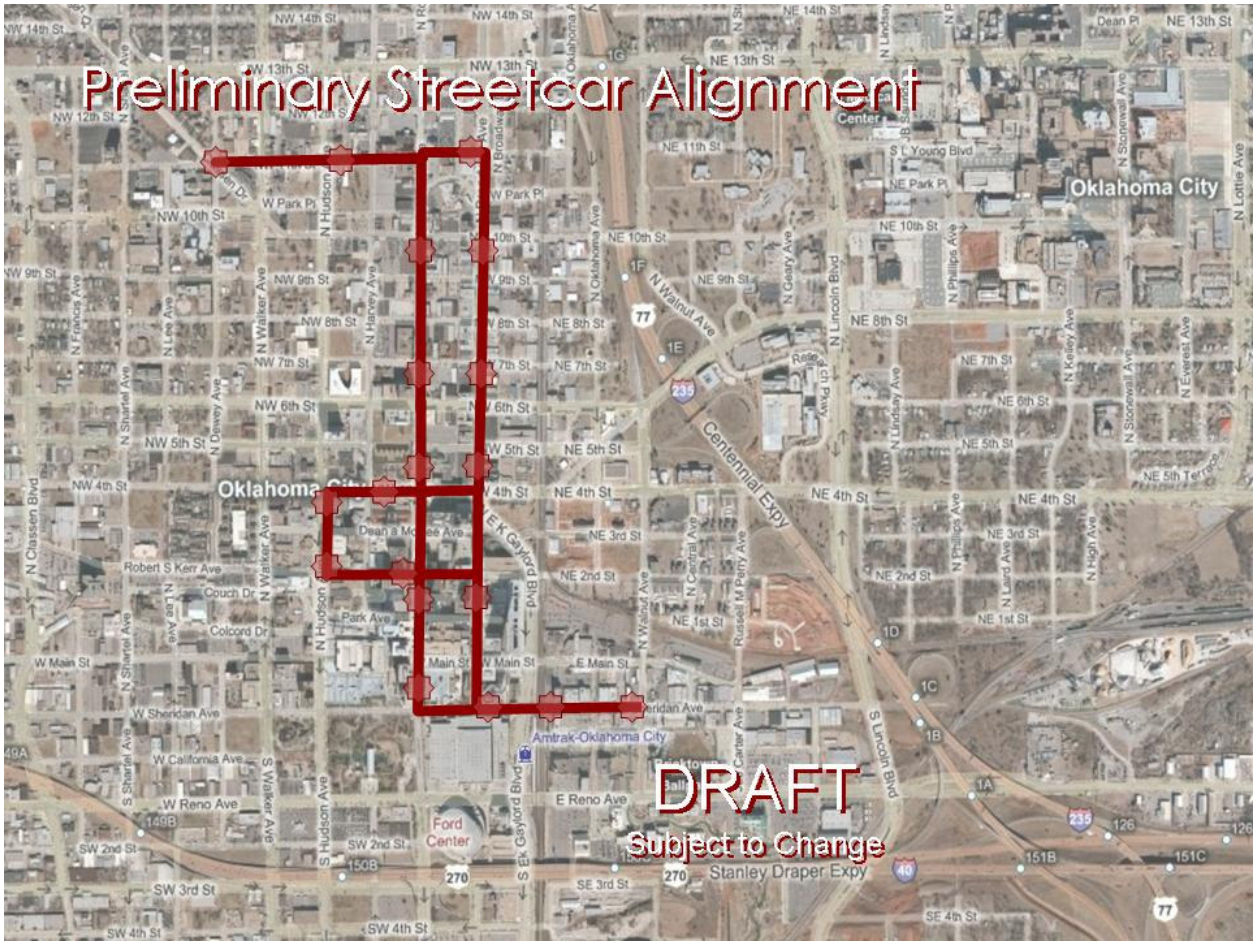


Figure 3
Downtown Streetcar Alignment and Station Location Assumptions



Passenger Activity at the HUB Sites

Projected person trip activity for the modeled Tier 1 HUB sites are presented below in Table 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 sites 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).

Table 1
Estimated Passenger Activity for Select Tier 1 HUB Sites
(2035 Person Trips)

Tier 1 Hub Sites	Location	Modes of Access/Egress			Weekday Total	Parking Spaces
		Walk	Drive	Transfers		
1 & 2	North Bricktown (1) / Buffalo Statue (2)	1,470	60	260	**1,790**	**40-60**
3, 5 & 6	Sante Fe Station(3), Bricktown, North (5) or South (6) of Reno	1,540	60	300	**1,910**	**40-60**
7 & 8	Central Park (7), Lumber Yard (8)	1,210	60	250	**1,510**	**40-60**

Parking space estimates assume 1.1 auto occupancy for work, 1.3 for non-work, 25% turnover and 5% Kiss-Ride.

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 service (e.g., local bus, BRT, Streetcar).

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 sites 7&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 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 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.).

Table 2
Peak Bus Connectivity Assumptions by Site Location

Tier 1 Hub Sites	Location	Pk Buses per Hour
1 & 2	North Bricktown (1) / Buffalo Statue (2)	**8.0**
3, 5 & 6	Sante Fe Station(3), Bricktown, North (5) or South (6) of Reno	**15.0**
7 & 8	Central Park (7), Lumber Yard (8)	**11.0**

Commuter Rail Ridership and Peak Period Line Loads

Table 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 on Table 1.

Total boardings range from a low of 6,150 per day (HUB sites 7&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.

Table 3
Estimated Daily Commuter Rail Boardings by Line
(Systemwide 2035)

Tier 1 Hub Sites	Location	Daily Commuter Rail Boardings by Line			Total Boardings
		Norman-Edmond	Norman-MWC	Edmond-MWC	
1 & 2	North Bricktown/Buffalo Statue	2,520	2,250	1,430	6,200
3, 5 & 6	Sante Fe Station/Bricktown North or South of Reno	2,650	2,280	1,500	6,430
7 & 8	Central Park / Lumber Yard	2,530	2,220	1,400	6,150

Individual service frequency for each line was 60-min / 120-min peak/off-peak.

Peak period line loads measure passenger accumulation and thus, are used to approximate train consist 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 also in the interest of accommodating future growth.

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 Okalhoma 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)[1] 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-n-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.

[1] *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 have been done with the new OCARTS regional travel demand model (TDM). To our knowledge, this is the first transit-related application of the new TDM. Some modifications have been made to improve performance (e.g., re-calibration of bus speeds, path processes, etc.).

During a cursory review of the model, two potential model variable adjustments were identified. The first concerns income travel markets. With the income markets, the mode choice model assigns home-based trips to transit based on a household's income (low medium, high). The transit On-Board survey that was conducted to support the new OCARTA model suggests that existing ridership is based roughly on 60% low income, 33% medium income and 5% high income for all of the modeled systems (i.e., COTPA, CARTS and OUHSC services). Results from the model's validation, however, yields results significantly different (14% from the low income group, 56% from medium and 30% from the high income group).

The second concern is drive access to transit. The transit On-Board survey suggests approximately 30% of existing passenger trips access a bus route by either driving and parking, or being dropped off at bus stops. Transit on-board survey results, however, suggests this percentage should be around 12%, with a majority of these trips (60%) being drop-offs.

It is important to note that these findings are based on a cursory review of the OCARTS model. It is unknown how modifications to these two important input variables would impact HUB site results presented in this memo.

2.0 Facility Program

Oklahoma City Intermodal Transportation Hub
Facility Program

Schedule of Program Assumptions 15-Apr-11

COTPA OPERATIONS

	SPACE REQUIREMENTS			SHARED	NOTES
BUS BAY / BOARDING AREA	**Units**	**Unit Area**	**SF**		On- Street
Berthing / Boarding Area	1	1100	1100	**N***	4 Bus Bays w/ Waiting Area (17 x 65')
Shelter	1	120	120	**N***	8' x 15' Shelter
BRT / BOARDING AREA	**Units**	**Unit Area**	**SF**		On- Street
Berthing / Boarding Area (Reno / Airport Route)	1	1100	1100	**N***	2 Bus Bays w/ Waiting Area (17 x 65')
Shelter	1	120	120	**N***	8' x 15' Shelter
STREETCAR BOARDING AREA	**Units**				On- Street
Boarding Area	1	1100	1100	**N***	40' Streetcar Boarding (on-street)
Shelter	1	120	120	**N***	8' x 15' Shelter

(1) Supplemental waiting area included in Terminal Building

INTERCITY BUS (Greyhound)

	SPACE REQUIREMENTS			SHARED	NOTES
OPERATIONS / BOARDING	**Units**	**Unit Area**	**SF**		
Ticketing and Information	0	0	0	**N**	Located off -site at Greyhound Facility

PRIVATE SHUTTLE

	SPACE REQUIREMENTS			SHARED	NOTES
25' SHUTTLE BOARDING AREA	**Units**	**Unit Area**	**SF**		On- Street
Boarding Area	1	600	600	**N**	Streetcar Boarding (on-street)
Shelter	1	120	120	**N***	8' x 15' Shelter

COMMUTER RAIL

	SPACE REQUIREMENTS			SHARED	NOTES
N/S PLATFORM (EDMOND - NORMAN) (2)	**Units**	**Unit Area**	**SF**		
Platform	1	8800	8800	**N***	22' x 350'
Canopy (1/2 Platform Length x 18')	1	3600	3600	**N**	18' x 175'
Ticketing	0	0	0	**N**	On Platform
E/W PLATFORM (EDMOND/NORMAN - TINKER) (2)	**Units**	**Unit Area**	**SF**		
Platform	1	8800	8800	**N***	Combined with N/S Above
Canopy (1/2 Platform Length x 18')	1	3600	3600	**N**	
Ticketing	0	0	0	**N**	
OPERATIONS SUPPORT SPACE	**Units**	**Unit Area**	**SF**		
Crew Room / Supervisors Office	1	400	400	**N**	16' x 25'
Housekeeping	1	64	64	**N**	

* Supplemental waiting area included in Terminal Building

AMTRAK

	SPACE REQUIREMENTS			SHARED	NOTES
BOARDING PLATFORM	**Units**	**Unit Area**	**SF**		
Platform	1	24000	24000	**N***	20' x 1200'
Canopy (1/2 Platform Length x 16')	1	9600	9600	**N***	16' x 400'

*Supplemental waiting area included in Terminal Building

PASSENGER SUPPORT SPACE	**Units**	**Unit Area**	**SF**		
Ticketing					Located at Waiting Area
Ticket Counter	2	32	64		4' LF Counter / Station w/ Work Space
Agents Office	1	108	108	**N**	Located adjacent to Ticketing Area
Agents Office Closet	1	30	30	**N**	
Accounting / Safe	1	80	80	**N**	
General Storage	1	50	50	**N**	

Baggage					Located adjacent to Ticketing Area
Baggage Room	1	900	900	**N**	
Baggage Pick Up	1	150	150	**N**	
Mail & Express	1	900	900	**N**	
Equipment Storage	1	600	600	**N**	
Subtotal: Net Area			**2,882**		
Circulation (Net: Usable)		0.3	865		
Subtotal: Usable Area			**3,747**		

OPERATIONS SUPPORT SPACE	**Units**	**Unit Area**	**SF**		Located near Platform access
Manager's Office	2	150	300	**N**	
Storage	1	60	60	**N**	
Clerk Office	1	110	110	**N**	
Reception Area	1	150	150	**N**	
File/Copy	1	80	80	**N**	
Crew Sign Up	1	120	120	**N**	
Locker Room	60	7	420	**N**	
Restroom/Shower	2	150	300	**N**	
Subtotal: Net Area			**1,540**		
Circulation (Net: Usable)		0.4	616		
Subtotal: Usable Area			**2,156**		

HIGH SPEED RAIL (Future)

* Assumes 110 mph service on shared track with CR & Freight

	SPACE REQUIREMENTS			**SHARED**	**NOTES**
BOARDING PLATFORM	**Units**	**Unit Area**	**SF**		
Platform (serves 9 PAX cars @ 88' ea and engine @ 70') [2] [3]	1	22,400	22400	**N***	26' x 900'
Canopy (1/2 Platform Length x 24')	1	9600	9600	**N***	22' x 450'

* Waiting included in common waiting area.

PASSENGER SUPPORT SPACE	**Units**	**Unit Area**	**SF**		
Ticketing					Located at Waiting Area
Ticket Counter	3	32	96		4' LF Counter / Station w/ Work Space
Agents Office	1	108	108	**N**	Located adjacent to Ticketing Area
Agents Office Closet	1	30	30	**N**	
Accounting / Safe	1	120	120	**N**	
General Storage	1	50	50	**N**	
Subtotal: Net Area			**404**		
Circulation (Net: Usable)		0.3	121		
Subtotal: Usable Area			**525**		

OPERATIONS SUPPORT SPACE	**Units**	**Unit Area**	**SF**	
Manager's Office	2	150	300	**N**
Storage	1	60	60	**N**
Clerk Office	1	110	110	**N**
Reception Area	1	150	150	**N**
File/Copy	1	80	80	**N**
Subtotal: Net Area			**700**	
Circulation (Net: Usable)		0.4	280	
Subtotal: Usable Area			**980**	

Common Areas

	SPACE REQUIREMENTS			**SHARED**	
	Units	**Unit Area**	**SF**		**LOCATION**
Waiting Room [1]	1	17500	17500	**Y**	Located at Waiting Area
Public Restrooms				**Y**	Located at Waiting Area
Men	1	800	800		10 fixtures
Women	1	800	800		10 fixtures
Vending	10	12	120	**Y**	Located at Waiting Area
Retail	1	1200	1200	**Y**	Located at Waiting Area
Police Storefront	1	800	800	**Y**	Located at Waiting Area
Visitors Center	1	400	400	**Y**	Located at Waiting Area

Staff Restrooms				**Y**	Verify based on Staffing and SF
Men	1	400	400		4 fixtures
Women	1	400	400		4 fixtures
Subtotal: Net Area			**22,420**		
Circulation (Net: Usable)		0.2	4484		
Total: Usable Area			**26,904**		
Total Project Area (Enclosed)			**34,312**		

Notes

(1) Waiting area based on total Peak Patronage @ LOS B/C (700 PAX) x 25 SF/PAX= 17500

Assume 50% PAX in Terminal = 8750

Add growth factor of 200% (additional growth accommodated by lowering LOS) 17,500

Peak Patronage Calculation

Commuter Rail Peak 20 Minute patronage	56
HSR Peak Hour patronage (20% Daily Ridership)	450
Amtrak Peak Hour patronage (Daily Ridership - Single Occurance)	200
Total	706

(2) Based on Amtrak Acela HSR service on NE Corridor

(3) Based on South Central High Speed Rail Corridor Service Development Plan, November 2009

3.0 Platform Capacity

Oklahoma City Intermodal Transportation Hub
2035 Platform Requirement Analysis

15-Apr-11

Commuter Rail Platform

2035 Daily Ridership		**2000** 1910 per Ridership Model
Peak Hour Ridership (25% of peak hour)		500
Peak Headways / Hour (3 lines at 60 min. headways)		3
Passengers Boarding / Alighting @ Peak Hour (500/3)		167
Passengers Boarding / Alighting @ Peak 20 Min (167/3)		**56**
Peak Line Load (daily passengers)		5000
Peak Line Load (passengers traveling on line)		**125**
Hours of Operation - 7:00AM - 9:00 PM		14 hours
Vehicle Capacity - Seated (1)		150

Passenger Vehicle Statistics

(1) Based on Bombardier Bi-level coach (capacity - 150 seated).
Coach length = 85' Equipment Length = 65'
(2) Design Length = 3 x 85' = 255 + 65' = 318' — **Use 350' platform length**
(3) Bombardier Bi-Level Cars in use at: — includes stopping tolerance factor
- Los Angeles Metrolink
- DFW Trinity Railway Express
- New Mexico Rail runner
- Seattle Sounder
- Toronto Go Transit

High Speed Rail Platform

2023 Daily Ridership (1)		1800
2023 Peak Ridership		
Projected 2035 Daily Ridership Based on 4% annual growth (assumption)		2880
Peak Ridership: 2880 / 6 trains per day		**480**

Passenger Vehicle / Platform Length

6 trains per day
9 passenger cars @ 68' plus Power Equipment @ 70' = 862' — **Use 900' platform length**
9 car seated capacity = 500

Amtrak Platform

2010 Daily Ridership		200
Projected 2035 Daily Ridership Based on 2% annual growth (2)		340
Peak Ridership: 340 / 2 trains per day = 680 (25% of Daily Ridership)		**170**

Passenger Vehicle / Platform Length

Platform Length = 1200' to accommodate passenger, mail cars and engine — **Use 1200' platform length**

Notes

(1) Connetics Ridership Report and Oklahoma HSR Service Development Plan (November 2009)
(2) Historic Growth is 1% annually (NARP)

Max No. Peak Hour Boardings

Commuter Rail, High Speed Rail, Amtrak	**706**

Oklahoma City Intermodal Transportation Hub
Commuter Rail Platform Capacity Analysis (Beyond 2035)

15-Apr-11

Commuter Rail Platform

2035 Daily Ridership	**2000**	1850 per Ridership Model
Peak Hour Ridership (25% of peak hour)	500	
Peak Headways / Hour (3 lines at 60 min. headways)	3	
Passengers Boarding / Alighting @ Peak Hour	167	
Passengers Boarding / Alighting @ Peak 20 Min	56	
Peak Line Load (daily passengers)	6400	
Peak Line Load (passengers traveling on line)	**125**	(use as maximum)
Hours of Operation - 7:00AM - 9:00 PM	14 hours	
Vehicle Capacity - Seated (1)	150	one passenger car sufficient (min)

Capacity Analysis

Vehicle		Capacity @ 60 minute Headways	Increase 0ver 2035 Daily PAX
1 Vehicle 2015 - 2035	Peak Hr Load Factor: 150 X 1.2 = 180 Peak Hours of Operations = 6	Capacity 180 x 3 trains / hr = 540 per hour 540 x 6hrs = 3240 PAX Peak Period	
	Off Peak Load Factor: 150 x .90 = 135 Off -Peak Hours of Operations = 8 Total Daily Capacity for 1 Vehicle (3240 + 3240) (Passengers)	135 x 3 trains / hr = 405 per hour 405 x 8hrs = 3240 PAX Off Peak Period	**6480** 101%
2 Vehicles After 2035	Peak Hr Load Factor: 150 X 1.2 = 180 2 Vehicles @ Peak Hour	Capacity 180 x 3 trains / hr = 540 per hour 540 x 6 hrs = 3240 x 2 (vehicles) = 6840	
	Off Peak Load Factor: 150 x .90 = 135 1 Vehicle @ Off-Peak Off -Peak Hours of Operations = 8 Total Daily Capacity for 2 Vehicles (6840 + 3240) (Passengers)	135 x 3 trains / hr = 405 per hour 405 x 8hrs = 3240 PAX Off Peak Period	**10080** 158%
3 Vehicles (Expansion)	Peak Hr Load Factor: 150 X 1.2 = 180 3 Vehicles @ Peak Hour	Capacity 180 x 3 trains / hr = 540 per hour 540 x 6 hrs = 3240 x 3 (vehicles) = 9720	
	Off Peak Load Factor: 150 x .90 = 135 2 Vehicles @ Off-Peak Off -Peak Hours of Operations = 8 Total Daily Capacity for 3 Vehicles (9720 + 6480) (Passengers)	135 x 3 trains / hr = 405 per hour 405 x 8hrs = 3240 x 2 (vehicles) = 6480	**16200** 253%

Vehicle	Capacity @ 30 minute Headways	Increase 0ver 2035
1 Vehicle	6480 x 2	**12960** 203%
2 Vehicles	10080 x 2	**20,160** 315%
3 Vehicles	16200 x 2	**32400** 506%

Passenger Vehicle Statistics

(1) Based on Bombardier Bi-level coach (capacity - 150 seated).
Coach length = 85' Equipment Length = 65'

(2) Design length = 3 x 85' = 255 + 65' = 318' **Use 350' Platform (Max Platform Length Required)**

(3) Bombardier Bi-Level Cars in use at: (includes allowance for stopping tolerance)
- Los Angeles Metrolink
- DFW Trinity Railway Express
- New Mexico Rail runner
- Seattle Sounder
- Toronto Go Transit

4.0 Parking Requirements

Intermodal Transportation Hub
Parking Requirements

4/15/2011

AMTRAK

	NO. SPACES	NOTES
Parking		
Customer Parking	170	Assumption (50% of daily riders) 340 x .50
Short Term (Drop-off)	3	
Staff Parking	6	
Total	**179**	

COMMUTER RAIL

	NO. SPACES	NOTES
Parking		
Customer Parking	60	Per Connetics Ridership Report (5% of daily riders)
Short Term (Drop-off)	2	
Staff Parking	2	
Total	**64**	

HIGH SPEED RAIL

	NO. SPACES	NOTES
Parking		
Customer Parking	576	Assumption (20% of daily riders) 2880 x .20
Short Term (Drop-off)	6	Assumes all other rail modes present at time of service
Staff Parking	4	
Total	**586**	

GENERAL FACILITY

	NO. SPACES	NOTES
Parking		
Customer Parking	2	
Short Term (Drop-off)	0	
Staff Parking	2	
Total	**4**	

Total Required Parking	**833**

5.0 Tier 2 Evaluations

Intermodal Transportation Hub Study
Tier 2 Evaluation

Site A (1 & 2)

	Evaluation Criteria	Notes	Ranking
Multimodal Access	Proximity to Rail Modes	Restricted by track curvature	1
	Accessibility by Streetcar	One to two blocks way	2
	Proximity to Major Thoroughfares	Good access via Sheridan	2
	Proximity to Primary Destinations	Disconnected from Downtown	3
	Pedestrian / Bicycle Accessibility	Removed from primary downtown street grid	3
Site Configuration	Transit Program Accommodation	Requires modification to existing guideway structure	1
	Parking / Access	Potential use of Sante Fe Garage. Access restricted from north	3
	Thoroughfare/Traffic Impacts	Current infrastructure sufficient	2
	Visibility / Image	Limited visibility from primary thoroughfares	1
Economic Development	Transit Supportive Land Uses	Limited by railroad ROW and residential development	2
	Redevelopment Potential	Potential infill development	2
	Civic Presence	Location not prominent	1
Urban Form	Neighborhood Compatibility	Compatible w/ existing - current railroad uses	2
	Land Use Plan Compatibility	Mixed use and multifamily	4
	Appropriate Density	Density limited by current residential development	3
	Walkable Environment	Street grid not complete	2
	Transit Supportive Zoning	Current mixed use zoning compatible but not transit specific	4
Environmental	Displacement of Businesses	Primarily public property	4
	Historic Property Impacts	None anticipated	5
	Noise Sensitivity	Current railroad use	3
	Property Availability	Primarily public property	5
	Total		55

Ranking Categories:

Alternative with highest numeric ranking indicates most preferred site.

Significantly Negative	1
Moderately Negative	2
Neutral	3
Moderately Positive	4
Significantly Positive	5

Intermodal Transportation Hub Study
Tier 2 Evaluation

Site B (3,5 & 6)

	Evaluation Criteria	Notes	Ranking
Multimodal Access	Proximity to Rail Modes	Immediately adjacent to current station	5
	Accessibility by Streetcar	Immediately ahdacent at Sheridan	4
	Proximity to Major Thoroughfares	Good access via Reno, Sherican and Gaylord	5
	Proximity to Primary Destinations	Immediate proximity to downtown and Bricktown	5
	Pedestrian / Bicycle Accessibility	Good access via streetgrid	5
Site Configuration	Transit Program Accommodation	Meets requirements	4
	Parking / Access	Good access via Sheridan, Reno and Gaylord	4
	Thoroughfare/Traffic Impacts	Current infrastructure sufficient	5
	Visibility / Image	Liminted by Current Cox Center	4
Economic Development	Transit Supportive Land Uses	Mixed use / office / entertainment	4
	Redevelopment Potential	Good infill potential	5
	Civic Presence	Good axial relationship to downtown and Bricktown	5
Urban Form	Neighborhood Compatibility	Current railroad use	5
	Land Use Plan Compatibility	Compatible with current planning	4
	Appropriate Density	Medium to high density but with vacant lots	4
	Walkable Environment	Good via streetgrid	5
	Transit Supportive Zoning	Current mixed use zoning compatible but not transit specific	4
Environmental	Displacement of Businesses	Existing Sante Fe Retail displaced	4
	Historic Property Impacts	Coordination with SHPO required for Santa Fe redevelopment	4
	Noise Sensitivity	Current railroad use	5
	Property Availability	Requires purchase od Santa Fe terminal	4
	Total		94

Ranking Categories:
Alternative with highest numeric ranking indicates most preferred site.

Significantly Negative	**1**
Moderately Negative	**2**
Neutral	**3**
Moderately Positive	**4**
Significantly Positive	**5**

Intermodal Transportation Hub Study
Tier 2 Evaluation

Site C (8)

	Evaluation Criteria	Notes	Ranking
Multimodal Access	Proximity to Rail Modes	Requires expansion of elevated ROW	3
	Accessibility by Streetcar	Pogtnetially across street at New Boulevard)	3
	Proximity to Major Thoroughfares	Good access via Sheridan	4
	Proximity to Primary Destinations	Disconnected from Downtown	3
	Pedestrian / Bicycle Accessibility	Removed from primary downtown street grid. Depressed roadway not ideal	2
Site Configuration	Transit Program Accommodation	Requires modification to existing guideway structure	2
	Parking / Access	Access fron New Boulevard at Oklahoma	3
	Thoroughfare/Traffic Impacts	Proposed infrastructure sufficient	4
	Visibility / Image	Limited visibility from primary thoroughfares. Hidden from Downtown & Gaylord	2
Economic Development	Transit Supportive Land Uses	Current industrial uses (Lunberyarde / Cotton Gin)	2
	Redevelopment Potential	Potential infill development @ Cotton Gim but potential limited by	4
	Civic Presence	Location not prominent	2
Urban Form	Neighborhood Compatibility	Compatible w/ existing - current railroad uses / industrial	5
	Land Use Plan Compatibility	Prim arilyh industrial	3
	Appropriate Density	Density limited by current indusgtrial uses	2
	Walkable Environment	Street grid not complete. Limited by depressed roadway	1
	Transit Supportive Zoning	Current mixed use zoning compatible but not transit specific	4
Environmental	Displacement of Businesses	Lumberyard displacement	4
	Historic Property Impacts	None anticipated	5
	Noise Sensitivity	Current railroad / industrial use	5
	Property Availability	Requires purchase of lumber yard (available)	4
	Total		67

Ranking Categories:
Alternative with highest numeric ranking indicates most preferred site.

Significantly Negative	1
Moderately Negative	2
Neutral	3
Moderately Positive	4
Significantly Positive	5

6.0 Traffic Analysis

TRAFFIC ANALYSES

BACKGROUND

The traffic impacts of the proposed new Intermodal Hub Master Plan were reviewed with respect to the expected increase in traffic due to the attraction of the facility. The intermodal hub is proposed to provide interconnectivity between several different modes of transportation including commuter rail, streetcar, 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 Boulevard 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 master plan 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 **Figure 1**.

The traffic volumes expected to be generated by the new hub facility were determined utilizing the trip rate information for the Light Rail Transit Station with Parking land use as included in Volume 2 of the Trip Generation, 8th Edition report as provided by the Institute of Transportation Engineers. 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 determined that on average, the parking garage would have an occupancy percentage of 80 percent. The resultant number

of vehicle trip ends for an average weekday and associated a.m. and p.m. peak hour periods are summarized below in **Table 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 is indicated on **Figure 2**. This traffic was then added to the 2025 background traffic. The total projected 2025 traffic volumes used to conduct the reviews and analyses are indicated in **Figure 3**.

TABLE 1.

PROJECTED SITE GENERATED TRAFFIC VOLUMES

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	Per Peak Hour of Adjacent Street Traffic									
			One Hour Between 7am & 9am	One Hour Between 4pm & 6pm								
		(vpd)	(vph)	(vph)	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TRIP RATE[1]		3.91	1.14	1.33								
Light Rail Transit Station w/Parking	510	1994	581	678	0.80	0.20	465	116	0.58	0.42	393	285

[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.

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.* The *Highway Capacity Manual* is provided by the Transportation Research Board of the National Research Council, Washington, D.C. The information has been 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.

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 (s/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 (s/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 2** below and included in the appendix 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 street car 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.

TABLE 2.

CAPACITY ANALYSIS RESULTS

Projected 2025 Total Traffic Conditions

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

* Indicates delay exceeds 80 seconds per vehicle.

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.

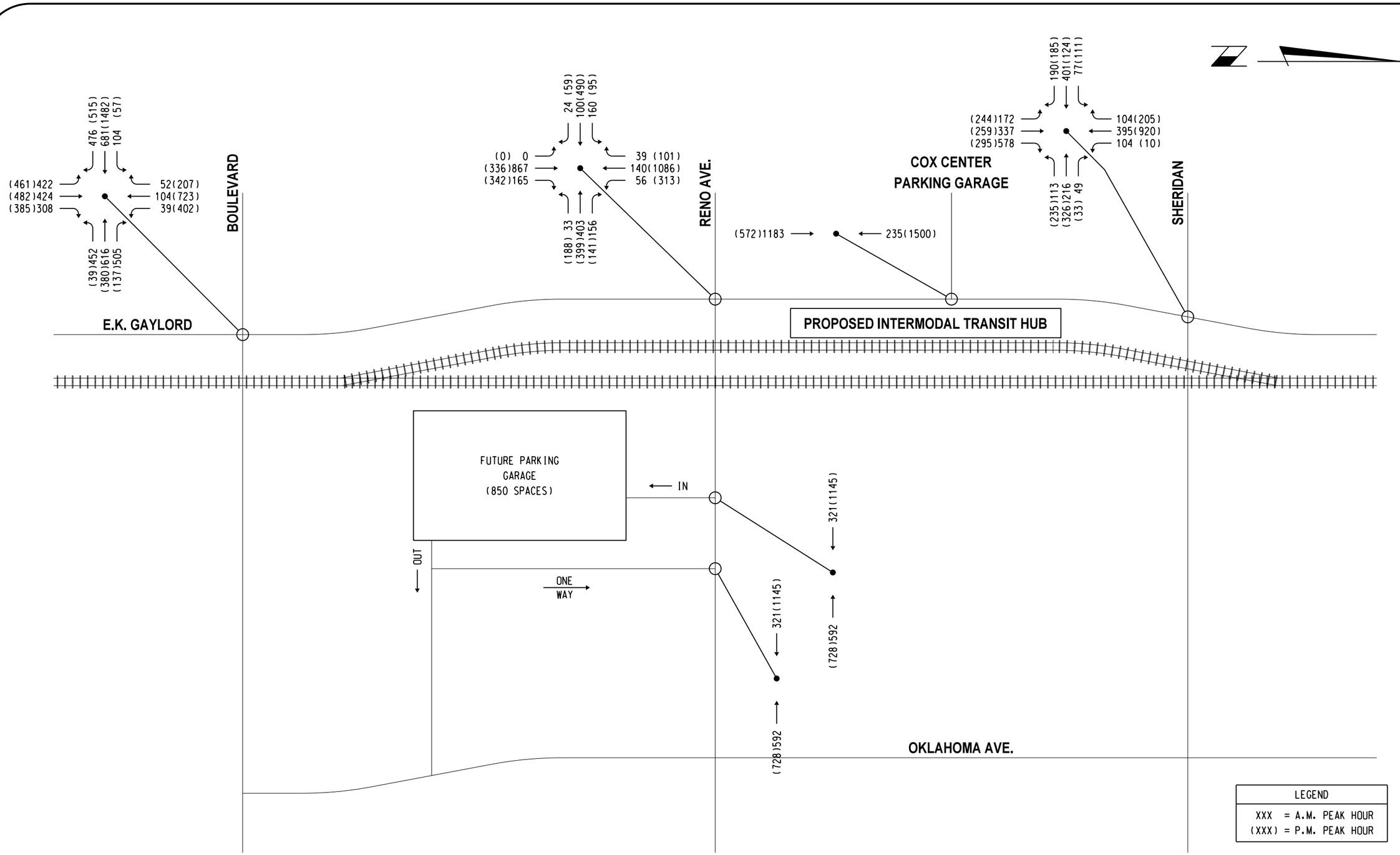


FIGURE 1. PROJECTED 2025 PEAK HOUR BACKGROUND TRAFFIC

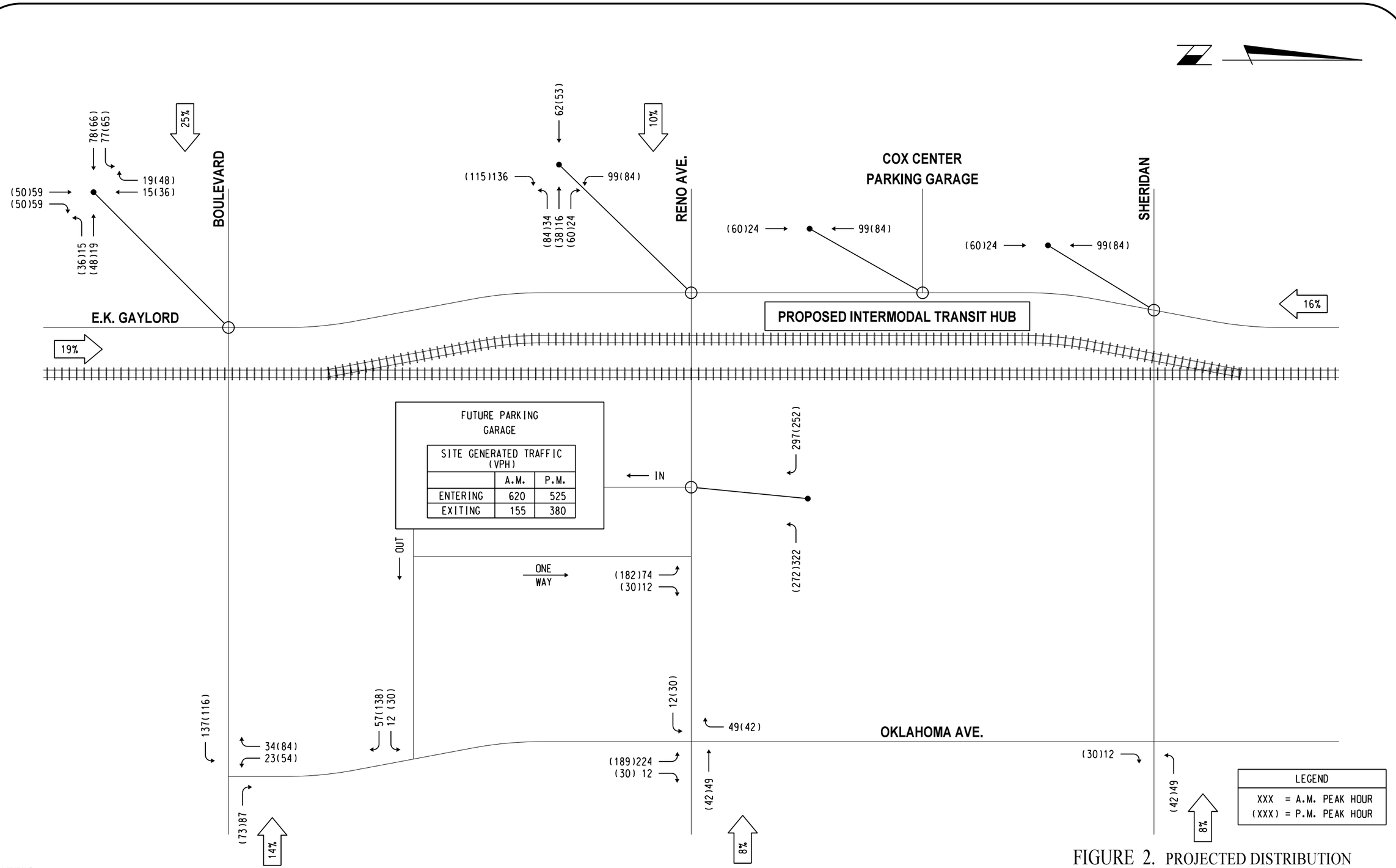


FIGURE 2. PROJECTED DISTRIBUTION OF TRANSIT HUB GENERATED TRAFFIC WITH 80% OCCUPIED GARAGE

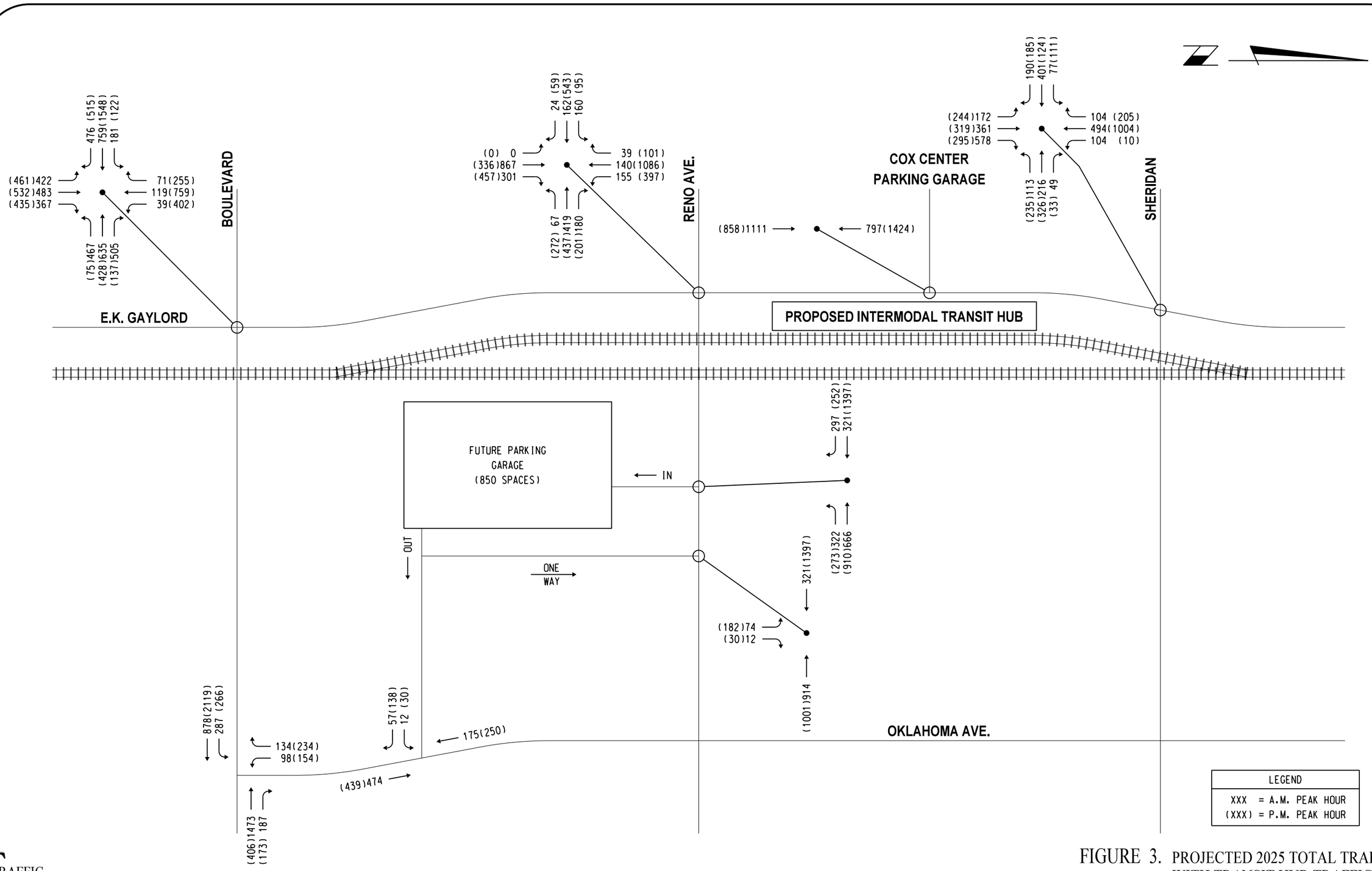
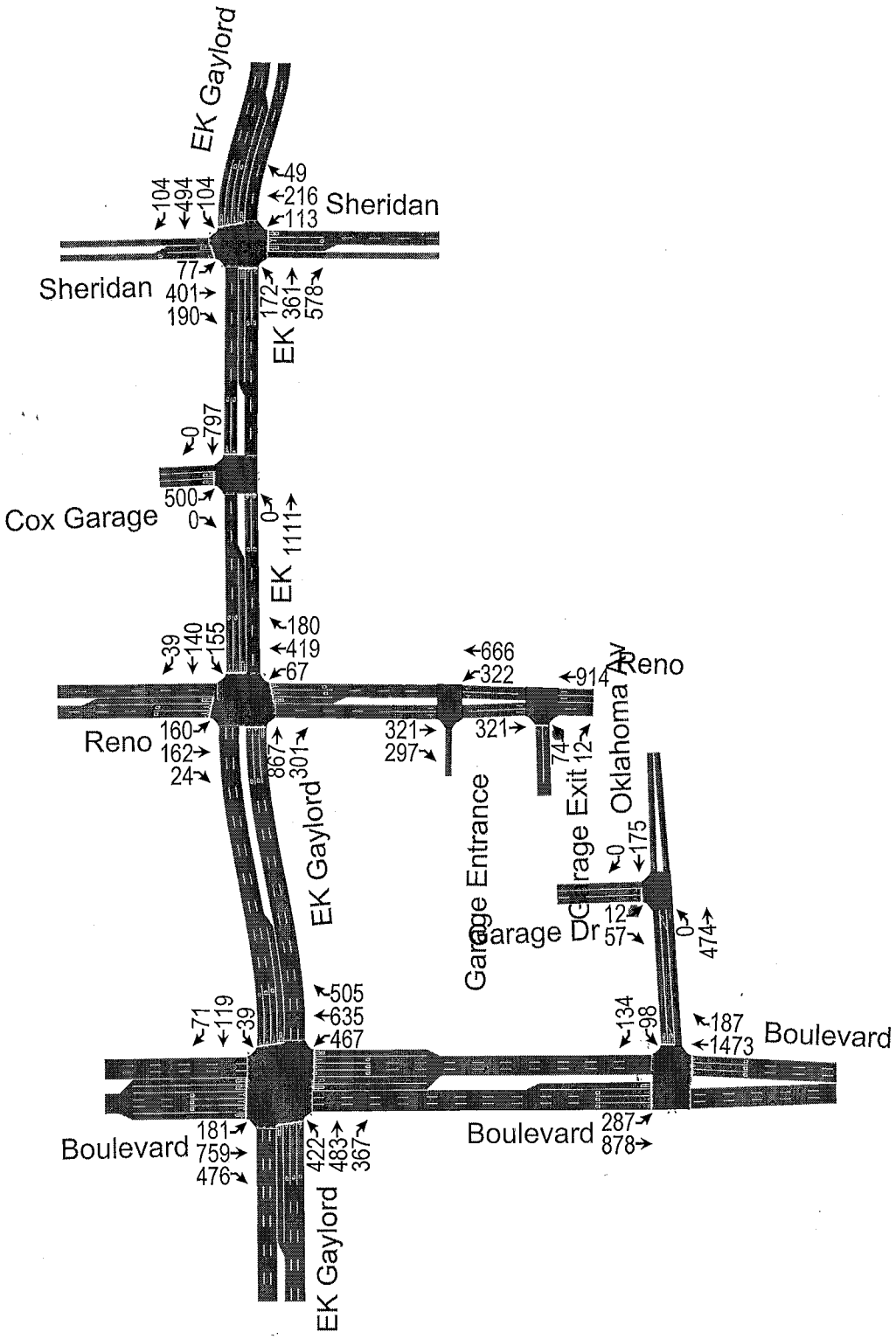


FIGURE 3. PROJECTED 2025 TOTAL TRAFFIC WITH TRANSIT HUB TRAFFIC

TRAFFIC ENGINEERING CONSULTANTS


EK Gaylord
104
494
104
49
216
113
Sheridan
Sheridan
77
401
190
172
361
578
EK
0
797
500
0
Cox Garage
0
1111
EK
39
140
155
180
419
67
666
322
914
Reno
Reno
160
162
24
867
301
321
297
321
74
12
Garage Entrance
Garage Exit
Oklahoma Av
EK Gaylord
0
175
Garage Dr
12
57
0
474
71
119
39
505
635
467
134
98
187
1473
Boulevard
Boulevard
181
759
476
422
483
367
Boulevard
287
878
EK Gaylord

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	181	759	476	467	635	505	422	483	367	39	119	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.91	1.00	0.92		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3467	5136	1486	3467	5136	1463	1787	4435		1787	4526	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3467	5136	1486	3467	5136	1463	1787	4435		1787	4526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	197	825	517	508	690	549	459	525	399	42	129	77
RTOR Reduction (vph)	0	0	28	0	0	7	0	152	0	0	63	0
Lane Group Flow (vph)	197	825	489	508	690	542	459	772	0	42	143	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	12.4	16.0	40.0	14.0	17.6	36.6	24.0	21.0		19.0	16.0	
Effective Green, g (s)	12.4	16.0	40.0	14.0	17.6	36.6	24.0	21.0		19.0	16.0	
Actuated g/C Ratio	0.14	0.18	0.44	0.16	0.20	0.41	0.27	0.23		0.21	0.18	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	478	913	660	539	1004	676	477	1035		377	805	
v/s Ratio Prot	0.06	c0.16	0.20	0.15	0.13	c0.17	c0.26	c0.17		0.02	0.03	
v/s Ratio Perm			0.13			0.20						
v/c Ratio	0.41	0.90	0.74	0.94	0.69	0.80	0.96	0.75		0.11	0.18	
Uniform Delay, d1	35.5	36.2	20.7	37.6	33.6	23.5	32.6	32.0		28.7	31.4	
Progression Factor	1.00	1.00	1.00	0.47	0.40	0.35	1.00	1.00		1.18	1.00	
Incremental Delay, d2	0.6	12.1	4.5	15.9	1.0	3.6	31.5	4.9		0.1	0.5	
Delay (s)	36.0	48.4	25.2	33.7	14.4	12.0	64.1	36.9		34.0	31.7	
Level of Service	D	D	C	C	B	B	E	D		C	C	
Approach Delay (s)		39.0			19.2			45.9			32.1	
Approach LOS		D			B			D			C	

Intersection Summary				
HCM Average Control Delay	33.6	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.89			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization	81.4%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	287	878	1473	187	98	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97		1.00	0.82
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1787	5136	4881		1787	1315
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1787	5136	4881		1787	1315
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	312	954	1601	203	107	146
RTOR Reduction (vph)	0	0	18	0	0	116
Lane Group Flow (vph)	312	954	1786	0	107	30
Confl. Peds. (#/hr)	100			100	100	100
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	19.1	61.5	37.4		18.5	18.5
Effective Green, g (s)	19.1	61.5	37.4		18.5	18.5
Actuated g/C Ratio	0.21	0.68	0.42		0.21	0.21
Clearance Time (s)	5.0	5.0	5.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	379	3510	2028		367	270
v/s Ratio Prot	c0.17	0.19	c0.37		c0.06	
v/s Ratio Perm						0.02
v/c Ratio	0.82	0.27	0.88		0.29	0.11
Uniform Delay, d1	33.8	5.5	24.2		30.2	29.1
Progression Factor	0.61	0.07	1.00		1.00	1.00
Incremental Delay, d2	7.4	0.0	4.9		2.0	0.8
Delay (s)	27.9	0.4	29.1		32.2	29.9
Level of Service	C	A	C		C	C
Approach Delay (s)		7.2	29.1		30.9	
Approach LOS		A	C		C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	162	24	67	419	180	0	867	301	155	140	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.90	1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	0.95			1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	3425		1787	3231			3574	1433	1787	3325	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	3425		1787	3231			3574	1433	1787	3325	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	176	26	73	455	196	0	942	327	168	152	42
RTOR Reduction (vph)	0	14	0	0	54	0	0	0	30	0	21	0
Lane Group Flow (vph)	174	188	0	73	597	0	0	942	297	168	173	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot			Prot					pm+ov	Prot		
Protected Phases	7	4		3	8			2	3	1	6	
Permitted Phases									2			
Actuated Green, G (s)	11.5	10.2		19.9	18.6			27.9	47.8	12.0	44.9	
Effective Green, g (s)	11.5	10.2		19.9	18.6			27.9	47.8	12.0	44.9	
Actuated g/C Ratio	0.13	0.11		0.22	0.21			0.31	0.53	0.13	0.50	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	228	388		395	668			1108	841	238	1659	
v/s Ratio Prot	c0.10	0.05		0.04	c0.18			c0.26	0.08	c0.09	0.05	
v/s Ratio Perm									0.13			
v/c Ratio	0.76	0.48		0.18	0.89			0.85	0.35	0.71	0.10	
Uniform Delay, d1	37.9	37.4		28.5	34.7			29.1	12.2	37.3	11.9	
Progression Factor	1.00	1.00		1.00	1.00			0.87	0.78	0.35	0.02	
Incremental Delay, d2	14.0	1.0		0.2	14.4			5.5	0.2	8.3	0.1	
Delay (s)	52.0	38.4		28.7	49.1			30.7	9.7	21.5	0.3	
Level of Service	D	D		C	D			C	A	C	A	
Approach Delay (s)		44.7			47.0			25.3			10.2	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	321	297	322	666	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	349	323	350	724	0	0
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	0.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	370					
pX, platoon unblocked			0.98		0.98	0.98
vC, conflicting volume			772		1772	536
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			723		1745	482
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			59		100	100
cM capacity (veh/h)			863		42	478

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	233	439	591	483
Volume Left	0	0	350	0
Volume Right	0	323	0	0
cSH	1700	1700	863	1700
Volume to Capacity	0.14	0.26	0.41	0.28
Queue Length 95th (ft)	0	0	50	0
Control Delay (s)	0.0	0.0	9.4	0.0
Lane LOS			A	
Approach Delay (s)	0.0		5.2	
Approach LOS				

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰	↱
Volume (veh/h)	321	0	0	914	74	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	349	0	0	993	80	13
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	8	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	520					
pX, platoon unblocked						
vC, conflicting volume			449		1046	374
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			449		1046	374
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		58	98
cM capacity (veh/h)			1022		190	526

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	174	174	497	497	80	13
Volume Left	0	0	0	0	80	0
Volume Right	0	0	0	0	0	13
cSH	1700	1700	1700	1700	190	526
Volume to Capacity	0.10	0.10	0.29	0.29	0.42	0.02
Queue Length 95th (ft)	0	0	0	0	48	2
Control Delay (s)	0.0	0.0	0.0	0.0	37.3	12.0
Lane LOS					E	B
Approach Delay (s)	0.0		0.0		33.8	
Approach LOS					D	

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	12	57	0	474	175	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	62	0	515	190	0
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	8	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				336		
pX, platoon unblocked						
vC, conflicting volume	905	390	290			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	905	390	290			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	89	100			
cM capacity (veh/h)	259	555	1171			

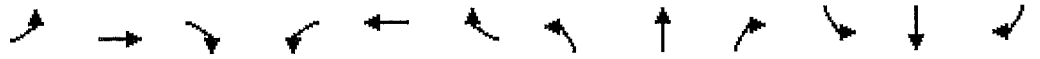
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	13	62	0	515	190
Volume Left	13	0	0	0	0
Volume Right	0	62	0	0	0
cSH	259	555	1700	1700	1700
Volume to Capacity	0.05	0.11	0.00	0.30	0.11
Queue Length 95th (ft)	4	9	0	0	0
Control Delay (s)	19.6	12.3	0.0	0.0	0.0
Lane LOS	C	B			
Approach Delay (s)	13.6		0.0		0.0
Approach LOS	B				

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	500	0	0	1111	797	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			5.0	5.0	
Lane Util. Factor	1.00			0.95	0.95	
Frpb, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1787			3574	3574	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1787			3574	3574	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	543	0	0	1208	866	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	543	0	0	1208	866	0
Confl. Peds. (#/hr)	100	100	100			100
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	32.8			47.2	47.2	
Effective Green, g (s)	32.8			47.2	47.2	
Actuated g/C Ratio	0.36			0.52	0.52	
Clearance Time (s)	5.0			5.0	5.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	651			1874	1874	
v/s Ratio Prot	c0.30			c0.34	0.24	
v/s Ratio Perm						
v/c Ratio	0.83			0.64	0.46	
Uniform Delay, d1	26.1			15.4	13.4	
Progression Factor	1.00			0.16	0.17	
Incremental Delay, d2	9.0			0.9	0.4	
Delay (s)	35.1			3.3	2.8	
Level of Service	D			A	A	
Approach Delay (s)	35.1			3.3	2.8	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

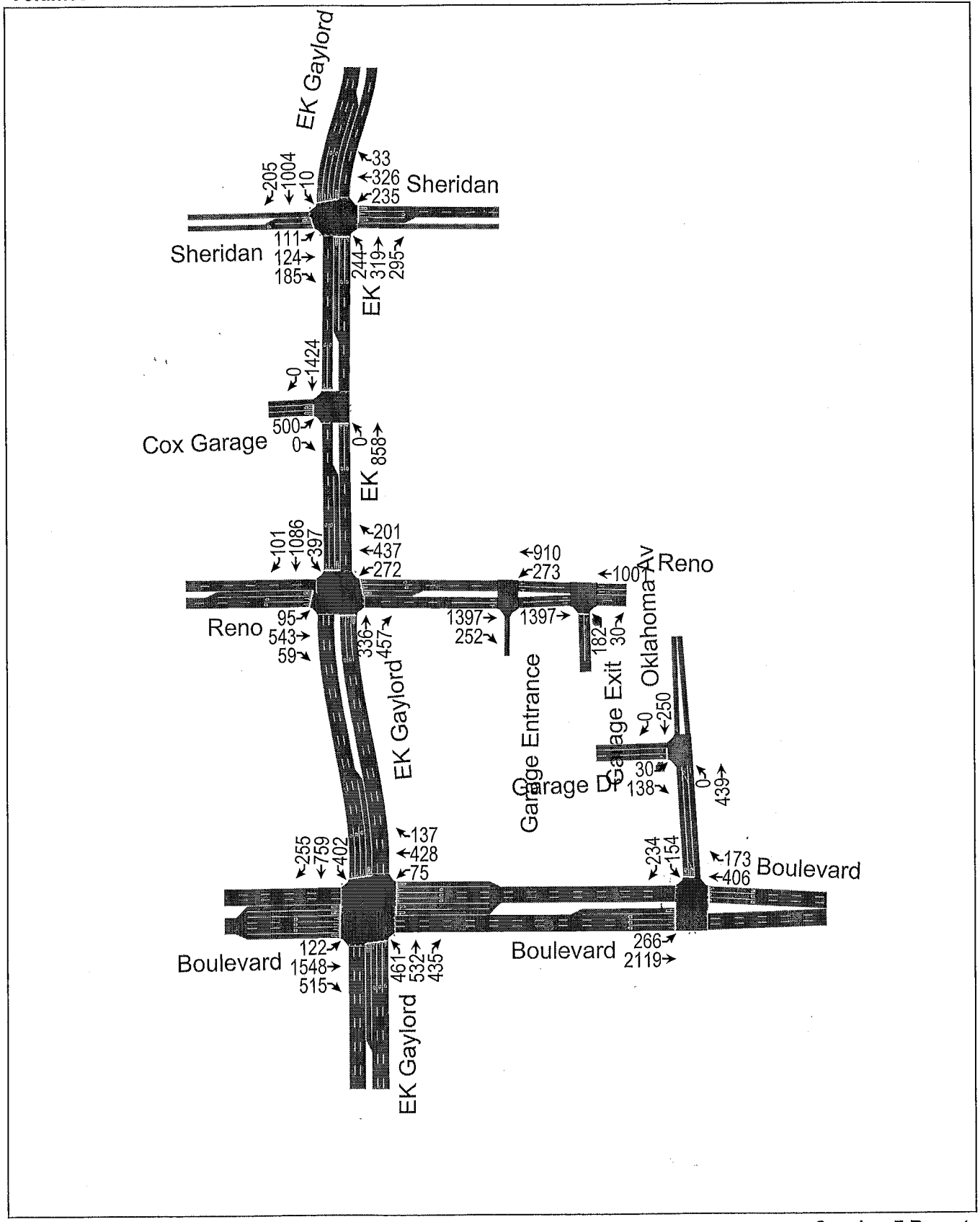
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	77	401	190	113	216	49	172	361	578	104	494	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.94		1.00	1.00	0.85	1.00	0.82		1.00	1.00	0.79
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	1688		1787	1881	1363	1787	2654		1787	3574	1269
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	1688		1787	1881	1363	1787	2654		1787	3574	1269
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	436	207	123	235	53	187	392	628	113	537	113
RTOR Reduction (vph)	0	19	0	0	0	32	0	184	0	0	0	79
Lane Group Flow (vph)	84	624	0	123	235	21	187	836	0	113	537	34
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot			Prot		pm+ov	Prot			Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	8.2	31.0		7.0	29.8	35.8	13.0	26.0		6.0	19.0	27.2
Effective Green, g (s)	8.2	31.0		7.0	29.8	35.8	13.0	26.0		6.0	19.0	27.2
Actuated g/C Ratio	0.09	0.34		0.08	0.33	0.40	0.14	0.29		0.07	0.21	0.30
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	163	581		139	623	618	258	767		119	755	384
v/s Ratio Prot	0.05	c0.37		c0.07	0.12	0.00	0.10	c0.31		0.06	c0.15	0.01
v/s Ratio Perm						0.01						0.02
v/c Ratio	0.52	1.07		0.88	0.38	0.03	0.72	1.12dr		0.95	0.71	0.09
Uniform Delay, d1	39.0	29.5		41.1	23.0	16.5	36.8	32.0		41.8	33.0	22.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.77	0.71		1.00	1.00	1.00
Incremental Delay, d2	2.7	58.8		43.7	0.4	0.0	7.4	55.8		65.9	5.6	0.1
Delay (s)	41.7	88.3		84.8	23.4	16.6	35.7	78.4		107.8	38.6	22.6
Level of Service	D	F		F	C	B	D	E		F	D	C
Approach Delay (s)		82.9			40.9			71.8			46.5	
Approach LOS		F			D			E			D	

Intersection Summary			
HCM Average Control Delay	64.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group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EK Gaylord

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	1548	515	75	428	137	461	532	435	402	759	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	1.00	0.97	0.91	1.00	1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00	0.90	1.00	1.00	0.90	1.00	0.91		1.00	0.95	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	5085	1422	3433	5085	1421	1770	4324		1770	4653	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	5085	1422	3433	5085	1421	1770	4324		1770	4653	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	1683	560	82	465	149	501	578	473	437	825	277
RTOR Reduction (vph)	0	0	0	0	0	6	0	70	0	0	61	0
Lane Group Flow (vph)	133	1683	560	82	465	143	501	981	0	437	1041	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot		pm+ov	Prot		pm+ov	Prot			Prot		
Protected Phases	7	4	5	3	8	1	5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	7.7	31.0	59.6	3.2	26.5	50.5	28.6	25.8		24.0	21.2	
Effective Green, g (s)	7.7	31.0	59.6	3.2	26.5	50.5	28.6	25.8		24.0	21.2	
Actuated g/C Ratio	0.08	0.31	0.60	0.03	0.26	0.50	0.29	0.26		0.24	0.21	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	264	1576	848	110	1348	718	506	1116		425	986	
v/s Ratio Prot	0.04	c0.33	0.19	c0.02	0.09	0.05	c0.28	0.23		c0.25	0.22	
v/s Ratio Perm			0.20			0.05						
v/c Ratio	0.50	1.07	0.66	0.75	0.34	0.20	0.99	1.04dr		1.03	1.06	
Uniform Delay, d1	44.3	34.5	13.5	48.0	29.7	13.6	35.6	35.6		38.0	39.4	
Progression Factor	1.00	1.00	1.00	0.78	0.62	0.86	1.00	1.00		0.78	0.76	
Incremental Delay, d2	1.5	43.2	1.9	21.7	0.1	0.1	37.3	9.9		40.9	38.5	
Delay (s)	45.8	77.7	15.3	59.1	18.5	11.9	72.9	45.5		70.4	68.6	
Level of Service	D	E	B	E	B	B	E	D		E	E	
Approach Delay (s)		61.2			21.8			54.3			69.1	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM Average Control Delay	57.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.0%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	266	2119	406	173	154	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.90		1.00	0.80
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	5085	4384		1770	1273
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	5085	4384		1770	1273
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	289	2303	441	188	167	254
RTOR Reduction (vph)	0	0	89	0	0	173
Lane Group Flow (vph)	289	2303	540	0	167	81
Confl. Peds. (#/hr)	100			100	100	100
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	38.3	60.3	18.0		31.7	31.7
Effective Green, g (s)	38.3	60.3	18.0		31.7	31.7
Actuated g/C Ratio	0.38	0.60	0.18		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	678	3066	789		561	404
v/s Ratio Prot	0.16	c0.45	0.12		c0.09	
v/s Ratio Perm						0.06
v/c Ratio	0.43	0.75	0.68		0.30	0.20
Uniform Delay, d1	22.7	14.4	38.3		25.8	24.9
Progression Factor	0.45	0.34	1.00		1.00	1.00
Incremental Delay, d2	0.0	0.1	2.5		1.4	1.1
Delay (s)	10.2	4.9	40.8		27.1	26.0
Level of Service	B	A	D		C	C
Approach Delay (s)		5.5	40.8		26.4	
Approach LOS		A	D		C	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	543	59	272	437	201	0	336	457	397	1086	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.94			1.00	0.91	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.95			1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3420		1770	3165			3539	1445	1770	3436	
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1770	3420		1770	3165			3539	1445	1770	3436	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	590	64	296	475	218	0	365	497	432	1180	110
RTOR Reduction (vph)	0	8	0	0	50	0	0	0	18	0	7	0
Lane Group Flow (vph)	103	646	0	296	643	0	0	365	479	432	1283	0
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot			Prot					pm+ov	Prot		
Protected Phases	7	4		3	8			2	3	1	6	
Permitted Phases									2			
Actuated Green, G (s)	8.9	20.7		20.1	31.9			16.2	36.3	27.0	47.2	
Effective Green, g (s)	8.9	20.7		20.1	31.9			16.2	36.3	27.0	47.2	
Actuated g/C Ratio	0.09	0.21		0.20	0.32			0.16	0.36	0.27	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	158	708		356	1010			573	525	478	1622	
v/s Ratio Prot	0.06	c0.19		0.17	0.20			0.10	c0.18	c0.24	0.37	
v/s Ratio Perm									0.15			
v/c Ratio	0.65	0.91		0.83	0.64			0.64	0.91	0.90	0.79	
Uniform Delay, d1	44.1	38.8		38.3	29.1			39.2	30.3	35.2	22.2	
Progression Factor	1.00	1.00		1.00	1.00			1.03	0.74	0.42	0.15	
Incremental Delay, d2	9.3	16.1		15.1	1.3			3.9	15.5	15.6	2.9	
Delay (s)	53.3	54.9		53.5	30.4			44.3	38.1	30.5	6.3	
Level of Service	D	D		D	C			D	D	C	A	
Approach Delay (s)		54.7			37.3			40.7			12.4	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1397	252	273	910	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1518	274	297	989	0	0
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	0.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	370					
pX, platoon unblocked			0.83		0.83	0.83
vC, conflicting volume			1892		2943	1096
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1662		2932	701
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			6		100	100
cM capacity (veh/h)			317		1	289

Direction, Lane #	EB 1	EB 2	WB 1	WB 2
Volume Total	1012	780	626	659
Volume Left	0	0	297	0
Volume Right	0	274	0	0
cSH	1700	1700	317	1700
Volume to Capacity	0.60	0.46	0.94	0.39
Queue Length 95th (ft)	0	0	234	0
Control Delay (s)	0.0	0.0	72.4	0.0
Lane LOS			F	
Approach Delay (s)	0.0		35.3	
Approach LOS				

Intersection Summary			
Average Delay	14.7		
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↰	↱
Volume (veh/h)	1397	0	0	1001	182	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1518	0	0	1088	198	33
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	8	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	520					
pX, platoon unblocked			0.86		0.86	0.86
vC, conflicting volume			1618		2262	959
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1397		2145	633
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		0	89
cM capacity (veh/h)			383		30	306

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	759	759	544	544	198	33
Volume Left	0	0	0	0	198	0
Volume Right	0	0	0	0	0	33
cSH	1700	1700	1700	1700	30	306
Volume to Capacity	0.45	0.45	0.32	0.32	6.57	0.11
Queue Length 95th (ft)	0	0	0	0	Err	9
Control Delay (s)	0.0	0.0	0.0	0.0	Err	18.2
Lane LOS					F	C
Approach Delay (s)	0.0		0.0		8586.6	
Approach LOS					F	

Intersection Summary			
Average Delay	697.5		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	138	0	439	250	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	150	0	477	272	0
Pedestrians	100			100	100	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	8			8	8	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				336		
pX, platoon unblocked						
vC, conflicting volume	949	472	372			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	949	472	372			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	70	100			
cM capacity (veh/h)	243	498	1088			

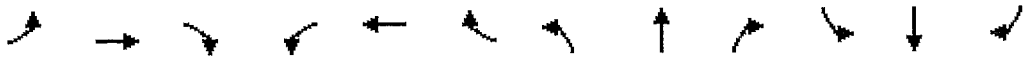
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	33	150	0	477	272
Volume Left	33	0	0	0	0
Volume Right	0	150	0	0	0
cSH	243	498	1700	1700	1700
Volume to Capacity	0.13	0.30	0.00	0.28	0.16
Queue Length 95th (ft)	11	31	0	0	0
Control Delay (s)	22.1	15.3	0.0	0.0	0.0
Lane LOS	C	C			
Approach Delay (s)	16.5		0.0		0.0
Approach LOS	C				

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	500	0	0	858	1424	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.95	
Frpb, ped/bikes	1.00			1.00	1.00	
Flpb, ped/bikes	1.00			1.00	1.00	
Frt	1.00			1.00	1.00	
Flt Protected	0.95			1.00	1.00	
Satd. Flow (prot)	1770			3539	3539	
Flt Permitted	0.95			1.00	1.00	
Satd. Flow (perm)	1770			3539	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	543	0	0	933	1548	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	543	0	0	933	1548	0
Confl. Peds. (#/hr)	100	100	100			100
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	35.1			56.9	56.9	
Effective Green, g (s)	35.1			56.9	56.9	
Actuated g/C Ratio	0.35			0.57	0.57	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	621			2014	2014	
v/s Ratio Prot	c0.31			0.26	c0.44	
v/s Ratio Perm						
v/c Ratio	0.87			0.46	0.77	
Uniform Delay, d1	30.4			12.6	16.5	
Progression Factor	1.00			0.56	0.17	
Incremental Delay, d2	13.0			0.7	1.1	
Delay (s)	43.4			7.8	4.0	
Level of Service	D			A	A	
Approach Delay (s)	43.4			7.8	4.0	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	111	124	185	235	326	33	244	319	295	10	1004	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.88		1.00	1.00	0.82	1.00	0.84		1.00	1.00	0.74
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.91		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1497		1770	1863	1301	1770	2769		1770	3539	1175
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1497		1770	1863	1301	1770	2769		1770	3539	1175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	135	201	255	354	36	265	347	321	11	1091	223
RTOR Reduction (vph)	0	53	0	0	0	26	0	162	0	0	0	23
Lane Group Flow (vph)	121	283	0	255	354	10	265	506	0	11	1091	200
Confl. Peds. (#/hr)	100		100	100		100	100		100	100		100
Turn Type	Prot			Prot		pm+ov	Prot			Prot		pm+ov
Protected Phases	7	4		3	8	1	5	2		1	6	7
Permitted Phases						8						6
Actuated Green, G (s)	8.9	18.0		15.0	24.1	26.5	17.6	48.6		2.4	33.4	42.3
Effective Green, g (s)	8.9	18.0		15.0	24.1	26.5	17.6	48.6		2.4	33.4	42.3
Actuated g/C Ratio	0.09	0.18		0.15	0.24	0.26	0.18	0.49		0.02	0.33	0.42
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	158	269		266	449	345	312	1346		42	1182	497
v/s Ratio Prot	0.07	c0.19		c0.14	0.19	0.00	c0.15	0.18		0.01	c0.31	0.04
v/s Ratio Perm						0.01						0.13
v/c Ratio	0.77	1.05		0.96	0.79	0.03	0.85	0.38		0.26	0.92	0.40
Uniform Delay, d1	44.5	41.0		42.2	35.6	27.2	39.9	16.2		47.9	32.1	20.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.09	0.87		1.00	1.00	1.00
Incremental Delay, d2	19.6	68.9		43.3	8.9	0.0	16.1	0.7		3.3	13.2	0.5
Delay (s)	64.1	109.9		85.5	44.5	27.2	59.8	14.7		51.2	45.3	20.6
Level of Service	E	F		F	D	C	E	B		D	D	C
Approach Delay (s)		97.8			59.7			27.5			41.2	
Approach LOS		F			E			C			D	

Intersection Summary				
HCM Average Control Delay	48.6	HCM Level of Service	D	
HCM Volume to Capacity ratio	0.94			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.0	
Intersection Capacity Utilization	89.1%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

7.0 Capital Cost Estimate

Intermodal Transportation Hub
Estimate of Probable Construction Costs Summary

Project Summary

Phase 1	
Hard Costs	**$4,832,850**
Soft Costs	**$4,254,041**
Phase 1 Total	**$9,086,891**
Phase 2 (A & B)	
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**

Intermodal Transportation Hub
Estimate of Probable Construction Costs Summary

Project Summary (Exclusive of High speed Rail)

Phase 1	
Hard Costs	**$4,832,850**
Soft Costs	**$4,254,041**
Phase 1 Total	**$9,086,891**
Phase 2 (A & B)	
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**

Note: High Speed Rail will share part of project cost for Commuter Rail Platform, Transit Hall, Sante Fe and Platform access

Intermodal Transportation Hub

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Estimate of Probable Construction Costs Summary

Phase 1 (Summary)

Property Acquisition , Sante Fe Modifications

Construction (Hard) Costs [1]		
Hub Terminal Modifications		**$3,514,800**
Sante Fe Modifications / Transit Hall		
Project Total		**$3,514,800**
Design Contingency	25% of Project Total	**$878,700**
Subtotal		**$4,393,500**
Construction Contingency	10% of total Construction Costs	**$439,350**
Total Terminal Facility Construction Costs		**$4,832,850**
Soft Costs [1]		
Sante Fe Terminal and Related Property		**$2,278,642**
Real Estate Acquisition, Tennant Relocation, Fees, Legal		
Garage Property		**$1,348,179**
Real Estate Acquisition, Fees, Legal		
Design Fees		**$627,220**
Environmental / Design / Construction Management		
Total Soft Costs Costs		**$4,254,041**
Total Phase Costs		**$9,086,891**

Intermodal Transportation Hub

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Estimate of Probable Construction Costs

Phases 1 (Detail - Soft Costs)

Soft Costs [1]

Real Estate Acquisition [1]

Sante Fe Terminal and Related Property

County Assessor's Valuation		$1,453,035	
20% Property Value Escalation over Valuation		$290,607	
Leasehold Interests and Retail Tenant Relocation (allowance)		$150,000	
Legal / Administrative related to ODOT leasehold assignment		$10,000	
Environmental Clearance, Testing, Reports		$175,000	
Facility Assessment and Building Stabilization Measures (allowance)		$200,000	
Subtotal		**$2,278,642**	

Garage Property

County Assessor's Valuation		$1,044,316	
20% Property Value Escalation over Valuation		$208,863	
Environmental Clearance, Testing, Reports		$75,000	
Legal, Survey, Miscellaneous		$20,000	
Subtotal		**$1,348,179**	$3,626,821

Design Fees / Permits

Based on Hard Cost Exclusive of Construction Contingency

Environmental Assessment (included in Commuter / Passenger Rail EIS)		$0
Sante Fe Pre-design Assessment	Allowance	$50,000
A/E Design Fees	10% Construction Costs	$439,350
Construction Manager Fees	2% Construction Costs	$87,870
Permits (allowance)		$50,000
Subtotal		**$627,220**

Total Project Soft Costs ($2011) **$4,254,041**

Notes:

[1] Cost do not including financing or agency costs

Intermodal Transportation Hub

15-Jul-11

Estimate of Probable Construction Costs

Phase 1 (Detail - Hard Costs)

Construction (Hard) Costs [1]				
Hub Terminal	**Area**	**Units**	**Unit Price**	**Cost**
Surface Parking (resurfacing of 130 existing spaces)	42000	SF	5.00	$210,000
Sante Fe Building Preservation / Renovation	8000	SF	225.00	$1,800,000
Sante Fe Building Renovation - Amtrak [2]	9800	SF	150.00	$1,470,000
Public Art (1%)	1	LS	34800.00	$34,800
Project Total				**$3,514,800**
Design Contingency	25% of Project Total			$878,700
Subtotal				**$4,393,500**
Construction Contingency	10% of total Construction Costs			$439,350
Total Terminal Facility Construction Costs [1]				**$4,832,850**

Notes

[1] All costs are in 2011 $

[2] Tenant finish by Amtrak nort included

Intermodal Transportation Hub

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Estimate of Probable Construction Costs Summary

Phase 2 A & B (Summary)

Transit Hall, Platform No. 1 - Amtrak, Platform No. 2 - Commuter Rail / HSR, Plazas, Parking Structure

Construction (Hard) Costs [1]		
Hub Terminal		**$4,508,640**
Sante Fe Modifications / Transit Hall		
Common Passenger Areas (Access / Canopy)		**$19,174,250**
Pedestrian Underpass / Canopies		
Passenger Boarding Areas		**$3,799,180**
Commuter Rail		$1,909,730
High Speed Rail		$645,650
Amtrak		$1,243,800
Gaylord Plaza / Streetscape		**$990,050**
Pedestrian Streetscape / Drop / Off Lanes		
Bricktown Plaza / Canopy		**$3,879,990**
Upper Pedestrian Linkage / Lower Plaza / Pedestrian Bridges		
Parking Structure		**$13,611,500**
Commuter Rail / Amtrak - 243 Spaces		$1,579,500
High Speed Rail - 586 Spaces / Access Roadway / Platform Access		$12,032,000
Intercity Bus		**$1,552,325**
Tennant Space / Bus Parking / Access		
Project Total		**$47,515,935**
Design Contingency	25% of Project Total	**$11,878,984**
Subtotal		**$59,394,919**
Construction Contingency	10% of total Construction Costs	**$5,939,492**
Total Terminal Facility Construction Costs		**$65,334,411**
Soft Costs [1]		
Sante Fe Terminal and Related Property		**$0**
Real Estate Acquisition, Tennant Relocation, Fees, Legal		
Garage Property		**$0**
Real Estate Acquisition, Fees, Legal		
Design Fees		**$7,302,390**
Environmental / Design / Construction Management		
Total Soft Costs Costs		**$7,302,390**
Total Phase Costs		**$72,636,802**

Intermodal Transportation Hub

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Estimate of Probable Construction Costs

Phase 2 A & B (Detail - Soft Costs)

Soft Costs [1]

Real Estate Acquisition [1]

Sante Fe Terminal and Related Property		**See Phase 1**
County Assessor's Valuation		
20% Property Value Escalation over Valuation		
Leasehold Interests and Retail Tenant Relocation (allowance)		
Legal / Administrative related to ODOT leasehold assignment		
Environmental Clearance, Testing, Reports		
Facility Assessment and Building Stabilization Measures (allowance)		
Subtotal		**$0**
Garage Property		**See Phase 1**
County Assessor's Valuation		
20% Property Value Escalation over Valuation		
Environmental Clearance, Testing, Reports		
Legal, Survey, Miscellaneous		
Subtotal		**$0**

Design Fees / Permits

Based on Hard Cost Exclusive of Construction Contingency		
Environmental Assessment (included in Commuter / Passenger Rail EIS)		$0
Sante Fe Pre-design Assessment	Allowance	$50,000
Pre-Design Services (Project Definition)	Allowance	$75,000
A/E Design Fees	10% Construction Costs	$5,939,492
Construction Manager Fees	2% Construction Costs	$1,187,898
Permits (allowance)		$50,000
Subtotal		**$7,302,390**
Total Project Soft Costs ($2011)		**$7,302,390**

Notes:

[1] Cost do not including financing or agency costs

Intermodal Transportation Hub

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Estimate of Probable Construction Costs

Phase 2 A & B (Detail - Hard Costs)

Construction (Hard) Costs [1]				
Hub Terminal	**Area**	**Units**	**Unit Price**	**Cost**
Site Demolition at Building Area (Existing Parking Area)	6600	SF	7.50	$49,500
Surface Parking (resurfacing of 130 existing spaces)	0	SF	5.00	$0
Sante Fe Building Preservation / Renovation	0	SF	175.00	$0
Sante Fe Building Renovation - Amtrak	0	SF	150.00	$0
Transit Hall North New Construction (Commuter)	11620	SF	275.00	$3,195,500
Transit Hall Canopy / Bike Station [3]	7200	SF	120.00	$864,000
Fixtures / Furnishing				
Seating / Amenities (Allowance)	1	LS	100000.00	$100,000
Digital Schedule Display	3	LS	35000.00	$105,000
Utilities Allowance	1	LS	150000.00	$150,000
Public Art (1%)	1	LS	44640.00	$44,640
Terminal Sub Total				**$4,508,640**
Common Passenger Boarding Area (Access / Canopy)	**Area**	**Units**	**Unit Price**	**Cost**
Passenger Underpass (Cut & Cover) Excavation	2400	CY	120.00	$288,000
Passenger Underpass Construction	1600	SF	350.00	$560,000
Primary Canopy / Support [2]	81450	SF	225.00	$18,326,250
Common Boarding Area Sub Total				**$19,174,250**
Passenger Boarding Areas	**Area**	**Units**	**Unit Price**	**Cost**
Commuter Rail				
Passenger Underpass (Cut & Cover) Excavation	1700	CY	140.00	$238,000
Passenger Underpass Construction	2000	SF	300.00	$600,000
Platform				
Concrete Platform	9100	SF	12.00	$109,200
Enhanced Platform / Pavers Finish	7700	SF	4.50	$34,650
Warning Strips	700	LF	22.00	$15,400
Secondary Canopy	880	SF	95.00	$83,600
Windscreens / Seating (allowance)	1	LS	80,000.00	$80,000
Elevator 1 / Excavation (north)	96	CY	140.00	$13,440
Elevator 1 (north)	1	EA	200,000.00	$200,000
Elevator 2 / Excavation (south)	96	CY	140.00	$13,440
Elevator 2 (south)	1	EA	150,000.00	$150,000
Stair 1 / Excavation (north)	150	CY	140.00	$21,000
Stair 1 (north)	1	EA	40,000.00	$40,000
Stair 2 / Excavation (south)	150	CY	140.00	$21,000
Stair 2 (south)	1	EA	40,000.00	$40,000
Communications / Electrical (allowance)	1	LS	250,000.00	$250,000
Commuter Rail Sub Total				**$1,909,730**
High Speed Rail (Shared with Commuter Rail)				
Platform				
Concrete Platform (900' - 350' = 550' additional)	14300	SF	12.00	$171,600
Enhanced Platform / Pavers Finish	12100	SF	4.50	$54,450
Warning Strips	1100	LF	22.00	$24,200
Secondary Canopy	1320	SF	95.00	$125,400
Windscreens / Seating (allowance)	1	LS	120,000.00	$120,000
Communications / Electrical (allowance)	1	LS	150,000.00	$150,000
HSR/Commuter Rail Sub Total				**$645,650**
Amtrak				
Existing Platform Demo	24000	SF	7.50	$180,000
Platform (New)				
Concrete Platform	24000	SF	12.00	$288,000
Enhanced Platform / Pavers Finish	24000	SF	4.50	$108,000
Warning Strips	2400	LF	22.00	$52,800
Secondary Canopy	2200	SF	95.00	$209,000
Windscreens / Seating (allowance)	1	LS	100,000.00	$100,000
Passenger Elevator Replacement	1	LS	150,000.00	$150,000
Baggage Elevator Replacement	1	LS	95,000.00	$95,000
Stair 1 / Excavation	150	CY	140.00	$21,000
Stair 1	1	EA	40,000.00	$40,000
Amtrak Boarding Areas Sub Total				**$1,243,800**

Gaylord Plaza / Streetscape	Area	Units	Unit Price	Cost
Site Demolition at Building Area (Existing Parking Area)	30283	SF	5.00	$151,415
Street Demolition	8400	SF	7.00	$58,800
Drainage Modifications	1	LS	150000.00	$150,000
6" Concrete Paver Base (50% Total Area)	15142	SF	4.00	$60,568
6" Finished Concrete (50% Total Area)	15142	SF	5.00	$75,710
Hardscape (50% Unit pavers)	15142	SF	4.50	$68,139
Drop Off Lane (8" concrete)	5184	SF	6.50	$33,696
New Curb & Gutter	1071	LF	20.00	$21,420
Pedestrian Lighting 50' oc	20	EA	5,000.00	$100,000
Bollards	26	EA	750.00	$19,500
Street Trees / Grates	24	EA	4,500.00	$108,000
Plaza Trees	12	EA	3,000.00	$36,000
Tree Underdrains	1000	LF	20.00	$20,000
Seating / Trash Receptacles (Allowance)	1	LS	15,000.00	$15,000
Bike Racks	8	EA	1,500.00	$12,000
Irrigation	1	LS	50,000.00	$50,000
Public Art (1%)	1	LS	9,802.48	$9,802
Gaylord Plaza Sub Total				**$990,050**

Bricktown Plaza / Canopy	Area	Units	Unit Price	Cost
Existing Lower Level Plaza Demolition (Allowance)	66,261	SF	10.00	$662,610
Demolition of Existing Canal on South End	6,750	SF	22.00	$148,500
New Lower Level Lawn	17,470	SF	4.00	$69,880
New Lower Level Walks Pavers (50% pavers with conc)	24,400	SF	10.00	$244,000
New Lower Level Walks Concrete	24,400	SF	5.00	$122,000
Planting (Trees)	55	EA	2500.00	$137,500
Upper Level Canopy	8,830	SF	50.00	$441,500
Flag Poles	9	EA	6000.00	$54,000
Sub Surface Drainage	1,000	LF	20.00	$20,000
Irrigation	1	LS	40000.00	$40,000
Bridge Connections to Transit	4,000	SF	200.00	$800,000
Elevator	1	LS	200000.00	$200,000
Stair	1	LS	40000.00	$40,000
Modifications to Canal and Fountain Equipment	1	LS	750000.00	$750,000
Pedestrian Lighting 50' oc	30	EA	5000.00	$150,000
Bricktown Plaza Sub Total				**$3,879,990**

Parking	Area	Units	Unit Price	Cost
Surface Parking (Commuter Rail / Amtrak)				
243 Spaces	243	EA	6,500.00	1,579,500
Surface Parking Sub Total				**$1,579,500**
HSR Parking Structure				
586 Spaces [4]	586	EA	20000.00	11,720,000
Access Roadway	4,200	SF	10.00	42,000
Pedestrian Enclosure to Guideway	1,800	SF	150.00	270,000
Structure Parking Sub Total				**$12,032,000**

Intercity Bus	Area	Units	Unit Price	Cost
Enclosed Space (Finishout by Tenant)	15,000	SF	75.00	$1,125,000
Bus Canopy	4,500	SF	80.00	$360,000
Exterior Boarding Area	2,250	SF	4.50	$10,125
Bus Circulation / Access (8" concrete)	8,800	SF	6.50	$57,200
Intercity Bus Sub Total				**$1,552,325**

Project Total		**$47,515,935**
Design Contingency	25% of Project Total	$11,878,984
Subtotal		**$59,394,919**
Construction Contingency	10% of total Construction Costs	$5,939,492
Total Terminal Facility Construction Costs [1]		**$65,334,411**

Notes

[1] All costs are in 2011 $

[2] Canopy Unit Cost includes foundations and lighting

[3] Bikes / Equipment not included

[4] Garage unit costs include vertical circulation

Terminal Transit Hall includes waiting/common areas and unfinished tenant space

Tenant finish by Transportation Providers / Retail Tenants

Track relocation for platform construction by others (Commuter Rail / HSR programs)

Streetcar and LRT costs by others

Intermodal Transportation Hub

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Estimate of Probable Construction Costs

Phase 3 (Summary)

Guideway/Bridge Widening Platform No.3

Construction (Hard) Costs [1]		
Infrastructure (Guideway Expansion)		$13,640,000
Elevated Guideway / Bridge Widening		
Common Passenger Areas (Access / Canopy)		$9,523,125
Pedestrian Underpass / Primary Canopy		
Passenger Boarding Areas		$2,145,500
Commuter Rail		$1,059,650
High Speed Rail		$1,085,850
Bricktown Plaza / Canopy		$1,799,200
Project Total		**$27,107,825**
Design Contingency	25% of Project Total	$6,776,956
Subtotal		**$33,884,781**
Construction Contingency	10% of total Construction Costs	$3,388,478
Total Construction Costs [1]		**$37,273,259**
Soft Costs [1]		
Design Fees		
A/E Design Fees	10% Construction Costs	$3,388,478
Construction Manager Fees	2% Construction Costs	$677,696
Total Soft Costs Costs		**$4,066,174**
Total Phase Costs		**$41,339,433**

Notes

[1] All costs are in 2011 $

[2] Canopy Unit Cost includes foundations and lighting

Sub ballast / Ballast and Trackwork by others (Commuter Rail / HSR programs)

Intermodal Transportation Hub

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Estimate of Probable Construction Costs

Phase 3 (Detail - Hard Costs)

Construction (Hard) Costs [1]				
Infrastructure (Guideway Expansion)	**Area**	**Units**	**Unit Price**	**Cost**
Site Demolition	196000	SF	10.00	$1,960,000
Excavation	16500	CY	10.00	$165,000
Footings / CIP Concrete Retailing Wall	20000	CY	350.00	$7,000,000
Select Fill	130000	CY	13.00	$1,690,000
Sheridan RR Bridge Expansion (25' span)	3600	SF	300.00	$1,080,000
Reno Bridge Expansion (25' span)	3600	SF	300.00	$1,080,000
Boulevard RR Bridge Expansion (35' span)	1900	SF	350.00	$665,000
Terminal Sub Total				**$13,640,000**
Common Passenger Boarding Area (Access / Canopy)	**Area**	**Units**	**Unit Price**	**Cost**
Passenger Underpass Extension Construction	1200	SF	300.00	$360,000
Primary Canopy / Support [2]	40725	SF	225.00	$9,163,125
Common Boarding Area Sub Total				**$9,523,125**
Passenger Boarding Areas	**Area**	**Units**	**Unit Price**	**Cost**
Commuter Rail				
Passenger Underpass Extension Construction	2000	SF	300.00	$600,000
Platform				
Concrete Platform	9100	SF	12.00	$109,200
Enhanced Platform / Pavers Finish	7700	SF	4.50	$34,650
Warning Strips	700	LF	22.00	$15,400
Secondary Canopy	880	SF	80.00	$70,400
Windscreens / Seating (allowance)	1	LS	200,000.00	$200,000
Elevator 3 (north)	1	EA	200,000.00	$200,000
Elevator 4 (south)	1	EA	150,000.00	$150,000
Stair 3 (north)	1	EA	40,000.00	$40,000
Stair 4 (south)	1	EA	40,000.00	$40,000
Communications / Electrical (allowance)	1	LS	200,000.00	$200,000
Commuter Rail Sub Total				**$1,059,650**
High Speed Rail				
Platform				
Concrete Platform	14300	SF	12.00	$171,600
Enhanced Platform / Pavers Finish	12100	SF	4.50	$54,450
Warning Strips	1100	LF	22.00	$24,200
Secondary Canopy	1320	SF	80.00	$105,600
Windscreens / Seating (allowance)	1	LS	200,000.00	$200,000
Elevator 3 (north)	1	EA	200,000.00	$200,000
Elevator 4 (south)	1	EA	150,000.00	$150,000
Stair 3 (north)	1	EA	40,000.00	$40,000
Stair 4 (south)	1	EA	40,000.00	$40,000
Communications / Electrical (allowance)	1	LS	100,000.00	$100,000
HSR Sub Total				**$1,085,850**
Bricktown Plaza / Canopy	**Area**	**Units**	**Unit Price**	**Cost**
Existing Lower Level Plaza Demolition (Allowance)	20000	SF	10.00	$200,000
Replaced Lower Level Lawn	5200	SF	4.00	$20,800
New Lower Level Walks Pavers (50% pavers with Conc. base)	7320	SF	10.00	$73,200
New Lower Level Walks Concrete	7320	SF	5.00	$36,600
Planting (Trees)	16	EA	1000.00	$16,000
Upper Level Canopy Relocation	8830	SF	20.00	$176,600
Sub Surface Drainage	1000	LF	20.00	$20,000
Irrigation	1	LS	6000.00	$6,000
Bridge Connections to Transit (Modifications)	1200	SF	200.00	$400,000
Elevator	1	150,000	2000.00	$400,000
Stair	1	LS	40000.00	$400,000
Pedestrian Lighting 50' oc	10	EA	5,000.00	$50,000
Bricktown Plaza Sub Total				**$1,799,200**
Project Total				**$27,107,825**
Design Contingency	25% of Project Total			$6,776,956
Subtotal				**$33,884,781**
Construction Contingency	10% of total Construction Costs			$3,388,478

Total Construction Costs [1]	**$37,273,259**

Notes

[1] All costs are in 2011 $

[2] Canopy Unit Cost includes foundations and lighting

Sub ballast / Ballast and Trackwork by others (Commuter Rail / HSR programs)