

COTPA FIXED GUIDEWAY TRANSIT STUDY
3rd Steering Committee Meeting
Agenda

Presbyterian Health Foundation Conference Center
655 Research Parkway
Tuesday, June 28, 2005
3:00 to 5:00 P.M.

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|------------------|--|--|
| 3:00 – 3:05 P.M. | 1, Opening Remarks..... | Mick Cornett
Mayor of Oklahoma City |
| 3:05 – 3:10 P.M. | 2. Introductions..... | Chris Kauffman
COTPA Board Chairman |
| 3:10 – 3:20 P.M. | 3. Results of June 14-16 Public Meetings | Tom Shelton
Carter & Burgess |
| 3:20 – 3:30 P.M. | 4. Results of June 21, 2005 Interagency Work Group Meeting | Mike McAnelly
Carter & Burgess |
| 3:30 – 4:00 P.M. | 5. Corridor Alternative Technologies and Alignment Concepts | Mike McAnelly
Carter & Burgess |
| | <ul style="list-style-type: none">• Corridor Delineation• Alternative Fixed Guideway Transit Technologies• Alternative Alignments and Station Areas• Central Area Concept• Travel Demand and Ridership Potential | |
| 4:00 – 4:30 P.M. | 6. Break-Out Groups to Review and Comment on Alternative Technologies, Alignments, and Station Areas | |
| 4:30 – 4:45 P.M. | 7. Report Back from Break-Out Groups | |
| | <ul style="list-style-type: none">• Alternative Technologies• Alternative Alignments• Station Areas | |
| 4:45 – 5:00 P.M. | 8. Next Steps and Tentative Date for next Steering Committee Meeting on Tuesday, September 13, 2005 or Tuesday September 20, 2005 (to be confirmed later) | |
| 5:00 P.M. | 9. Adjourn | |

Public Meeting Report

PROJECT: Fixed Guideway Study, Central Oklahoma Transportation and Parking Authority (COTPA)

PROJECT NO.: 023144.010.001

PRESENT: See attached sign-in sheets

DATE: June 14-16, 2005 and July 7, 2005

The following is our understanding of the subject matter covered in this meeting. If this differs from your understanding, please notify us within five working days.

The second series of seven public meetings was conducted at various locations dispersed across the Oklahoma City Metropolitan Area over a period of three days, from June 14-16, 2005 and July 7, 2005. The purpose of the meetings was to provide an update about the Fixed Guideway Study and to obtain input regarding alternative fixed guideway transit technologies and potential alignment concepts for each of the project corridors. The following handouts were made available to meeting participants: Meeting Agenda, *Pathways* May 2005 newsletter, Comment Card, Land Use map, and Existing Transit Service map. The public comments received from the meetings are documented for each meeting location in the following sections of this meeting record.

Norman Library, 225 N. Webster Ave., Norman -- Tuesday, June 14, 2005, 12:00 PM to 1:30 PM

Harold Haralson, Mayor of the City of Norman, called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Tom Shelton, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Tom reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Tom then reviewed the corridors, evaluation criterion, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology preferences in their corresponding corridor. The following comments were received from participants in the meeting.

- Public transportation should utilize the most cost effective alternatives.
- Historically, the Norman and Oklahoma City area has a well developed interurban rail transit system, which should be considered as a model for possible re-introduction of fixed guideway transit for the area.
- The Bus Rapid Transit technology alternative should include consideration of adding new lanes to I-35 between Norman and Oklahoma City.
- Bus Rapid Transit seems to be an attractive option because stations could be located at points encircling Norman:
 - North side of Norman
 - West at W.24th and Main
 - East at E. 24th and Main

- On the OU campus
 - South on HWY 9
 - Add a seasonal stop for football games or special events at the University
- Would like to look at Commuter Rail going from Oklahoma City to Norman (or even further south to Purcell or Noble) with a downtown central hub in both Norman and Oklahoma City
 - Need a station by Crossroads Mall
 - Norman stop should be at the downtown Norman rail station - make it a central hub connecting to bus routes, hike and bike trails, and commuter parking.
- Need to improve the existing bus system!
 - Current bus system is not sufficient for people living outside zone 2
 - Handicap riders must call a van to get a ride somewhere – demand responsive service
 - Need more frequent buses (it is an hour wait now)
 - Need more wheelchair seating on buses; some wheelchair riders have to wait for another bus because the handicap seating is taken
- Light rail or streetcar stations should be located near the Health Science Center, Oklahoma State Capitol campus, and Downtown
- Need a transit hub at a location in downtown Norman like the Santa Fe Station
- Union Station in Oklahoma City has more available land for redevelopment around it; not as congested as the Santa Fe terminal near Bricktown in OKC.
- Historic transit service should be considered, recognizing the Interurban trolley lines that once served the area.
- New rail transit could be less expensive by using the existing rail right-of-way.
- The Burlington Northern Santa Fe Railway is considering adding a second main line for their own freight rail use. Additional capacity may be necessary for commuter rail use. Additional tracks could be shared for use by freight and commuter rail.
- May need to consider widening the existing railroad right-of-way to accommodate both freight and commuter rail.
- Park & Ride station locations can be at OU, HSC, State Capitol, Downtown, at Hwy 9 & BNSF RR, and at Tecumseh & BNSF RR.
- Light Rail Transit might be easier to implement than Commuter Rail since LRT could utilize the streets right-of-way.
- Availability of locations for a park and ride station is difficult between the new Research Park and the OU campus.
- Improved bus service would be a better possibility than Bus Rapid Transit.
- Something other than regular bus service should be considered which does not use existing roads/streets, because of busy traffic causing congestion on the roadways during peak periods.
- Hwy 9 gets lots of traffic. Hwy 9 east of Hwy 77 needs to have improved bus service.
- Light Rail Transit can save fuel costs because it is electrically powered.
- Light Rail Transit can use existing street right-of-way to connect between places. That's why it can be very effective in this corridor.
- A commuter rail connection should be established between Tinker AFB and the northern portion of the Norman-Oklahoma City corridor. I-240 is the connecting route between I-35 and Tinker AFB.
- The cost of constructing Light Rail Transit is very high compared to the improved bus, Bus Rapid Transit, or Commuter Rail options.
- Travel patterns/times should be considered in order to plan the network of alignments for the fixed guideway system.

- Southwest Norman is designated as the future growth area.
- Commuter Rail Transit (CRT) could extend south to Purcell with varying stations. Union Station is too far from CBD so the downtown Oklahoma City station should be located at the Santa Fe Depot.
- Double track should extend all the way between Norman and Oklahoma City with a third track added at some locations.
- HOV lanes would require new lanes to be added to I-35.
- Union Station would be a desirable intermodal site serving the central Oklahoma City area.

Belle Isle Public Library, 5501 N. Villa Ave., Oklahoma City --Tuesday, June 14, 2005, 6:30 PM to 8:00 PM

Larry Hopper called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Tom Shelton, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Tom reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Tom then reviewed the concept corridors, evaluation criteria, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology and alignment preferences in their corresponding corridor. The following comments were received.

- It is logical to use history as our guide. There used to be Interurban rail lines that went through Yukon. We should start in the central area and then expand outward to the surrounding areas.
- Don't think people will ride buses, but Light Rail has more appeal.
- Northwest Highway has a good median that should be taken advantage of.
- Bus Rapid Transit (BRT) would be a good solution for the Northwest Corridor.
- We need to get acceptance by providing good bus service that will get people on board. People are married to their automobiles - idea to fix that would be to reduce availability or increase cost of downtown parking.
- Need to improve current bus system with more frequent service and expanded routes.
- Consider putting Bus Rapid Transit on Broadway Extension, Hefner Parkway, and Yukon Corridor
- CRT can use the existing right-of-way - Yukon to Oklahoma City downtown.
- LRT is more expensive than CRT, though it is more attractive
- HOV lane can be implemented along I-40 from Yukon to downtown Oklahoma City.
- Environmental study needs to be done to find out impact of noise and safety issues.
- These CRT or HOV will include employment areas along South Meridian - south of I-40.
- Park and Ride locations: Mustang Road, Meridian, Rockwell, Fairgrounds.
Westside I-44 Corridor
- Utilize the highway right-of-way
- Hefner Parkway & I-44 need some kind of HOV lanes to control traffic
- NW of Oklahoma City is having rapid growth
Northwest Corridor
- NW Expressway is a six-lane roadway with a wide median.
- BRT can be implemented along the median.

Edmond Public Library, 10 S. Boulevard, Edmond -- Wednesday, June 15, 2005, 12:00 PM to 1:30 PM

Larry Hopper called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Mike McAnelly, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Mike reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Mike then reviewed the corridors, evaluation criteria, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology preferences and potential alignments in their corresponding corridor. The following comments were received.

- Most of the people who live in Edmond don't work in Edmond.
- 87% of University of Central Oklahoma students commute.
- More bus routes should be provided around the University of Central Oklahoma campus.
- HOV or Light rail should be considered down the Broadway Extension or Commuter Rail along the existing BNSF tracks
- Improved Bus is needed along 2nd Street.
- Whatever technology is used, it needs to go far enough North to reach the MAC senior center with a station somewhere between Covell and Sorghum Mill.
- Would be ideal to go as far north as Guthrie with Commuter Rail service.
- Should be a station or stop on Britton, 63rd, or at I-44 and 23rd street ending in downtown Edmond.
- BRT alignment should be considered along either Eastern/MLK or Sooner
- BRT alignment should also be considered along Kilpatrick or Memorial
- Traffic congestion occurs during peak periods along Memorial and Pennsylvania.
- Streetcar should be considered in Downtown Oklahoma City.
- Light Rail technology could consider alignments along Hefner Parkway and I-35 instead of along the Broadway Extension.

Rose State College, Student Union Raider Room, 6420 SE 15th St., Midwest City -- Wednesday, June 15, 2005 6:30 PM to 8:00 PM

Larry Hopper called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Mike McAnelly, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Mike reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Mike then reviewed the corridors, evaluation criterion, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology preferences and potential alignments in their corresponding corridor. The following comments were received.

- The proposed Midwest City Comprehensive Plan includes participating in future transit improvements and includes preserving the UPRR corridor for future fixed guideway transit. Midwest City wants to be “on board” for transit. The abandoned UPRR corridor could be considered for hike/bike trail until it is used for fixed mass transit.
- Stations for Bus Rapid Transit, Commuter Rail or Light Rail should be considered at Tinker AFB, Midwest/15th and the Del City feedstore on Reno.
- Improved Bus Service should be considered with commuter rail or other fixed guideway service along the UPRR alignment.
- Shuttle bus service should be considered to the Reed Center, 29th, and Tinker AFB.
- High Occupancy Vehicle lanes could be considered along I-40.
- Bus Rapid Transit could be considered along Sooner Road between Norman and I-44.
- High density locations should be evaluated to determine where stations should be located.
- Midwest City and Del City area population is concentrated in the area between Reno and I-240, and between Douglas and I-35. Sooner Road is in center and suffers from traffic congestion due to development.
- Concern whether Light Rail would be suitable to damage by tornados and severe winds in OKC area. Overhead electrical wiring would need to be designed for local weather conditions. In the long run, cost for repair and rebuilding might outweigh/overshadow cost savings by LRT.
- Life cycle and cost effectiveness for Bus Rapid Transit versus Light Rail Transit should be considered in choosing preferred technology alternatives.
- How much reduction in traffic congestion results from Light Rail or Commuter Rail?

Kiwanis Club Meeting, Santa Fe Cattle Company Restaurant, 1445 SW 74th St., Oklahoma City -- Thursday, June 16, 2005, 12:00 PM to 1:30 PM

Larry Hopper called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Mike McAnelly, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Mike reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Mike then reviewed the corridors, evaluation criterion, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology preferences in their corresponding corridor. The following comments were received.

- Live near the intersection of Northwest Highway and Kessler Road – like the idea of fixed guideway transit along the Northwest Highway corridor. The area needs better bus service.
- Funding is the most important issue. What will be the most cost effective option?
- Rubber-tired trolley service used to operate along Meridian connecting to the Cowboy Hall of Fame. The service was discontinued because it did not transport sufficient riders in comparison to other Metro Transit routes.
- Would like to see express bus service to Remington Race Track and Casino.
- Sidewalk improvements are needed so that pedestrians can walk to bus stops.
- Need more frequent buses and improved bus service.
- Many south OKC neighborhoods have no sidewalks, so people walking (or people in wheelchair) are exposed to safety hazard in getting to bus stops.

- Avoid requiring too many transfers between buses and fixed guideway service.
- There used to be a trolley system that went by the zoo and Remington Park. There needs to be transit service from Remington (because of its expansion) to the hotel district along Meridian and to Will Rogers World Airport.
- Need transit service to the airport, to Norman for football games, and to Crossroads Mall.

**Ralph Ellison Public Library, 2000 NE 23rd St., Oklahoma City
Thursday, June 16, 2005, 6:30 PM to 8:00 PM**

Larry Hopper called the meeting to order. He welcomed the participants and introduced other community officials. A slide show was presented by Mike McAnelly, Project Manager for Carter & Burgess, providing an update of the Fixed Guideway Study. Mike reviewed the results from the February 21-25, 2005 public meetings. He reviewed some of the previous public meeting comments, revised delineation of concept corridors, 2030 population and employment densities, 2000 Land Use, 2030 traffic congestion and level of service (LOS). Mike then reviewed the corridors, evaluation criterion, travel demand, and applicable potential fixed guideway technologies for the corridors. Subsequent to the presentation, breakout tables were formed. Meeting participants were encouraged to provide comments and mark up maps pertaining to technology preferences and potential alignments in their corresponding corridor. The following comments were received.

- People in Nichols Hills won't use transit; service should be provided in low income areas.
- Park and ride service needs to provide enough parking spaces that are not pay-parking.
- Can we afford the expense of operating a fancier transit system? Need to focus on improving the bus system to provide more frequent bus service.
- Ridership varies -- some days there are 50 people on the bus and some days there are only 5.
- Need to keep what we have and improve it; not add more expensive technologies
- Consider Commuter Rail along existing railroad tracks.
- Can we use the existing railroad tracks where the new army center near N.E. 36th, or is it too close?
- Utilize the abandoned railroad tracks for Commuter Rail
- Need adequate parking at stations or people won't use Commuter Rail.
- Need adequate bus service.
- Need closer bus stops, so elderly will not have to walk 3 or 4 blocks.
- Need transit service to the airport.
- Need to pick a hub that has lots of room around it
- Need to increase frequency of bus service and decrease the time people are waiting on buses.
- Consider Light Rail along Military St. from about N.W. 23rd to N.W. 50th.
- Worried about how to fund it -- service needs to be cost effective
- Centennial bus is always packed
- Consider High Occupancy Vehicle lane on Broadway Extension and along Reno.
- Include improved bus service all the way to the City of Spencer

**McAlpine Center, 428 W. California, Oklahoma City -- Thursday, July 7,
2005, 6:30 PM to 8:00 PM**

(To be added subsequent to the scheduled meeting date.)

Conventional Bus Service

The primary advantages of bus operations are low cost and high flexibility. Buses do not require a significant initial investment in infrastructure. Capital costs are primarily limited to vehicles. Routes can be flexible. Routing changes can be implemented, for all practical purposes, immediately. Buses can serve a wide range of passenger demand and bus size can be adapted to passenger loads. Small or mid-sized buses can be assigned to routes with lower peak demand. For high ridership routes with frequent service, economies of scale can be realized with articulated buses which can accommodate 50 percent more passengers with one bus operator.

Buses are compatible with the existing transit system; however, the efficiency and effectiveness of additional routes in attracting ridership and providing a significant improvement in travel time would be less than a fixed guideway option. Operating costs would also rise substantially to provide significantly increased capacity through additional bus service. Bus stops are typically low cost and easily accessible since stop spacing is close. Buses on streets and roadways are subject to traffic delays. Diesel emissions create a localized environmental impact, but use of alternative fuel buses may reduce bus emissions.

Conventional Bus Services Evaluation

1. Ability to Satisfy Operations and Service Levels – Bus routes in high ridership corridors often face severe street congestion, and lower bus speeds require additional vehicles to provide a comparable level of service as compared to a rail alternative. Even where large (articulated) buses are used, bus services can be limited by traffic congestion and other factors that impact operating speed and adherence to published schedules. High volume bus routes are seldom as efficient, in terms of operating cost per passenger as comparable rail services.

Rating – 2

2. Compatibility with Existing Transit System – Expanded bus service would be compatible with METRO Transit's existing fleet, operating and maintenance facilities.

Rating – 5

3. Cost Effectiveness – Although rail technologies are often more cost-effective in terms of operating costs, bus services have a low capital cost requirement and are therefore considered cost-effective for this evaluation.

Rating – 4

4. System Accessibility – Local bus services offer frequent stops, providing a high degree of accessibility to most potential passengers. While some areas of the city lack sidewalks or accessibility to persons with mobility limitations, these infrastructure problems can be corrected around affected bus stops with minimal expense.

Rating – 3

5. System Flexibility –Local bus services are highly flexible, and routes can be changed virtually on demand. Only customer service, policy, funding and administrative reasons limit the ability to make rapid changes to the bus network; other transit options generally require construction.

Rating – 5

6. Service Frequency - Bus services are able to adapt to increasing passenger demands by increasing bus frequency. Buses operating every few minutes on a single route in a congested corridor are generally far less cost-effective than a comparable rail transit service. While limited capital improvements can often improve operating performance on high-demand routes, frequent bus services in a congested corridor are less reliable than grade separated options.

Rating – 4

7. Environmental Impacts – In terms of environmental impacts. Emissions can be mitigated through the use of alternative fuels, but noise from internal combustion buses can impact residential areas. In most other respects, bus services do not significantly impact their operating environments any more significantly than other traffic.

Rating – 3

8. Land Use Compatibility – Bus services have not been shown to have any significant positive or negative impact on surrounding land use. Bus services do not require any infrastructure that may negatively impact surrounding land uses.

Rating – 3

9. Availability of Technology – Buses are manufactured by numerous vendors in North America and are operated in a wide variety of services, environments, and conditions.

Rating – 5

High Occupancy Vehicle (HOV) Lanes

As compared to a fixed guideway alternative, primary advantages of HOV are relatively low-cost, easy implementation, and joint utilization by transit and other authorized vehicles. HOV's may be implemented along selected freeways by adding a new lane, re-striping the freeway or re-designating a shoulder lane in conjunction with operating a managed lane (tolls) HOV can add more options for commuters. Bus service routed along HOV's would be compatible with the regional transit system, but may not provide a corridor alternative meeting community desires. HOV's typically serve longer trips with few or very limited access to neighborhoods.

Because passenger capacity of buses on HOV's is lower than that of rail or busway, there is typically less of an effect on roadway network performance in terms of levels of service and travel time savings. Buses must also operate within mixed traffic to get to

and from the HOV lanes; therefore, increasing traffic congestion will affect operations and schedule reliability.

Disadvantages of HOV's and managed lanes are related to directionality and access. For one-way reversible HOV's, traffic in the opposite directions must operate in mixed traffic along congested roadways. Therefore, reversible HOV's are not appropriate for corridors with roughly equal bi-directional travel demand during peak periods. Since HOV's are typically located along freeways, passenger access and transfers must occur at transit centers or off-line bus stops adjacent to the freeway. Access between these stops and the freeway HOV lane may be circuitous and subject to congestion delay. Direct ramps can be provided from the HOV to adjacent transit or parking facilities; however, these may significantly increase HOV cost.

High occupancy vehicle (HOV) lanes on highly congested arterials and freeways could improve travel times for carpools, vanpools, and transit during congested periods, which is especially true with managed lanes. This capital investment could be implemented in phases; however, the capital cost of this option would require analysis as an independent transit alternative. HOV lanes may also emerge as a likely improvement in one or more of the corridors identified.

HOV Evaluation

1. Ability to Satisfy Operations and Service Levels – HOV's have been shown to carry up to three times the number of people as a regular lane of traffic. HOV's often operate in existing freeway rights-of-way, but where additional right-of-way is required, HOV's can approach busway or light rail costs. Since busways and light rail can carry many more people than HOV's, HOV's are rated low for their carrying capacity, particularly in relation to the cost of the infrastructure.

Rating – 3

2. Compatibility with Existing Transit System – HOV's can support METRO Transit's express bus system, help encourage a vanpool system, and enhance carpooling. However, ODOT has not included HOV facilities in its highway improvement plans. HOV often has such a negative perception that it is not used sufficiently to justify dedicating lanes for HOV use. This perception is less likely if the HOV lane is a new lane or is used in a city where highway users are more accustomed to toll roads.

Rating – 3

3. Cost Effectiveness – HOV's can save bus operating costs and increase transit ridership.

Rating – 4

4. System Accessibility – HOV access is rated poorly, compared to other transit options, since HOV and transit access is predominately by auto. HOV's with a high level of transit access are generally dependent on park-and-ride passengers.

Rating – 2

5. System Flexibility – HOV's offer a relatively high level of system flexibility for bus routes. Prior to entering the HOV lane, buses can circulate through neighborhoods collecting passengers or local routes can provide connections to express service. Many HOV's operate with a moderate level of transit service focused on park-and-ride lots, since suburban neighborhoods are often too dispersed to warrant a high level of connecting transit services. This ability to connect neighborhoods to transit allows this category to be rated highly.

Rating – 4

6. Service Frequency – HOV's offer the potential to increase transit demand and warrant frequent services. Bus services on existing HOV's are generally limited to peak periods with little service during other periods. Service frequency is rated high, since bus services on HOV's can be adjusted to meet demand as warranted.

Rating – 4

7. Environmental Impacts – HOV's generally have a marginal impact on the environment. If HOV's increase carpooling and transit ridership or reduce congestion, environmental benefits are possible. The high rate of auto access to park-and-ride facilities, however, generally allows few, if any, environmental benefits to be realized. Some studies have suggested that many HOV users would carpool without the HOV and a study in Houston showed that transit users often form informal carpools at park-and-ride lots, reducing transit use.

Rating – 2

8. Land Use Compatibility – Park-and-ride lots associated with HOV facilities can, in some cases, affect the potential for development. Generally, HOV's have not been shown to have any impact on land use, but can help make CBD's and other large highway nodes more accessible.

Rating – 2

9. Availability of Technology – HOV's are a proven technology, in terms of construction and operation. In certain cases, HOV's have been shown to improve transit ridership, notably in Houston.

Rating – 3

Bus Rapid Transit (Busway)

Bus Rapid Transit (BRT) on busways provides the speed and guideway advantages typically attributed to a rail line with the added advantage of circulation within local areas. Busways allow high-speed operation, express/non-stop service and one-seat rides. This technology has been implemented at various levels of exclusive right-of-way and operates effectively in several cities. Required right-of-way is wider than that for a rail line and may result in significant impacts. For an at-grade busway to be effective and provide faster operating speeds, the numbers of grade crossings must be limited or transit priority signal systems must be installed.

The guided bus technology is appropriate for corridors where right-of-way is severely restricted or joint operation over a narrow streetcar/LRT trackway is required. Buses can be operated at very close intervals along the guideway without interference from other traffic. Buses can be operated along narrow rights-of-way similar to a streetcar or light rail route. Buses can also be operated along roadways, thereby allowing one-seat rides and fewer required transfers for a larger percentage of passengers.

Whereas bus rapid transit uses a guideway or street rights-of-way and standard buses, the guided bus technology requires specially adapted buses. The guided bus technology is less flexible since buses cannot bypass each other. Operation along a guideway within a downtown activity center is possible; however, the guideway may prove to be a hazard and visually intrusive. Therefore, buses would operate in mixed traffic in activity centers and would be subject to congestion delay.

BRT/Busways Evaluation

1. Ability to Satisfy Operations and Service Levels – Buses of all sizes can operate frequent service that allow busways to approach the carrying capacity of rail lines.

Rating – 5

2. Compatibility with Existing Transit System – A BRT improvement combined with expanded bus services would be compatible with METRO Transit's existing fleet and operating and maintenance facilities and allows a high ranking of BRT technology. *This ranking excludes consideration of guided bus technology, which may not be compatible with the existing bus fleet.*

Rating – 5

3. Cost Effectiveness – Although rail technologies are often more cost-effective in terms of operating costs, a BRT alternative would not necessarily require procurement of a new bus fleet or maintenance facilities. BRT is also eligible under the FTA's BRT pilot program and may allow Oklahoma City to leverage a higher share of federal funds.

Rating – 4

4. System Accessibility – Local bus services offer frequent stops, providing a high degree of accessibility to most potential passengers. Local bus services can operate on a busway for a degree of flexibility, increased services, and improved operating speeds could improve access for many passengers.

Rating – 4

5. System Flexibility – As previously mentioned, local bus services can operate on a busway for a portion of their routes, or new routes can be designed to operate exclusively on the busway. Moreover, certain busway alignments might be constructed incrementally, reducing up-front capital costs. The high degree of flexibility in service design allows this category to be ranked highly.

Rating – 4

6. Service Frequency – Bus services are able to adapt to increasing passenger demands by increasing bus frequency. Buses operating every few minutes on a single route in a congested corridor are generally far less cost-effective than a comparable rail transit service; however, many different bus routes can branch from the busway, allowing localized services in many neighborhoods while maintaining a high cumulative frequency on the busway.

Rating – 4

7. Environmental Impacts – Emissions can be mitigated through the use of alternative fuels, but noise from internal combustion buses can impact residential areas. Electric trolleybuses are quiet and clean, but overhead wires represent a visual intrusion. In most other respects, bus services do not significantly impact their operating environments any more significantly than other traffic.

Rating – 3

8. Land Use Compatibility – The limited number of busways in North America have not shown notable impacts on transit-oriented development or transit-related land uses in either a positive or negative sense.

Rating – 3

9. Availability of Technology – Buses are manufactured by numerous vendors in North America and are operated in a wide variety of services, environments, and conditions. Busways, as conventional streets, are also a proven technology. *This ranking excludes consideration of guided bus technology, which requires specialized infrastructure that has had operating problems in other areas. With few examples of guided busways around the world, the recent advances in this technology could be considered experimental and could present challenges for implementation in Oklahoma City.*

Rating – 4

Light Rail Transit (LRT)

The primary advantage of modern light rail transit is its adaptability to a variety of operating environments and passenger capacities. Furthermore, the lower labor requirements and higher passenger capacity generally allows light rail to be operated at a lower cost per passenger than bus alternatives. LRT design can range from a high speed, high capacity system comparable to heavy rail or other completely grade separated technologies, to a low speed, medium capacity streetcar or shuttle service. LRT trains can consist of up to four vehicles; thereby accommodating ten times the number of passengers on a standard 40 foot bus with one operator, resulting in lower operating cost per passenger. Capital cost per mile for at-grade LRT is within the lower range for rail systems and is comparable to the cost for busways or guided bus technology.

Light rail can operate at-grade in many corridors and cross roadways at-grade. These operations can be cost-effective, particularly in areas where grade separation is unnecessary. Station spacing can be close enough to provide convenient walk access.

Stations can be simple, sidewalk stops with a shelter or as elaborate as desired. Light rail is a higher capital cost alternative as compared to buses, requiring more costly investment in tracks, electrification, and modifications to streets and traffic control. In some cases, delaying some features such as selected stations, structures, or trackage can defer construction costs over several years. This would allow the corridor to have service sooner with upgrades provided as ridership grows and funds become available.

Light rail at-grade operation can be affected by traffic in areas of shared right-of-way. This can be mitigated by provision of exclusive right-of-way and traffic control that favors light rail. LRT can operate in multi-car trains at speeds up to 70 mph. The number of grade crossings and on-street sections will slow operating speeds significantly. Improvements to benefit transit may impact traffic flow and pedestrian movements.

The flexibility and relatively low cost, compared to other rail alternatives, could allow a light rail transit (LRT) system to emerge as a viable alternative in any high-capacity transit corridor. While less flexible than a busway, potentially lower operating costs may prove that LRT is a viable transit option. Moreover, light rail may play a significant role in transit oriented development and redevelopment near LRT stations.

LRT Evaluation

1. Ability to Satisfy Operations and Service Levels – Light rail vehicles can operate in trains that allow a high carrying capacity.

Rating – 5

2. Compatibility with Existing Transit System – LRT would be a new technology in Oklahoma City, requiring new guideway and operating and maintenance facilities.

Rating – 3

3. Cost Effectiveness – Although rail technologies are often more cost-effective in terms of operating costs than comparable bus services, LRT alternatives require a high level of capital investment, much of the cost could be funded by federal grant programs, but the local cost remains quite high.

Rating – 3

4. System Accessibility – While feeder bus services can provide system access, many residents will not have direct access to the LRT system.

Rating – 3

5. System Flexibility – LRT can operate in a separate guideway, in mixed traffic, at-grade, elevated or subway. It has the maximum speed to provide a travel time savings in an exclusive guideway with wide station spacing and can fulfill a distribution/circulation function with station spacing of a few blocks in a central business district environment.

Rating – 4

6. Service Frequency – LRT services have the ability to operate services every few minutes on a double-tracked alignment. This frequency of service allows this category to be ranked highly.

Rating – 5

7. Environmental Impacts – Electrically powered LRT can reduce emissions where ridership is substantial. LRT is generally quiet and typically has few negative impacts on surrounding land uses.

Rating – 5

8. Land Use Compatibility – LRT has often encouraged transit-oriented development, allowing new land developments around stations to support additional ridership while reducing automobile usage.

Rating – 5

9. Availability of Technology – LRT is widely used around the world. Light rail vehicles are manufactured in both mass production and custom configurations by a number of manufactures.

Rating – 5

Historic Streetcar

Historic trolleys are a specialized type of service or tourist attraction more appropriate for a shuttle or circulator rather than a line-haul transit service. Whereas historic trolleys would be compatible with LRT insofar as ability to operate along the same trackway, it would have limited capacity to meet overall community mobility needs. Vehicle capacity is limited and performance characteristics, such as acceleration and maximum speed, restrict its utility for line-haul service, but it could provide connection between other modes and/or circulator service within or between growth centers. A historic streetcar route could also operate on a portion of modern light rail tracks, such as Portland's downtown historic streetcar; however, light rail as a line-haul transit service may not operate on tracks, at stations, or with a power system designed specifically for a historic streetcar. This does not, however, preclude operation of a historic trolley service as a feeder or shuttle service that could complement a line-haul transit service.

Historic Streetcar Evaluation

1. Ability to Satisfy Operations and Service Levels – Historic trolley services could operate as frequently as other light rail and bus transit options.

Rating – 4

2. Compatibility with Existing Transit System – Historic streetcars would be a new transit technology in Oklahoma City, requiring new guideway, and operating and maintenance facilities.

Rating – 3

3. Cost Effectiveness – Although rail technologies are often more cost-effective in terms of operating costs than comparable bus services, historic trolley alternatives can require a high level of capital investment. Likewise, the cost to procure, restore, and maintain authentic historic vehicles is typically high.

Rating – 3

4. System Accessibility – While feeder bus services can provide system access, many residents will not have direct access to the streetcar system, and it is unlikely that a historic streetcar system could be expanded as a regional service. Additionally, older vehicles are often not ADA-accessible, and ensuring that the system maintains full access may be a formidable issue when using older vehicles.

Rating – 2

5. System Flexibility – Although historic streetcar systems operate slowly, which limits future expansions, the smaller size and shorter turning radius of the vehicles allows them to operate in dense urban areas where other vehicles cannot operate. The low passenger capacity and low maximum speed of the vehicles do not limit this mode's potential to serve a large metropolitan area.

Rating – 4

6. Service Frequency – Like LRT, historic streetcar services have the ability to operate services every few minutes on a double-tracked alignment in a moderate speed operation.

Rating – 4

7. Environmental Impacts – Electric powered vehicles would be environmentally friendly, and the historic character of streetcars would be compatible with historic areas. Noise and vibration impacts can be more significant than conventional light rail, and lower ridership generally results in few mobility benefits.

Rating – 3

8. Land Use Compatibility – Like LRT, historic streetcar systems have often encouraged transit oriented development, encouraging new land development along transit lines. Moreover, historic streetcars are often compatible in historic districts where visual impacts might be more severe for modern transit options.

Rating – 5

9. Availability of Technology – There are manufacturers of replica equipment using new vehicle chassis and components. In addition, several suppliers remanufacture older equipment into working condition.

Rating – 4

Modern Streetcar

This technology has passenger capacity and operating characteristics approaching those of light rail systems with predominately on-street, at-grade operations. Vehicles and power systems are generally lower in cost than higher speed, higher capacity light rail systems. In areas where maximum speeds are restricted by street-running operations, modern streetcars may represent a lower cost alternative to light rail. A modern streetcar could serve a variety of functions in Oklahoma City. A downtown circulator could connect commercial and residential areas to major employment centers and to the fairgrounds for special events. As a frequent service on relatively short routes, modern streetcars could operate in line-haul transit service between Oklahoma City's major activity centers. Like the light rail systems in Boston and San Francisco, a streetcar system in Oklahoma City could eventually be upgraded to higher capacity light rail services as demand warrants.

The flexibility and relatively low cost, compared to other rail alternatives, could allow a modern streetcar system to emerge as a viable alternative in any high-capacity transit corridor. While this option is similar to light rail, a streetcar alternative may be further differentiated from LRT as a low cost option by minimizing station features and design, maximizing single-tracked and on-street operations, and procuring off-the-shelf technologies (e.g. minimizing custom design features).

Modern Streetcar Evaluation

1. Ability to Satisfy Operations and Service Levels – Modern streetcars can operate in single or double car configurations with capacities similar to small LRT trains or single LRT vehicles.

Rating – 5

2. Compatibility with Existing Transit System – Modern streetcars would be a new transit technology in Oklahoma City, requiring new guideway and operating and maintenance facilities.

Rating – 3

3. Cost Effectiveness – Modern rail technologies are often more cost-effective in terms of operating costs than comparable bus services; however, modern streetcar alternatives can require a high level of capital investment.

Rating – 3

4. System Accessibility – While feeder bus services can provide system access, many residents will not have direct access to the streetcar system. Future expansion of streetcar service could allow the service to branch to several neighborhoods or growth centers.

Rating – 3

5. System Flexibility – Modern streetcar options are ranked high since systems operate slowly, limiting future expansions, and operate on dedicated guideway, requiring construction of new guideway for any expansion of service.

Rating – 5

6. Service Frequency – Modern streetcar services, like LRT, have the ability to operate services every few minutes on a double-tracked alignment.

Rating – 5

7. Environmental Impacts – Modern streetcar technology is rated highly in terms of environmental impacts. Electrically powered vehicles, along with high transit ridership could help improve air quality.

Rating – 4

8. Land Use Compatibility – Like LRT, modern streetcar systems are likely to encourage transit-oriented development along transit lines. Moreover, modern streetcars are often compatible in neighborhood districts where smaller vehicles would be more widely accepted.

Rating – 5

9. Availability of Technology – Although modern streetcars are not widely used in the United States, they are widely used in countries throughout the world. Modern streetcar technology is very similar to light rail technology and therefore represents a technology that is compatible with light rail. Streetcars are also mass-produced by several manufacturers for use on existing transit systems.

Rating – 5

Commuter Rail

Passenger capacity, speed and access to central cities are the primary advantages of commuter rail. Trains can comfortably accommodate a large number of seated passengers over a long distance. Provided that track and signal system conditions are good, service can be implemented at a relatively low-cost and within a short time frame. Commuter rail is often ill suited to serve areas where closer station spacing is required. The slower acceleration rate of commuter rail as compared to heavy or light rail is mitigated by wider station spacing, which allows faster travel times, but diminishes its accessibility for walk-on passengers.

Commuter rail often does not penetrate the core of the CBD or activity centers; stations are often located at one end of the CBD. In Oklahoma City, Union Station is on the periphery of the CBD and will not provide passengers with “front door” service; however, the Santa Fe Station located within the CBD and would provide passengers a short walk to Bricktown, the baseball stadium, and employment centers. Extending commuter rail to better serve urban activity centers required grade separated right-of-way. Introduction of commuter rail may not be feasible where limited by geometric constraints, conflicts with freight traffic, inconvenient access for vehicles and pedestrians, or extensive

rehabilitation of track and structures is needed to meet acceptable operating criteria. Grade separation of commuter rail to serve a downtown or activity center would be expensive and probably less cost-effective than an at-grade light rail extension.

Commuter Rail Evaluation

1. Ability to Satisfy Operations and Service Levels – Commuter rail services have very high passenger capacities due to the large potential train length.

Rating – 5

2. Compatibility with Existing Transit System – Commuter rail would be a new transit technology in Oklahoma City, requiring new guideway and operating and maintenance facilities. However, with the vast amount of existing freight lines traversing the city, the existing lines may be utilized for commuter rail operations.

Rating – 4

3. Cost Effectiveness – Extremely high operating costs generally prove other rail technologies as more cost-effective. Commuter rail offers a lower capital cost than other technologies; however, commuter rail systems that reach their maximum operating speeds and carrying capacity often require a high level of capital investment and dedicated operations that severely limit freight railroad traffic. These requirements could limit the cost effectiveness of commuter rail alternatives.

Rating – 3

4. System Accessibility – Commuter rail stations are generally located several miles apart, and many existing freight corridors would place stations in industrial areas, flood plains, and other areas where access to the system is limited. A preliminary review of existing and potential commuter rail corridors indicates that the primary mode of access to the system would be by auto. While feeder bus services can provide system access, many residents will not have direct access to the rail system without driving or taking a bus.

Rating – 2

5. System Flexibility – Commuter rail systems operate on a dedicated guideway. Several low-capacity rail corridors, could prove ideal for commuter rail operations. High freight volumes may limit applicability of commuter rail in some corridors. Creation of new corridors within the existing urban environment would present numerous challenges.

Rating – 3

6. Service Frequency – Commuter rail services do not operate as frequently as other rail modes.

Rating – 3

7. Environmental Impacts – Commuter rail operations would occur within existing railroad rights-of-way where there would be limited impacts from construction or operations on adjacent land use. Also, most freight railroad operations are in industrial or transportation corridors (adjacent to existing roadways or highways), and so impacts to residential and commercial areas from increased frequency of operations would be limited. It is likely that the dominant access mode would be by automobile, and air quality benefits would only be realized on longer transit trips or where commuter rail significantly reduced congestion.

Rating – 5

8. Land Use Compatibility – Existing freight railroad tracts often lie in industrial or flood-prone areas, limiting opportunities for new transit-oriented development.

Rating – 3

9. Availability of Technology – Commuter rail is widely used around the United States and the world. Commuter rail vehicles are manufactured in both mass production and custom configurations by a number of manufactures. Aside from locomotives that pull several passenger cars, some vehicles are essentially passenger cars powered by a hidden motor.

Rating – 5

Heavy Rail

Heavy rail can reliably transport high numbers of passengers per hour at a high average speed. However, the capital cost per mile can be significantly higher than LRT or commuter rail. Because total guideway separation is required, heavy rail routes are basically inflexible due to their fixed, exclusive guideway. Alignment changes can be costly unless implemented in an already guideway separated right-of-way. Like the guideway, stations must be separated from traffic. These requirements lead to higher cost stations that typically have high platforms and elevators. Downtown alignments would be elevated or in subways. Construction and operation of heavy rail would offer few benefits over that of a comparable light rail system that is completely grade-separated. Moreover, it is unlikely that the current development patters in Oklahoma City could generate ridership to warrant such a high-capacity transit option. Likewise, high construction costs would likely exceed METRO Transit's ability to fund such a system.

Heavy Rail Evaluation

1. Ability to Satisfy Operations and Service Levels – Heavy rail services have very high passenger capacities.

Rating – 4

2. Compatibility with Existing Transit Systems – Heavy rail would be a new transit technology in Oklahoma City requiring new guideway, operating and maintenance facilities.

Rating – 2

3. Cost Effectiveness – Although rail technologies are often more cost-effective in terms of operating costs than comparable bus services, heavy rail alternatives can require an extremely high level of capital investment. Requirements that guideway and stations be grade separated add to the capital costs. The extremely high capital costs rate this option negatively, since they are not likely commensurate with the expected ridership levels.

Rating – 1

4. System Accessibility – While feeder bus services can provide system access, many residents will not have direct access to the rail system, particularly since heavy rail stations are generally located farther apart than other transit options.

Rating – 2

5. System Flexibility – Heavy rail systems operate on dedicated guideway that requires full grade separation.

Rating – 1

6. Service Frequency – Heavy rail services have the ability to operate services every few minutes.

Rating – 4

7. Environmental Impacts – Heavy rail vehicles are electrically powered; however, negative environmental impacts would result from construction of subways or aerial structures.

Rating – 3

8. Land Use Compatibility – Like LRT, heavy rail systems have often encouraged transit-orientated development, encouraging new land development near transit stations. However, since most stations are either underground or elevated it's impacts are not as great as LRT or commuter rail that have at grade stations.

Rating – 2

9. Availability of Technology – Heavy rail operates in cities worldwide and in North America, but due to the high cost of construction no new heavy rail lines have been constructed in many years.

Rating – 2

Monorail

Monorail can provide fast operation along an elevated guideway that is often perceived as less intrusive than those for other rail modes. The rubber tired vehicles operate

quietly. No overhead wires are required, and the single beam structure may be perceived as less visually intrusive than other elevated transportation modes.

Station costs are higher than for at-grade rail and similar to grade-separated heavy rail. Guidebeam switching is more complicated than conventional track switches. The switch issue has tended to relegate monorail to shuttle or loop service within an activity center and limited its use for line-haul transit. An elevated monorail guideway could be extended along roadways or other rights-of-way; but this may be considered visually intrusive in some areas.

Monorail Evaluation

1. Ability to Satisfy Operations and Service Levels – Monorail services have high passenger capacities.

Rating – 4

2. Compatibility with Existing Transit System – Monorail would be a new technology in Oklahoma City. A new operations and maintenance base would be required for ongoing system support.

Rating – 3

3. Cost Effectiveness – Grade separated alignments and stations result in high capital costs for monorail. Monorail in the United States is limited to shuttle operations; there are not line-haul monorail systems in operation. Low operating costs and high ridership found on Seattle's monorail shuttle, a popular tourist attraction may not be realized in a larger monorail transit system. High capital costs and largely unknown operating costs rate this technology low.

Rating – 1

4. System Accessibility – Monorail requires complete grade separation, and stations are typically several stories above street level, adding time for passengers to access stations.

Rating – 1

5. System Flexibility – Monorail options are ranked low since systems operate on a dedicated guideway. Monorail often faces opposition from local neighborhoods due to the visual intrusion, further limiting where monorail alignments could be planned.

Rating – 1

6. Service Frequency – Monorail operate as frequently as other rail modes.

Rating – 4

7. Environmental Impacts – Monorail ranks low since aerial structures would represent a notable visual intrusion, particularly in any of Oklahoma City's historic districts.

Rating – 1

8. Land Use Compatibility – Where monorail is planned as part of a development, stations can be incorporated directly inside buildings. Over time, new developments may also incorporate stations as part of the overall development. Where monorail is constructed as part of existing development, however, aerial stations are often difficult to integrate into existing developments, particularly in areas with historic buildings.

Rating – 1

9. Availability of Technology – Monorail is a proven technology for short shuttle services; however, no line-haul monorail systems exist. This category is rated low since monorail manufacturers are limited, and systems consisting of several lines are limited to applications in Japan. It is likely that implementation of monorail in Oklahoma City would require a large degree of customization of vehicles and power systems, since these are not readily available technologies in widespread use.

Rating – 1

The following table presents a summary evaluation for each transit technology. Technologies that received a score of 25 or higher in the nine categories were recommended for further consideration.

Evaluation Criteria	Bus	HOV	BRT	LRT	Historic Streetcar	Modern Streetcar	Commuter Rail	Heavy Rail	Monorail
Ability to Satisfy Operations and Service Levels	2	3	5	5	4	5	5	4	4
Compatibility with Existing Transit System	5	3	5	3	3	3	4	2	3
Cost Effectiveness	4	4	4	3	3	3	3	1	1
System Accessibility	3	2	4	3	2	3	2	2	1
System Flexibility	5	4	4	4	4	5	3	1	1
Service Frequency	4	4	4	5	4	5	3	4	4
Environmental Impacts	3	2	3	5	3	4	5	3	1
Land Use Compatibility	3	2	3	5	5	5	3	2	1
Availability of Technology	5	3	4	5	4	5	5	2	1
Total	34	27	36	38	32	38	33	21	17

Conventional bus service, high occupancy vehicle lanes, bus rapid transit, light rail transit, historic streetcar, modern streetcar, and commuter rail will be carried over to the next level of analysis. During the next level of analysis these technologies will be further analyzed to determine which technology would be best for each corridor.