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2.0 ALTERNATIVES CONSIDERED

Graphics for Chapter 2 are included together at the end of this chapter.

2.1 ALTERNATIVES CONSIDERED IN THE I-71 CORRIDOR TRANSPORTATION STUDY

2.1.1 TRANSPORTATION STUDY PROCESS

Several planning efforts have been undertaken for the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) region over the past 25 years. These include:

- 1981 Regional Transportation Plan;
- 1986 Cincinnati Alternatives Analysis Transitional Study;
- 1992 Cincinnati Intermodal Surface Transportation Plan;
- Managing Mobility, Year 2010 Regional Transportation Plan (November, 1993);
- 1993 Light Rail Transit for Greater Cincinnati: The Past, Present, and Future Directions, (December 1993);
- Looking Ahead: 2020 Metropolitan Transportation Plan (May, 1998); and,
- I-71 Corridor Transportation Study Final Report (August 1998).

In each document, part or all of the I-71 Corridor, as it is known today, is recognized as a priority travel corridor and recommended for further analysis.

In November 1993, the regional Long Range Transportation Plan for the year 2010 entitled *Managing Mobility, Year 2010 Regional Transportation Plan* was adopted by OKI. This plan established a long-range commitment to rail transit as an alternative travel mode to improve the region's mobility and to meet regional air quality goals. A total of seven corridors were recommended for further study, with the (Northeast) I-71 Corridor selected as the region's top priority. The report entitled *Light Rail Transit for Greater Cincinnati: The Past, Present, and Future Directions* summarized the impacts, both physically and financially, of light rail transit (LRT) development. This plan recommended corridor studies for the six most heavily traveled and congested corridors in the OKI region. Furthermore, the plan stated that the priority corridor for development of LRT in the Cincinnati region be the corridor extending from the Florence-Greater Cincinnati/Northern Kentucky International Airport vicinity northwestward, through Covington and the Cincinnati central business district, and north generally paralleling I-71, to southwestern Warren County.

2.1.2 TRANSPORTATION STUDY LOCALLY PREFERRED STRATEGY

In response to the recommendations of the 1993 Regional Long Range Transportation Plan, the I-71 Corridor Major Investment Study (MIS) was initiated in 1995. The study area was defined as beginning at Florence and the airport in a northeasterly direction along I-71 to Kings Mills. At the onset of the I-71 Corridor MIS, a committee of 80 representatives from local and state government agencies, businesses, citizen groups and environmental groups was formed by OKI to guide the decision-making process and to make recommendations to the OKI Board of Trustees. This committee, named the I-71 Corridor Oversight Committee, met on a monthly basis (and more frequently when needed) to identify the goals

and objectives of the study, to review and evaluate the technical analysis of a range of modal solutions, to gain feedback from the public, and to refine alternatives.

The I-71 Corridor MIS identified conceptual mode and alignment alternatives which were discussed in public meetings throughout the corridor and ultimately evaluated by the I-71 Corridor Oversight Committee. The preliminary set of alternatives resulted from an expansive public involvement effort during August 1995These alternatives are defined in the *I-71 Corridor Transportation Study Scoping Report (March 1996).* These included:

1. No-Build
2. High Occupancy Vehicle Lanes on I-71
3. Busway
4. Transportation System Management (TSM)
5. Highway Widening
6. Light Rail Transit (LRT)
7. Commuter Rail Transit (CRT)

On October 16, 1995, the Oversight Committee met in a workshop session referred to as the "Scoping Meeting". That meeting marked the end of Phase 1, Preliminary Screening. The goal of the meeting was to reach consensus on elimination of some alternatives that did not merit further analysis in the study. Members of the general public were provided an opportunity to address comments to members of the Oversight Committee prior to decision points. As a result, the CRT alternative was eliminated from further analysis and the six remaining alternatives were advanced for more detailed analysis. These alternatives are fully described in the *I-71 Corridor Transportation Study Conceptual Definition of Alternatives Report (November 1996).*

In Phase 2 of the MIS evaluation, the highway widening alternative was modified to eliminate consideration of widening I-71 within the limits of I-275. Additional capacity (one lane in each direction) was evaluated in Phase 3 between Pfeiffer Road and State Route 48 in Ohio. At the request of Ohio Department of Transportation (ODOT), this option was evaluated as a priority and recommended by the Oversight Committee for inclusion in the final recommendations of the MIS.

Similarly, a parallel planning process was established to evaluate alternatives for Fort Washington Way (I-71/US 50 through the Cincinnati Riverfront). This analysis was conducted as a subcorridor study within the decision structure of the I-71 Corridor MIS. The process evaluated multiple alternatives for reconfiguration of Fort Washington Way and accommodation of fixed guideway transit. A final alternative was selected and documented in a Fort Washington Way MIS study and adopted by the OKI Board of Trustees.

As the evaluation of conceptual alternatives continued, the highway widening alternative was eliminated from further study. The final set of alternatives evaluated during the MIS included:

1. No-Build
2. Transportation System Management (TSM)
3. Busway
4. High Occupancy Vehicle Lanes on I-71
5. Light Rail Transit (LRT)

Following three years of study, the I-71 Corridor Oversight Committee recommended to the OKI Board of Trustees that LRT in conjunction with the No-Build and TSM Alternatives, was the best solution for addressing the future transportation needs of the I-71 Corridor. The OKI Board of Trustees formally adopted this recommendation as the Locally Preferred Strategy (LPS) on March 26, 1998. This decision was made based on the following evaluation criteria which the I-71 Corridor Oversight Committee developed (listed in priority order):

- Transportation Service
- Environmental Impacts
- Community Impacts
- Costs
- Engineering Difficulty
- Public Input
- Economic Impacts

2.1.3. 2020 LONG RANGE TRANSPORTATION PLAN (LRTP)

In 1998, OKI adopted an updated regional long range transportation plan entitled *Looking Ahead: 2020 Metropolitan Transportation Plan*. This 1998 transportation plan included a conceptual regional rail network for Greater Cincinnati/Northern Kentucky (Figure 2). The regional rail concept includes light rail linkages (in addition to those identified for the I-71 Corridor) to important destinations in the region, such as Newport, Northern Kentucky University, Covington and Florence in Kentucky, and Western Hills, Middletown, Mason, Fairfield and Hamilton in Ohio.

2.1.4 CONCEPT FOR PRELIMINARY ENGINEERING/ ENVIRONMENTAL IMPACT STATEMENT (PE/EIS)

Following completion of the MIS, OKI and the I-71 Oversight Committee decided to proceed into the preliminary engineering/environmental impact statement (PE/EIS) phase of project development. The proposed action was defined as a light rail line extending from 12th Street in Covington, KY to Glendale-Milford Road in Blue Ash, OH. This 16-mile segment of light rail was determined to be an appropriate minimal operable segment (MOS) for the PE/EIS. This MOS was amended on April 26, 1999 to extend northward an additional three miles to Grooms Road in Blue Ash.

2.2 EIS ALTERNATIVES DEFINITION

In addition to the LRT "build" alternative, No-Build and TSM are evaluated in the EIS.

The four LRT Alternatives include:

- Alternative 1 - From Covington (at grade), through Uptown via Martin Luther King (MLK), to Blue Ash;
- Alternative 2 - From Covington (above grade), through Uptown via MLK, to Blue Ash;
- Alternative 3 - From Covington (at grade), via Zoo , to Blue Ash; and
- Alternative 4 - From Covington (above grade), via Zoo , to Blue Ash.

The components of each alternative are summarized in Table 2.2.1 and described in the remainder of this chapter.

Table 2.2.1: I-71 Corridor Transportation Improvement Alternatives

Transportation Improvements	No-Build	TSM	LRT
Widening of I-71 from Pfeiffer Road to State Route 48	X	X	X
Reconstruction of Fort Washington Way (I-71/US 50)	X	X	X
Reconstruction of I-71/75 south of Dixie Hwy. to Kyles Lane	X	X	X
Adding an eastbound lane to U.S. 22 between Kenwood Road. and I-71	X	X	X
Adding one lane on U.S. 22 in each direction from I-71 east to Hosbrook Road.	X	X	X
Major expansion of current bus system, including additional routes and more frequent service		X	X
Travel Demand Management programs (carpooling and telecommuting)		X	X
Intelligent Transportation Systems, (signal timing & variable message displays) ARTIMIS		X	X
Traffic Engineering Improvements, (intersections & ramp improvements)		X	X
Transit Center at Peebles Corner		X	X
Transit Center at Anderson		X	X
Transit Center at Kenwood		X	X
Transit Center at Fields Ertel Road. and I-71		X	X
Transit Center at Reading (U.S. 42 and Galbraith)		X	X
Transit Center at Tri-County Mall		X	X
Transit Center at Knowlton's Corner		X	X
Transit Center at Northgate Mall		X	X
Transit Center at Western Hills Plaza		X	X
Transit Center at Florence Mall		X	X
Transit Center at Latonia Center		X	X
Transit Center at Northern Kentucky University		X	X
Light Rail Transit Alignment (19.5 miles, 20-21 stations, and yard and shop facility)			X

2.2.1 NO-BUILD ALTERNATIVE

The No-Build Alternative utilizes the existing transportation system and provides for a minimum level of transportation system expansion. It includes all projects programmed and funded in the state Transportation Improvement Program (TIP) for fiscal years 1998 - 2001. Components of the No-Build Alternative include the following roadway projects in the I-71 Corridor:

- Adding 2 lanes on I-71 from Pfeiffer Road to State Route 48 (completed 2000)
- Reconstruction/realignment of Fort Washington Way (completed 2001)
- Reconstruction of I-71/75 south of Dixie Highway to Kyles Lane (completed 2000)
- Adding one eastbound lane on U.S. 22 between Kenwood Road and I-71 and one travel lane on U.S. 22 in each direction from I-71 to Hosbrook Road (project awarded in June 2003)

2.2.2 TSM ALTERNATIVE

The TSM Alternative consists of a variety of relatively low-cost improvements to the existing transportation system designed to improve transportation conditions in the I-71 Corridor. It would include major expansion of the current bus system, Travel Demand Management (TDM) programs such as carpooling and telecommuting, ITS, and traffic engineering improvements.

This Alternative would expand bus service in areas that are currently unserved or underserved (Figure 2.2-1a). Bus service would include both local and express service. An important element would be the implementation of timed-transfer transit centers. These are locations where several bus routes converge, with synchronized schedules to permit convenient transferring among routes, similar to the hub-and spoke systems of major airlines. A transit center may include a small building for waiting, ticket sales, etc., and may also include a park & ride lot. Transit centers may serve as neighborhood centers and/or be the focus of economic redevelopment in the area. New service could include a wide variety of bus types including small buses for neighborhood, shuttle, or circulator services and large articulated buses for mainline trunk services.

Under the TSM Alternative, the following transit centers would be constructed in the vicinity of the following street intersection or shopping centers:

- Peebles Corner (Gilbert Avenue and McMillan Street)
- Anderson (possible locations include Beechmont Mall or the Anderson Township Building)
- Kenwood (Kenwood Road and I-71)
- Fields Ertel (Fields Ertel Road and I-71)
- Reading (U.S. 42 and Galbraith)
- Tri-County Mall
- Knowlton's Corner (Hamilton Avenue and Spring Grove Avenue)
- Northgate Mall
- Western Hills Plaza

- Florence Mall
- Latonia Center, and
- Northern Kentucky University

2.2.3 BUILD (LRT) ALTERNATIVE

2.2.3.1 General Description

LRT is an electrically powered urban mass transit technology with characteristics as described below. Figure 2.2-2 shows a prototypical section and identifies LRT system elements and components.

Trackway

Light rail vehicles operate on standard gauge railroad track. The system is proposed to be double track throughout, providing a separate track for northbound and southbound train movements. A cross section of on-grade double track LRT alignment requires approximately 30 feet of right-of-way and the vertical clearance is approximately 14 feet above the rails. The maximum recommended gradient along a LRT alignment is 4 to 6 percent, although short segments may have steeper grades. The radius of track curvature is a primary influence to the LRT operating speed at that location. The minimum turning radius for a typical modern articulated LRT vehicle is 82 feet. Crossovers to allow trains to cross from the northbound to the southbound track will be provided at regular intervals for special operations. The track will generally be tie and ballast construction similar to a typical railroad track. Through the downtown area, in selected urban areas and at-grade street crossings, the track will be embedded in the roadway.

Vehicles

Light rail vehicles will be double-ended, articulated cars capable of bi-directional operation as a single unit or in a multi-unit train. A pantograph located on the roof of each vehicle will provide for power collection from the overhead power distribution system to the traction motors. Each car will be approximately 90 feet long, containing 70 to 75 seats with a total car capacity (including standees) of over 200 passengers. A “low floor” configuration will allow level boarding from platform areas. Passengers will board the trains through four double doors located on each side of the vehicle. The system is being designed for 2-car trains with consideration for future expansion to accommodate 3-car trains. The vehicles may be operated at up to 55 MPH.

Train Control

An operator controls each light rail train. The operator has control over the acceleration and braking of the train as well as passenger door operations. Passenger announcements may be made automatically, by the operator, or the rail control center. The operator will be in radio contact with a rail control center that will oversee and direct all rail operations. Automated train signal and communication systems will transmit various operations data to the rail control center. These systems will also provide for priority consideration at traffic signals, activation of crossing gates, collision and overspeed protection as well as track switch operations.

Stations

Passenger boarding occurs at designated station sites. LRT stations vary in spacing and configuration, depending on their location and function. The boarding platforms will be approximately 200 feet long to accommodate two-car trains and will be 14 inches above the top of the rails to allow for level boarding with a low floor light rail vehicle. Each station will consist of either one center loading platform approximately 20 to 24 feet wide located between the tracks or two side loading platforms each approximately 12 feet wide located on the side of the tracks. Each platform will generally be furnished with a canopy and wind screen for weather protection, signage, seating, trash receptacles and ticketing equipment. Selected station locations will also incorporate park & ride spaces and may be associated with transit centers.

Fare Collection

A self-service, proof-of-payment fare collection system is planned. Passengers will purchase individual or multiple tickets or passes from ticket vending machines located at each station. Passengers will validate tickets prior to boarding the train and retain the validated ticket during their trip. Ticket inspectors will randomly ride trains and check passengers for proof-of-payment. The absence of positive fare control (i.e. turnstiles or fareboxes), level boarding, and use of cars with multiple, wide boarding doors provides for rapid passenger boarding/alighting and minimal delays at stations. It also reduces operating costs and allows for barrier free integration of stations with surrounding areas.

Power System

Traction power substations will be located at regular intervals along the LRT line. Most substations will be located near station sites. The substations will generally be single-story buildings approximately 40 feet by 20 feet on about a 4,000 square foot limited access site. The substations will transform and rectify the AC three-phase power from the utility to DC electrification voltage. The power will then be distributed to the trains via an overhead contact wire system.

Traffic Control - At locations where the LRT crosses public streets, active devices including railroad-type flashers, bells and gates will provide traffic control. In low speed situations, including through the downtown area, intersection-type traffic signals may be used. Traffic and pedestrian signals, signs and markings will generally be in accordance with the current *Manual on Uniform Traffic Control Devices* (MUTCD).

Yard and Shop

The yard and shop facility will be the location where light rail vehicles are stored overnight and where trains will enter and leave revenue service. This is the location where maintenance, operations and administrative staff for the light rail system will report for work. Vehicles will be cleaned and repaired both inside and outside on a daily basis. Vehicles will be also be inspected and serviced according to a fixed inspection/maintenance schedule to ensure operational safety and reliability.

Accessibility

The LRT system will be designed to be fully compliant with the Americans with Disabilities Act (ADA). The light rail vehicles will be fully accessible with level boarding from accessible platforms and provisions for mobility devices on all cars. Where parking is provided at stations, accessible parking will

be provided in accordance with ADA requirements. Signage and ticket vending machines will also be designed in accordance with ADA requirements.

Operating Hours and Frequency

The LRT is proposed to operate from 5:30 AM to 12:00 midnight seven days a week at the following service frequencies:

- Weekday:
  - Early Morning 5:30 to 6:30 AM 15 minutes
  - AM Peak 6:30 to 9:00 AM 7.5 minutes
  - Midday 9:00 to 4:00 PM 15 minutes
  - PM Peak 4:00 to 6:30 PM 7.5 minutes
  - Early Evening 6:30 to 9:00 PM 15 minutes
  - Late Evening 9:00 PM to 12:00 Midnight 30 minutes
- Weekends:
  - Early Morning 5:30 to 9:00 AM 30 minutes
  - Midday 9:00 to 9:00 PM 15 minutes
  - Late Evening 9:00 PM to 12:00 Midnight 30 minutes

This standard operating plan would be modified to accommodate special events such as evening or weekend cultural or sporting events. Rail vehicles that would primarily be used in the AM and PM peak periods would be used to provide supplemental rail service before and after special events.

The LRT Build Alternatives include the components of the No-Build and the TSM Alternatives. The expanded bus system associated with the TSM Alternative would be restructured to coordinate and interface with the proposed LRT service.

The proposed LRT alignment and general station locations are shown on Figure 2.2-3a and 2.2-3b and described in more detail in the following sections. There are two locations where the EIS is evaluating alternative light rail alignments. In the Covington Segment there is both an at-grade (Option B) and an aerial (Option A) alignment. In the Uptown Segment there are also two alternative alignments. An alignment that generally follows Martin Luther King, Jr. (MLK) Drive (Option B) and an alignment that serves the Cincinnati Zoo via Vine and Erkenbrecher Streets (Option A). The two options in each of the two areas combine to form four end-to-end LRT alignment alternatives as defined in the following matrix and shown on Figures 2.2-3a and 2.2-3b.

	Covington Alignment	
Uptown Alignment	Option A-Aerial	Option B-At-Grade
Option A - Zoo	LRT Alternative 4	LRT Alternative 3
Option B - MLK	LRT Alternative 2	LRT Alternative 1

The LRT Alternative includes 20 or 21 stations and a yard and shop facility. Stations are proposed as follows:

Table 2.2.2: Light Rail Station Characteristics

Station	Number of Park & ride Spaces	Travel Time (Minutes)To Government Square (Fifth Street In Downtown Cincinnati)	
		MLK/Covington Aerial Alignment	Zoo/Covington At-Grade Alignment
12th Street	253	9	10
Pike Street	0	8	9
Covington Riverfront	0	6	7
The Banks	0	3	3
Government Square	0	0	0
Court Street	0	2	2
Over the Rhine	0	4	4
Mount Auburn	0	7	7
Uptown	0	9	9
Zoo	0	NA*	11
Medical Center	0	11	15
Avondale	0	12	17
Xavier/Evanston	460	15	20
Norwood	0	18	23
Ridge Avenue	683	21	26
Silverton	303	25	30
Galbraith	423	28	33
Cooper	0	30	35
Pfeiffer	954	33	38
Reed Hartman	0	35	40
Cornell Park	857	38	43
TOTAL	3,933		

* There is no Zoo Station on the MLK alignment.

2.2.3.2 Covington Segment

EIS Alignment

The southern terminus of the LRT alignment is located approximately 500 feet south of 12th Street along the west side of the CSXT railroad tracks in Covington, KY. The two LRT tracks will proceed north under the existing bridge at 12th Street and replacement bridges at 11th Street and Robbins Street. Between Robbins Street and Eighth Street, the tracks will pass from the west side to the east side of the CSXT railroad in a new tunnel to be constructed under the railroad tracks. The alignment will then continue north, roughly paralleling the railroad tracks with at-grade crossings of Eighth Street and the intersection of Pike Street and Russell Street.

In the segment between Athey Street (which will end in a cul-de-sac) and the Ohio River, two alternative alignments are being studied; at-grade or aerial. The at-grade option will generally follow the existing

topography along the east side of the railroad tracks with at-grade crossings at Sixth Street, Fifth Street and Fourth Street and crossing over Third Street on a new bridge structure. The aerial option will have the tracks begin rising just south of Athey Street.

The tracks for the aerial option will climb on retained fill south of Athey Street and cross over Sixth Street, Fifth Street, Fourth Street and Third Street on new bridge structures. With both alternatives, existing underpasses beneath the CSXT Railroad for Seventh and Pershing Streets will be closed.

Stations

There will be three stations in the Covington Segment as described below:

12th Street
The 12th Street Station will be located adjacent to 12th Street between Russell Street and the CSXT railroad. The station area will encompass a total of 5.9 acres and will include 253 parking spaces, 20 drop-off spaces and three bus pull-outs. The station will have a center-loading platform. Vehicular access will be from Russell and 13th Streets.

Pike Street
The Pike Street Station will be located on a portion of the block bounded by Pike Street on the north, Washington Street on the east, Eighth Street on the south and the CSXT railroad on the southwest. This station will have side-loading platforms. No parking or drop-off areas are proposed.

Covington Riverfront
There are two options for this station corresponding to the aerial or at-grade alignment. With the at-grade alignment, the station will be located in the block bounded by Fourth Street on the north, Johnson Street on the east, Fifth Street on the south and the CSXT Right-of-way on the west. The 2.2 acre station will include nine drop-off spaces and four bus pull-outs with access from Fourth Street and Johnson Street. The station will have side-loading platforms. With the aerial alignment, the station will be located between Third Street and the floodwall on the west side of Main Street. Elevators and stairs will provide access from ground level to the elevated station. The station will encompass a total of 1.4 acres and will include five drop-off spaces and four bus pull-outs with access from Main Street. The station will have a center-loading platform. It is envisioned that this station alternative would be incorporated into Covington's Riverfront West development site.

Other Covington Alternatives Considered

During the MIS process, an alignment through Covington generally following Madison Avenue from 12th Street to the river was considered. This alignment was intended to connect to a new bridge across the Ohio River connecting Race Street in Cincinnati and Madison Avenue in Covington. This alignment was precluded by new development along the Cincinnati and Covington riverfronts.

At the June 25 and July 26, 1999 meetings of the I-71 Oversight Committee, three alternative alignments through Covington were considered. Alternative A (I-75 alignment) would generally follow along the east side of I-71/75 between approximately 15th Street and Fifth Street. The alignment would then follow Fifth Street east to the Ohio River crossing. Alternative B (CSXT West) would generally follow the west side of the CSXT railroad tracks from south of 12th Street to approximately Sixth Street where it would cross over the tracks to the east side of the railroad. Alternative C (CSXT East) with both the at-grade and aerial alternatives was the selected alignment option (described as the EIS Alignment). The Oversight Committee considered the following criteria in selecting the CSXT East alignment:

- Socio-economic – population, employment, low-income households within ¼ mile of stations
- Accessibility – at-grade road crossing, traffic access, bus access, pedestrian access
- LRT Operation – travel times, future extension routes
- Right-of-way – property acquisition and displacements
- Environmental – wetlands, potential contamination, parklands, historic, visual
- Capital costs
- Public input – as surveyed at public meetings on 5-18-99 and 6-26-99 in Covington; the CSXT East alignment was endorsed by the Covington Board of Commissioners on 7-20-99.

2.2.3.3 Ohio River Crossing Segment

EIS Alignment

The LRT will cross the Ohio River on a new bridge located just east of the existing Clay Wade Bailey Bridge. The new bridge will be approximately 1,500 feet long and 35 feet wide and will carry both northbound and southbound LRT tracks.

The Ohio River crossing is planned to be a through-truss bridge similar in appearance to the existing Clay Wade Bailey Bridge with generally the same vertical profile and pier placement.

Other Ohio River Crossing Alternatives Considered

During the MIS process, a new bridge across the Ohio River connecting Race Street in Cincinnati and Madison Avenue in Covington was considered. This alignment was eliminated for a variety of reasons, including new development along the Cincinnati and Covington riverfronts.

The I-71 Oversight Committee (1/22/99, 2/26/99, 5/27/99 meeting dates) considered using a portion of the existing Clay Wade Bailey Bridge for LRT. The concept considered using one of the three existing traffic lanes on the bridge for a single LRT track. The evaluation concluded that the bridge was structurally capable of carrying LRT and using the existing bridge would be less costly than building a new bridge. However, the Oversight Committee recommended a new bridge primarily because of the possible loss of traffic capacity and the importance of the bridge for traffic/incident management.

2.2.3.4 Cincinnati Riverfront Segment

EIS Alignment

After crossing the Ohio River, the LRT will continue to be elevated on new bridge structures adjacent to the Clay Wade Bailey bridge crossing over Mehring Way and the Cincinnati Bengals' practice field. At approximately Pete Rose Way, the northbound and southbound tracks will split. The northbound tracks will turn to the east and remain elevated on new bridge structures along the south side of Fort Washington Way crossing over Central Avenue. At Elm Street, the rails will be embedded in a new bridge deck and cross diagonally to the southern lane of Second Street. The LRT will continue along the southern lane of Second Street crossing Race, Vine and Walnut Streets at-grade. At Main Street, the northbound LRT track will turn to the north along the west side of the Main Street overpass over Fort Washington Way.

An auxiliary lay-up track will adjoin the northbound track with track connections to the west and east of Central Avenue.

After crossing Pete Rose Way, the southbound track will continue elevated on new bridge structures crossing the existing Fort Washington Way Ramp D bridge (from the Clay Wade Bailey bridge to Second Street) at-grade. At Third Street, the track will turn to the east at grade along the south side of Third Street. The rails will be embedded at Central Avenue and then shift into the southerly lane of Third Street. The southbound tracks will follow the southerly lane of Third Street crossing Elm, Race and Vine Streets at-grade. At Walnut Street, the track will turn to the north along the east side of Walnut. Also, via the Walnut Street overpass bridge over Fort Washington Way, track connections will be made between Second and Third Streets to facilitate special routing of trains.

Stations

The Banks Station will be located between Walnut and Vine Streets. The southbound station will be located on the south side of Third Street. The northbound station will be located on the south side of Second Street. No parking or drop-off areas are proposed. Station loading platforms will be incorporated into the sidewalks at these locations.

Other Cincinnati Riverfront Alternatives Considered

In addition to the split Second/Third Street alignment option selected for study in the EIS, the I-71 Corridor Oversight Committee considered a number of other alignment options through the Cincinnati riverfront. These options were identified in a report entitled *An Evaluation of LRT Options Through Fort Washington Way* (March 1999). The options considered included placing both tracks on the south side of Second Street and a variation of the split Second/Third Street alignment with the southbound tracks on the north side of Third Street. On March 28, 2001, the Oversight Committee voted to eliminate putting both tracks on the south side of Second Street. Placing the southbound tracks on the north side of Third Street was rejected because of multiple conflicts with existing driveways and potential future developments along the north side of Third Street.

2.2.3.5 Downtown Cincinnati Segment

EIS Alignment

Through the downtown area , the LRT will run northbound on the west side of Main Street and southbound on the east side of Walnut Street. The light rail tracks will displace the existing curbside uses along Main and Walnut Street and the streets will be reconfigured to maintain at least two through traffic lanes. The light rail tracks will be embedded in the street pavement. Private vehicles will be able to drive across the tracks but will not be permitted to drive in the trackway. The LRT will cross all east-west streets at-grade and the light rail vehicles will generally move in accordance with the traffic signal system.

Stations

There will be two stations in downtown Cincinnati as described below:

Government Square
The Government Square Station will be located between Fifth and Sixth Streets with the northbound station on Main Street and the southbound station on Walnut Street. Station loading platforms will be incorporated into the sidewalks at these locations. Government Square is currently the region's largest transit center.

Court Street
The Court Street Station will be located between Ninth Street and Court Street with the northbound station on Main Street and the southbound station on Walnut Street. Station loading platforms will be incorporated into the sidewalks at these locations.

Other Downtown Cincinnati Alignments Considered

Figure 2.2-4 defines a number of the other downtown alignment options and some of the evaluation criteria considered. There were a number of reasons for selection of Main Street and Walnut Street for LRT through downtown:

- The Main/Walnut alignment provided the best proximity to downtown employment centers.
- A north-south alignment was preferred over an east-west alignment to provide a direct linkage between downtown, UC and the riverfront.
- The northbound and southbound service must be provided on the same or adjacent streets for user understanding.
- Turns in the downtown area are undesirable because of reduced LRT operating speeds, interference with traffic operations, LRT maintenance, noise, and safety.
- The Main/Walnut alignment optimizes the length and curvature of the proposed tunnel under Mt. Auburn and provides the least impact to residential property in Over-the-Rhine for both the alignment itself and construction and staging areas needed during tunnel construction.

2.2.3.6 Over-the-Rhine/Mount Auburn Tunnel Segments

EIS Alignment

Through the Over-the-Rhine neighborhood, the LRT will run northbound on the west side of Main Street and southbound on the east side of Walnut Street. The light rail tracks will displace the existing curbside uses along Main and Walnut Streets and the streets will be reconfigured to maintain at least two through traffic lanes. The light rail tracks will be embedded in the street pavement. Private vehicles will be able to drive across the tracks but will not be permitted to drive in the trackway.

Approximately 350 feet south of Liberty Street, the southbound tracks will turn northeast diagonally across the block between Main and Walnut Streets to adjoin and parallel the northbound track. North of Liberty Street, both the northbound and southbound tracks will be on the west side of Main Street. After crossing McMicken Street at grade, the LRT tracks will enter a 1.1 mile long tunnel approximately 300 feet north of Liberty Street. Under the vicinity of Goethe Street, the tunnel will turn to the east entering

the general alignment of Auburn Avenue at approximately Mason Street. The LRT tunnel will continue north under and immediately east of Auburn Avenue to approximately McGregor Avenue where it will turn to the west until it reaches the Vine Street alignment in the vicinity of Calhoun Street. The tunnel will follow the Vine Street alignment under Corry Boulevard. The LRT tracks will emerge from the tunnel in the median of Jefferson Avenue south of Charlton Street. Overall, the tunnel will be approximately 6,600 feet long and will climb at a five percent grade from south to north over most of this distance.

Stations

There will be two stations in the Over-the-Rhine/Mount Auburn Tunnel Segments as described below:

Over-the-Rhine
The northbound Over-the-Rhine Station will be located between 14th and Melindy Street on the west side of Main Street . The station loading platform will be incorporated into the sidewalk. The southbound platform will be located in the block south of Liberty Street between Main and Walnut Streets.

Mount Auburn
The Mount Auburn Station will be a tunnel station located approximately 185 feet below the east side of Auburn Avenue between Earnshaw Avenue and Gillman Street. The Mount Auburn Station will have a center loading platform 300 feet long to accommodate future three car train operations. The station will have two elevators and two sets of stairs to the surface. On the surface there will be three headhouse structures; one for the elevators and one for each staircase and ventilation shaft. The station will be located across Auburn Avenue from the main entrance to Christ Hospital.

Other Over-the-Rhine/Mount Auburn Alignments Considered

In the Over-the-Rhine area, an alternative to the diagonal crossing between Main and Walnut Streets south of Liberty Street was considered. This alternative alignment would have continued north along the east side of Walnut Street from 14th Street through the intersection with Liberty to McMicken Street. The LRT would then turn slightly to the east along Lang Street where it would enter into a tunnel and join the northbound tracks in the tunnel near the surface intersection of Dorsey and Main Street. This alternative alignment was dropped by the Oversight Committee at their meeting on May 17, 2001 primarily because of the increased area of disruption and potential costs associated with two portals.

An alternative alignment for the Mount Auburn tunnel was also considered. The alternative tunnel alignment would have continued north directly into Jefferson Avenue rather than turning to the east under Auburn Avenue. This alternative alignment would result in a shorter and somewhat less costly tunnel but would have made a tunnel station in the vicinity of Christ Hospital infeasible. This alternative alignment was dropped by the Oversight Committee at their meeting on May 17, 2001 primarily because a tunnel station with this alignment would not be feasible.

2.2.3.7 Uptown Segment

EIS Alignments

In the Uptown Segment, two alternative alignments are being studied. Both alignments follow the median of Jefferson Avenue. From that point there are two alignments under consideration; the MLK Drive (Option B) alignment and the Zoo (Option A) alignment.

The MLK (Option B) alignment will begin to descend just north of University Avenue and will enter a short tunnel approximately 350 feet north of University Avenue. The tunnel will turn to the east along the south side of MLK Drive. The tracks will emerge from the tunnel just east of Vine Street and will continue along the south side of MLK. Just east of Euclid Avenue, the LRT tracks will pass diagonally over MLK on a new bridge that will touch down on the east side of Eden Avenue , north of MLK. The LRT will continue along the north side of MLK crossing Bellevue Avenue which will be closed between MLK and Piedmont and then enter a cut under Highland Avenue and Burnet Avenue. The LRT will return to grade, crossing Harvey Avenue, Reading Road and Van Buren Avenue at-grade and turning to the northeast along the west side of I-71. The LRT will continue alongside I-71, turn north to go under Whittier Street and then northeastward to cross Fredonia Avenue at-grade. Savoy Place will end in a cul-de-sac and the Borman Avenue cul-de-sac will be shifted northward.

The Zoo (Option A) alignment will begin to descend just north of University Avenue and will enter a short tunnel approximately 400 feet north of University Drive. The tunnel will continue to the north under the intersection of MLK and Jefferson emerging approximately 200 feet north of MLK. The LRT will continue north crossing from the west side of Jefferson to the east side of Vine at-grade through the intersection of Vine and Nixon. Continuing along the east side of Vine Street, the LRT will cross Shields Street at-grade and turn east into the median of Erkenbrecher Avenue. Louis Avenue will end in a cul-de-sac just east of Dury Avenue, the LRT will turn to the south between Holmes Hospital and Children's Hospital and cross Sabin Way at-grade. Just south of Sabin Way the LRT will turn to the southeast and pass between the University of Cincinnati Cardiovascular Sciences Building and Logan Hall. Just west of Logan Hall, the LRT will enter a tunnel under Sabin Way and under Burnet Avenue emerging in a parking lot for the Health Alliance Business Center approximately 300 feet west of Harvey Avenue. The LRT will cross Harvey Avenue at grade and turn to the south to the south side of Hickman Avenue. Hickman Avenue will be closed to through traffic at Harvey Avenue. The LRT will run along the south side of Hickman Avenue crossing Reading Road and Whittier at grade, then turning to the northeast to meet Fredonia Avenue at-grade. Tracks in the median of Jefferson and Erkenbrecher will be embedded in the pavement.

To the north of Fredonia, both alternatives will follow the same alignment. The LRT will generally continue to the north, slightly west of the SORTA owned Blue Ash line, under the Blair Avenue bridge, crossing Blair Court at-grade, and running over Victory Parkway on the existing railroad bridge. The LRT will continue on the SORTA owned Blue Ash line alignment to Dana Avenue with an at-grade crossing of Woodburn Avenue.

Stations

There will be three LRT stations in the Uptown Segment with the MLK (Option B) alternative and four stations with the Zoo (Option A) alternative as described below:

Uptown
This station will be located in the median of Jefferson Avenue between Charlton and Daniels Street. This station will have side-loading platforms. No parking or drop-off areas are proposed.

Zoo
This station will be built with the Zoo alignment only. The station will be located along the east side of Vine Street between Shields Street and Louis Avenue. The station will have a center loading platform. No parking or drop-off areas are proposed.

Medical Center

There are two alternative locations for the Medical Center Station. With the MLK (Option B) alignment, the Medical Center Station will be located on the north side of MLK between Bellevue Avenue and Highland Avenue. The station will have a center loading platform. Four bus pull-outs with access from Piedmont Avenue are proposed. No parking is proposed. With the Zoo (Option A) alignment, the Medical Center Station will be located south of Sabin Way, west of Logan Hall and north of University Hospital in the University of Cincinnati Levine Park. The station will have side loading platforms with no off-street parking or drop-off areas.

Avondale

There are two alternative locations for the Avondale Station. With the MLK (Option B) alignment, the station will be located along the north side of MLK, west of Reading Road. The 2.2 acre site will provide for 6 bus pull-outs with access to Reading Road. The station will have a center loading platform. With the Zoo (Option A) alignment, the station will be located on the south side of Hickman Avenue between Harvey Avenue and Reading Road. The 1.8 acre station site will have side-loading platforms, 10 drop-off spaces and four bus pull-outs. Vehicular access will be from Reading Road.

Other Uptown Alignments Considered

During the MIS process, a variation of the MLK (Option B) alignment was considered. The MIS alignment emerged from the Mount Auburn tunnel on the west side of Jefferson Avenue with a station located between Corry Street and Charlton Street. The LRT remained on the west side of Jefferson to north of MLK and turned to the east along the north side of MLK. The Medical Center Station was proposed to be located along the north side of MLK between Eden Avenue and Bellevue Avenue. The LRT remained on the north side of MLK with a station located under Reading Road. At I-71, the LRT turned to the northeast and into the SORTA owned Blue Ash line. During the early stages of the PE study, the MIS alignment was refined. The LRT was moved to the median of Jefferson to be more consistent with the University of Cincinnati Master Plan. The alignment was also moved to the south side of MLK between Jefferson and Eden Avenue to avoid the University's newly constructed Vontz Center. The profile was refined to allow for an at grade station at Reading Road.

The Zoo (Option A) alignment was developed based on the *Uptown Transit Study* (March 23, 1998) which was prepared by the Uptown Transportation Advisory Committee (UTAC). UTAC includes membership from the institutions in the area along with neighborhood and city representatives. The study evaluated five alternative routes through the university and medical center area. UTAC recommended a route similar to the Zoo (Option A) alignment. The Zoo (Option A) alignment was refined based on more detailed mapping and meetings with many of the property owners in the area. An alternative to the Zoo (Option A) alignment that used Shields Street rather than Erkenbrecher east of Vine was evaluated. A number of alignment options in the vicinity of Sabin Way were also considered as well as an alternative locating the Avondale Station along Ridgeway Avenue.

The alternative alignments through this area were considered by the I-71 Corridor Oversight Committee at their meetings on November 27, 2000, February 26, 2001 and March 28, 2001. Two general public meetings were held along with meetings with the Corryville, Avondale and Mount Auburn Community Councils. Based on this public input and an evaluation that considered travel time, ridership, operating cost, capital cost, and right-of-way impacts the Oversight Committee recommended further study of both the MLK alignment and the Zoo alignment in the EIS.

2.2.3.8 Avondale to Norwood Segment

EIS Alignment

The LRT will cross Dana Avenue at-grade on SORTA owned Blue Ash line at Idlewild Avenue. The LRT will continue to follow the SORTA owned Blue Ash line to the northeast crossing Cleneay, Mentor, Ivanhoe, Williams and Waverly Avenues at-grade. The LRT will cross Montgomery Road at-grade and proceed to the north along the northwest side of Lafayette Avenue including an at-grade crossing of Monroe Avenue. Ashland Avenue will be closed to through traffic at Lafayette. After passing behind the Surrey Square Shopping Center, the LRT will cross Smith Road at-grade and turn to the east through a portion of the Central Parke shopping center to the north side of the Salvation Army building on the north side of Park Avenue. The LRT will turn to the north just east of Wesley Avenue through the Contractors Warehouse site. Approximately 700 feet south of the existing CSXT railroad tracks, a new bridge will be constructed that will carry the LRT over the CSXT, Forest Avenue, Harris Avenue and the Norwood Lateral. The structure will end just south of Norwood Avenue and the tracks will cross Norwood Avenue at-grade just east of the existing Indiana and Ohio railroad crossing at Linden Avenue. The LRT will continue along the east side of the Indiana and Ohio railroad right-of-way crossing Highland Avenue at-grade and continuing northward in a SORTA owned easement along the east side of the Indiana & Ohio Railroad McCullough yard facility. Beech Street will be reconfigured as a cul-de-sac.

Stations

There are two LRT stations proposed in the Avondale to Norwood Segment:

Xavier/Evanston
The Xavier/Evanston Station will have a center loading platform located in the SORTA owned Blue Ash line right-of-way north of the intersection of Dana Avenue and Newton Avenue. The 3.4 acre station site will have 97 parking spaces, four drop-off spaces and four bus pull-outs. Vehicular access will be from Dana Avenue at Clarion Avenue. There is an existing parking lot to the east of the station site that is owned by Xavier University and used primarily for parking for special events at the Cintas Center. Based on discussions with Xavier University officials, it is anticipated that at least 350 parking spaces could be available for LRT park & ride use on weekdays.

Norwood
The Norwood Station will be located along the northwest side of Lafayette Avenue south of Sherman Avenue. The station will have side loading platforms and four bus pull-outs. Vehicular access to the station will be from Sherman Avenue.

Other Avondale to Norwood Segment Alignments Considered

During the EIS scoping process, it was suggested that a light rail alignment generally following Montgomery Road should be considered as an alternative to the MIS alignment following the railroad alignment. In response to these comments, a Montgomery Road alignment alternative was developed and evaluated. This alignment would have turned off the SORTA owned Blue Ash line right-of-way just north of Dana Avenue. The LRT would turn to the east through the BASF site with a station located west of Montgomery Road. The LRT would then turn into the Montgomery Road alignment and follow Montgomery Road to the north. Where Montgomery Road crosses Lafayette, the LRT could continue on Montgomery Road or turn north on the SORTA owned Blue Ash line right-of-way. The Montgomery Road alignment could continue on Montgomery Road north out of the City of Norwood through Pleasant Ridge, Kennedy Heights and into Silverton. The LRT could join the SORTA owned Blue Ash line right-of-way where it crosses Montgomery Road in Silverton or it could continue on Montgomery Road to Kenwood Road. At Kenwood Road in Columbia Township, the LRT alignment was assumed to turn north in the Kenwood Road alignment and follow Kenwood Road into Blue Ash. The alternative alignment would join the SORTA owned Blue Ash line right-of-way just north of Cooper Road in Blue Ash.

Along this general alignment, three alternative configurations were considered; LRT in shared traffic lanes, LRT in exclusive lanes within the existing right-of-way, and LRT in exclusive lanes with expansion of the Montgomery Road right-of-way. These three alternatives were evaluated relative to right-of-way/displacements, capital cost, LRT ridership, LRT travel time and traffic operations. This evaluation was reviewed by the I-71 Corridor Oversight Committee on July 17, 2000 and August 28, 2000. Community meetings were held in Norwood, Deer Park, Pleasant Ridge and Kennedy Heights. On October 23, 2000, the Oversight Committee voted to eliminate the Montgomery Road alignment except for the segment in Norwood between Dana and Lafayette. Further analysis of the segment between Dana and Lafayette was presented to the Oversight Committee on May 17, 2001 and the committee voted to also eliminate this segment of Montgomery Road as an alternative alignment.

A number of alignment options through the Central Parke area of Norwood were also considered. This area is located north of Park Avenue, south of the CSXT railroad between Smith Road and Forest Avenue. At one time, the Conrail railroad ran diagonally across the site. It has now been redeveloped to include a shopping center and office/warehouse uses. On May 17, 2001, the Oversight Committee considered two alignment options, one following the former rail alignment diagonally across the site and the other parallel to Park Avenue behind the Salvation Army building turning north along the west side of Forest Avenue. The Oversight Committee suggested a compromise alignment that made a more gentle turn to the north but required fewer property acquisitions than the former rail alignment. This compromise alignment was adopted by the Oversight Committee on July 10, 2001.

2.2.3.9 Norwood to Blue Ash Segment

EIS Alignment

The LRT alignment will proceed northward out of the City of Norwood in a SORTA owned easement along the east side of the Indiana & Ohio Railroad McCullough yard facility. The LRT will cross over the SORTA owned Blue Ash line on a new bridge and Lester Road at-grade at the corner of Delmar Avenue. East of Lester Road, the LRT will move into the SORTA owned Blue Ash line and follow the right-of-way to an at-grade crossing of Ridge Avenue. The LRT will continue in the SORTA owned Blue Ash line adjacent to Woodford Park, crossing Woodford/Robinson Road at-grade and under Kennedy Avenue using the existing underpass. Zinsle Avenue will be crossed at-grade near the intersection of Red Bank Road. Still following the SORTA owned Blue Ash line, the LRT will cross into the City of

Silverton and cross Montgomery Road at-grade just east of the intersection at Ohio Avenue. The Highland Avenue grade crossing at St. James will be closed to automotive traffic. The LRT will pass through the City of Silverton, crossing Section Road at-grade and into the City of Deer Park on the SORTA owned Blue Ash line crossing Plainfield Road and Webster Avenue at-grade. The LRT will continue through Deer Park in the railroad right-of-way west of Blue Ash Road with at-grade crossings at Matson, Schenck and Galbraith Road. Continuing into Sycamore Township, the LRT will cross Kugler Mill Road and Sycamore Road at-grade. Existing at-grade crossings at Emerald and Alpine will be closed along with several private driveways in this area. An at-grade crossing will be provided at Bellview Avenue.

Stations

There are three LRT stations proposed in the Norwood to Blue Ash Segment:

Ridge
The Ridge Station will have a center loading platform located in the existing SORTA owned Blue Ash line west of Ridge Avenue. The 9.5 acre station site will have 683 parking spaces, 23 drop-off spaces and four bus pull-outs. Vehicular access will be from Ridge Avenue at an existing signalized intersection south of the tracks.

Silverton
The Silverton Station will have a center loading platform located just east of Highland Avenue and south of Montgomery Road adjoining the existing SORTA training facility. The 3.8 acre station site will have 303 parking spaces, seven drop-off spaces and three bus pull-outs. Vehicular access will be from Montgomery Road at two locations.

Galbraith
The Galbraith Station will have a center loading platform located adjacent to the existing SORTA- owned Blue Ash line, west of Blue Ash Road between Galbraith Road and Kugler Mill Road. The 6.2 acre site will have 423 parking spaces and four bus pull-outs. Automobile access will be from Linden Avenue and Kugler Mill Road. Bus access will be from Galbraith Road.

Other Norwood to Blue Ash Alignments Considered

As described under the Avondale to Norwood Segment, an LRT alignment following Montgomery Road was evaluated in this segment. No other alignment alternatives were considered.

2.2.3.10 Blue Ash Segment

EIS Alignment

The LRT will continue into the City of Blue Ash in the SORTA owned Blue Ash line right-of-way west of Blue Ash Road crossing over Ronald Reagan Highway on a new railroad bridge. After crossing Hunt Road at-grade, the LRT will continue between Blue Ash Road and Railroad Avenue to an at-grade crossing of Cooper Road. North of Cooper Road the LRT will continue in the SORTA owned Blue Ash line west of and generally paralleling Kenwood Road and cross Glendale-Milford Road at grade. Approximately 1,300 feet north of Glendale-Milford Road, the LRT will turn to the west off the railroad right-of-way then to the north along the east side of Reed Hartman Highway. The LRT will continue northward along the east side of Reed Hartman Highway in a reserved right-of-way corridor, crossing Creek Road, Osborne Boulevard, Cornell Road, Ashwood Drive and Cornell Park Drive at-grade. The

LRT will turn to the east along the south side of the Procter & Gamble Sharon Woods Technical Center property and will terminate near Grooms Road.

Stations

There are four LRT stations proposed in the Blue Ash segment:

Cooper
The Cooper Station will have side loading platforms located just south of Cooper Road between Blue Ash Road and Railroad Avenue. A pull-out area on the west side of Blue Ash Road is proposed to provide 8 drop-off spaces. No other parking is proposed.

Pfeiffer
The Pfeiffer Station will have a center loading platform located north of Glendale-Milford Road (Pfeiffer Road). The 15.1 acre station site will have 954 parking spaces, 49 drop-off spaces and six bus pull-outs. Bus access will be from Glendale Milford. General vehicular access will be from Lake Forest Drive.

Reed Hartman
The Reed Hartman Station will be located on the east side of Reed Hartman Highway just north of Osborne Boulevard. The 1.6 acre site will have a center loading platform and will provide 12 drop-off spaces and three bus pull-outs.

Cornell Park
The Cornell Park Station will include a center loading platform located approximately 1,600 feet east of Reed Hartman Highway on the south side of the Procter & Gamble Sharon Woods Technical Center. The 12.1 acre site will have 857 parking spaces, 12 drop-off spaces and 6 bus pull-outs. Vehicular access will be from both Cornell Park Drive and Grooms Road.

Other Blue Ash Alignments Considered

During the MIS process, an alternative alignment through Blue Ash was studied. This alternative alignment continued on the railroad right-of-way north of Glendale Milford Road, crossing Kenwood Road and terminating at Cornell Road near the intersection of LaBelle Avenue. Both the Reed Hartman alignment and the alternative railroad alignment were presented at a public meeting in Blue Ash on May 12, 1999 and were considered by the Oversight Committee on June 25, 1999 and July 26, 1999. The Blue Ash City Council unanimously endorsed the Reed Hartman alignment on July 8, 1999. The Oversight Committee considered the following criteria in selecting the Reed Hartman alignment:

- Socio-economic – population, employment, low-income households within ¼ mile of stations
- Accessibility – at-grade road crossing, traffic access, bus access, pedestrian access
- LRT Operation – travel times, future extension routes
- Right-of-way – property acquisition and displacements
- Environmental – wetlands, potential contamination, parklands, historic, visual
- Capital costs
- Public input

2.2.3.11 Yard and Shop

EIS Alternative

The yard and shop will serve as the maintenance, operations and storage facility for the light rail system. The facility will include a storage yard and Maintenance and Operations Center (MOC) building. The storage yard will be capable of storing all light rail vehicles and will be the location at which trains will enter and leave revenue service. The MOC will include the main shop floor area with light rail vehicle (LRV) maintenance shops, utility areas and shop support. The MOC will also house various component maintenance shops, maintenance-of-way shops, material management and storage, transportation operations offices, the LRT control center, administrative and support services. Maintenance tracks will be provided for LRV scheduled inspection, maintenance, repairs, wheel truing, painting and body work, car washing, roof top and undercarriage equipment as well as truck assembly maintenance. The MOC is the location where maintenance, operations and administrative staff of the light rail system will report for work.

The proposed yard and shop is located in the Avondale neighborhood of the City of Cincinnati along the northwest side of I-71, east of Fredonia Avenue. The 18.8 acre triangular shaped site will be bounded by the LRT mainline tracks on the north, Fredonia Avenue on the west, I-71 on the south, and Victory Parkway on the east. The site will extend under the existing Blair Avenue overpass. Primary access to the site will be from Fredonia Avenue with secondary access from Blair Court.

The site will include storage tracks for the initial LRV fleet of 36 to 41 cars with the capability of accommodating a fleet increase of at least 33 percent without limiting car movements. Additional LRV storage could also be accommodated by storing across switches and lead tracks and within the shop itself. The MOC building will have a footprint of approximately 86,000 square feet with approximately 125,000 square feet of floor area. The site will include approximately 200 parking spaces for employees and visitors and approximately 30 parking spaces for service vehicles.

Other Yard and Shop Sites Considered

Four alternative yard and shop sites were considered and evaluated during the MIS process. The site evaluation considered a number of parameters including size, shape, topography, existing use, surrounding use, and roadway access. The sites and evaluation results are described below:

- MLK Site – This site was located under MLK Drive on the east side of I-71. It was bounded by Stanton Avenue on the east, I-71 on the west and Tuxedo Place on the south. This site was considered undesirable primarily due to operational weaknesses, limited access and extensive site preparation work.

- Dana Avenue Site – This site was located in the northwest quadrant of the intersection of Dana Avenue and Montgomery Road. The site included the former BASF property. It was bounded by Dana Avenue on the south, the railroad tracks on the west, Lexington Avenue on the north and Montgomery Road on the east. This site was considered undesirable because it was barely large enough to accommodate the initial light rail fleet and expansion of the site would be problematic.

- I&O Railroad McCullough Yard – This site is an operating freight rail yard located northeast of the intersection of Highland Avenue and Beech Street in the City of Norwood. The I&O yard was considered constrained but feasible if the existing freight operations could be terminated or relocated.

- Blue Ash Site – This site was located along the west side of Blue Ash Road, north of Emerald Avenue in Sycamore Township. The Blue Ash site was considered feasible and was ranked as the most favorable site.

Based on this evaluation, at the start of the Preliminary Engineering (PE) process, both the I&O site and the Blue Ash site were under consideration. Further discussions with the I&O Railroad indicated that they might be interested but did not have any current plans to relocate or abandon the existing yard operations. In addition, the narrow width of the existing yard would result in inefficient site utilization. At a meeting with I&O Railroad officials on May 23, 2001, is was determined that joint operations in the yard would not be feasible.

The Blue Ash site, while feasible, was determined to be undesirable because it was located near the north end of the light rail line necessitating additional non-revenue train miles, greater distances and travel times to recover damaged/disabled LRV's, and also because the site would be difficult to expand.

Because of these considerations, another search was conducted and the Avondale site was identified. The Avondale site was considered superior to either the I&O or Blue Ash sites and was selected for further study in the EIS.

2.3 CAPITAL COSTS

This section presents the capital cost estimates for the No-Build, TSM and LRT Build alternatives.

2.3.1 METHODOLOGY

The approach to estimating capital costs for the LRT alternatives involves categorizing and quantifying the various construction elements, then developing and applying appropriate unit costs. For cost estimating purposes, the current level of design of the LRT alignment alternatives is assumed to be consistent with prior system definitions and corresponding costs applicable in 1999. The costs have been adjusted to 2001 dollars at an annual rate of +3.5%.

2.3.1.1 Major Categories

Costs calculated for the LRT capital cost estimate include the following:

Guideway

The LRT guideway is defined to encompass all of the civil elements directly associated with the construction of the proposed alignment. Examples of LRT guideway elements include retaining walls, tunnels, structures, grading, drainage, subgrade, ballast, trackwork, pavement, curb and gutter, traffic barriers, fences, lighting and landscaping. Guideway costs are estimated by developing various typical cross-section designs and unit costs, and applying the cross-sections to the alignment as appropriate.

Stations

Station costs are estimated using typical LRT station designs and unit costs. For each proposed station location, an appropriate typical station design is selected, and the corresponding unit costs are applied. The typical station costs include platforms, shelters, mezzanines, stairways, elevators, if necessary, and other furnishings. Additional station cost elements are estimated for each proposed station individually, including site preparation, driveways, bus loading areas, parking lots, station landscaping, and stormwater retention.

Systems

Systems costs include traction electrification, train control signaling, communications, central control, and fare collection.

Special Conditions

This cost element includes construction activity that is not accounted for in the LRT guideway component. Examples of special conditions include roadway restoration, non-guideway structures, traffic signals, grade crossings (typically in signals), and traffic control.

Right-of-Way

This component includes all of the costs associated with right-of-way acquisition and relocation of existing land uses.

Yards & Shops

This component includes all of the costs associated with any necessary centralized facilities.

Vehicles

Vehicle costs are estimated using the LRT and bus fleet sizes indicated in the proposed operating plan, plus a spare ratio. The unit costs are based upon recent experience in other systems with similar characteristics.

Add-Ons

Add-on costs are non-construction costs that can be anticipated during project development. These include engineering, construction management, project management, project administration, insurance, and start-up. Add-ons are estimated of a percentage of the other major cost categories, including contingency.

In addition to the categories identified above, the LRT capital cost estimate incorporates the following contingencies to account for items not specifically included in the estimate:

- Guideway: 30%
- Stations: 30%
- Systems: 30%

- Special Conditions: 30%
- Right-of-Way: 30%
- Yard & Shops: 30%
- Vehicles: 10%

2.3.1.2 Unit Costs

The unit costs used in the LRT capital cost estimate were developed using a combination of data from similar projects in other locations and information on local construction cost trends.

2.3.1.3 Refinements

Cost refinements will be introduced during later stages of engineering project development and will include assumptions related to the construction schedule and time of expenditure.

2.3.1.4 Bus Improvements

The bus improvement costs include both the cost of fixed facilities (transit centers) and new and replacement buses.

2.3.2 CAPITAL COST ESTIMATES

Table 2.3.1 presents the total estimated capital costs for the transit element (bus and LRT) for each of the alternatives under consideration in this EIS.

Table 2.3.1: Summary of Total Capital Costs (Estimated in millions of 2001 dollars)

Alternative	Bus Improvements	LRT Capital Costs	Total Costs
No-Build Alternative	$222	$0	$222
TSM Alternative	$239	$0	$239
Alternative 1	$236	$816	$1,052
Alternative 2	$236	$808	$1,044
Alternative 3	$236	$845	$1,081
Alternative 4	$236	$852	$1,088

Source: URS, 2001

Table 2.3.2 shows the estimated capital costs using the No-Build Alternative as a baseline. This isolates the capital cost impacts of the TSM Alternative and the I-71 LRT Project and its directly associated bus improvements.

Table 2.3.2: Summary of Capital Costs Compared to No-Build as a Baseline (Estimated in Millions of 2001 Dollars)

Alternative	Bus Improvements	Rail Capital Costs	Total Costs
No-Build Alternative	$0	$0	$0
TSM Alternative	$17	$0	$17
Build Alternative 1	$14	$816	$830
Build Alternative 2	$14	$808	$822
Build Alternative 3	$14	$845	$859
Build Alternative 4	$14	$852	$866

Source: URS, 2001

2.4 OPERATING AND MAINTENANCE COSTS

This section presents preliminary operating cost estimates for each alternative based on opening year service plans and ridership forecasts. These costs do not reflect the annual operating costs for Travel Demand Management programs in the OKI region nor due they include the annual operating costs attributable to the region's Advanced Regional Traffic Interactive Management Information System (ARTIMIS).

2.4.1 METHODOLOGY

Estimates of annual operating and maintenance (O&M) costs were developed for the rail and bus transit improvements for each of the alternatives. The rail transit operating and maintenance costs were estimated using a cost model developed for LRT service that was developed for peer properties in the United States. The model is a disaggregate resource build-up model. Line item costs were determined according to the quantity of service provided and other service characteristics. The model assumes operation of the system by SORTA/TANK. This includes maintenance of vehicles and facilities by SORTA/TANK, with contract services for line items such as security and station cleaning.

The model line item costs are tabulated for specific LRT related cost centers such as vehicle operations, vehicle maintenance, non-vehicle maintenance and general administration. Line item costs are defined within each cost center as labor, materials, services, utilities, insurance, taxes, fuel and miscellaneous costs.

Operating and maintenance costs for the bus component of each of the alternatives have also been estimated. The bus costs were estimated using a bus operations and maintenance cost model. The cost model addresses the annual costs to operate and maintain bus vehicles and facilities and to provide the necessary administrative functions for the bus element of the transit system. The unit costs are based on existing SORTA/TANK bus system costs.

2.4.2 OPERATING AND MAINTENANCE COSTS ESTIMATE RESULTS

Table 2.4.1 shows the total estimated annual O&M costs for each of the alternatives.

Table 2.4.1: Summary of Annual Gross Operating and Maintenance Costs* (Estimated in Millions of 2001 Dollars)

Alternative	Bus Component (in 2001$)	LRT Component (in 2001$)	Total Annual O&M Costs
No-Build Alternative	$81.3	$0	$81.3
TSM Alternative	$114.0	$0	$114.0
Build Alternative 1	$110.6	$18.4	$129.0
Build Alternative 2	$110.6	$18.2	$128.8
Build Alternative 3	$110.6	$19.1	$129.7
Build Alternative 4	$110.6	$19.1	$129.7

Source: URS, 2001

*These numbers are gross operating and maintenance costs and do not include any reductions in costs based on projected fare revenues.

Table 2.4.2 shows the annual O&M cost estimates using the No-Build as a baseline for comparison for each of the alternatives evaluated in this DEIS.

Table 2.4.2: Summary of Operating Costs Compared to No-Build Alternative as a Baseline* (Estimated in Millions of 2001 Dollars)

Alternative	Bus Component (in 2001$)	LRT Component (in 2001$)	Total Annual Costs
No-Build Alternative	$0	$0	$0
TSM Alternative	$32.7	$0	$32.7
Build Alternative 1	$29.3	$18.4	$47.7
Build Alternative 2	$29.3	$18.2	$47.5
Build Alternative 3	$29.3	$19.1	$48.4
Build Alternative 4	$29.3	$19.1	$48.4

Source: Manuel Padron and Associates, 2001.

*These numbers assume that all of the roadway and base bus system improvements are part of the No-Build Alternative which forms a base system for comparisons among alternatives. This isolates the operating and maintenance cost impacts of the TSM Alternative and the I-71 LRT Project and its directly associated bus improvements.

2.4.2.1 No-Build Alternative

The bus system included in the No-Build Alternative is assumed to be the current bus system of all transit agencies in the OKI region. The combined operating costs for the agencies estimated in the OKI 1998-2001 TIP are $81.3 million per year.

Using the No-Build Alternative as a baseline system for comparisons among alternatives, as shown in Table 2.4.2, then no additional transit operating and maintenance costs, in addition to the annual costs assumed for the baseline bus transit system, would be incurred for this alternative.

2.4.2.2 TSM Alternative

The bus system included in the TSM alternative has an estimated annual operating and maintenance cost of $114 million per year (2001$).

In comparison to the No-Build Alternative, the estimated additional annual operating and maintenance cost associated with the implementation of the TSM Alternative bus improvements is approximately $32.7 million per year.

2.4.2.3 Build Alternatives

Alternative 1

The transit system for Alternative 1 includes an estimated annual operating and maintenance cost of $129.0 million per year (2001$). This consists of $110.6 million per year for the bus system component and the remaining $18.4 million for the rail component of the system.

In comparison to the No-Build Alternative, the additional annual operating and maintenance cost for Alternative 1 is approximately $47.7 million per year. The additional bus system improvements account for $29.3 million of the total cost and the remaining $18.4 million per year are the costs of the rail component of the system.

Alternative 2

The transit system for Alternative 2 includes an estimated annual operating and maintenance cost of $128.8 million per year (2001$). This consists of $110.6 million per year for the bus system component and the remaining $18.2 million for the rail component of the system.

In comparison to the No-Build Alternative, the additional annual operating and maintenance cost for Alternative 2 is approximately $47.5 million per year (2001$). The additional bus system improvements account for $29.3 million of the total cost and the remaining $18.2 million per year are the costs of the rail component of the system.

Alternative 3

The transit system for Alternative 3 includes an estimated annual operating and maintenance cost of $129.7 million per year (2001$). This consists of $110.6 million per year for the bus system component and the remaining $19.1 million for the rail component of the system.

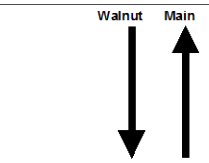
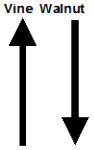
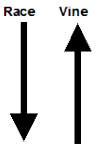
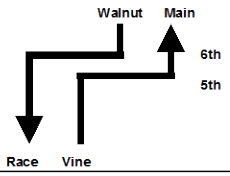
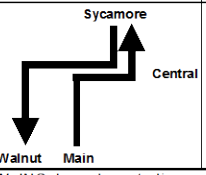
In comparison to the No-Build Alternative, the additional annual operating and maintenance cost for Alternative 3 is approximately $48.4 million per year. The additional bus system improvements account for $29.3 million of the total cost and the remaining $19.1 million per year are the costs of the rail component of the system.

Alternative 4

The transit system for Alternative 4 includes an estimated annual operating and maintenance cost of $129.7 million per year (2001$). This consists of $110.6 million per year for the bus system component and the remaining $19.1 million for the rail component of the system.

In comparison to the No-Build Alternative, the additional annual operating and maintenance cost for Alternative 4 is approximately $48.4 million per year. The additional bus system improvements account for $29.3 million of the total cost and the remaining $19.1 million per year are the costs of the rail component of the system.

DOWNTOWN LIGHT RAIL TRANSIT ALIGNMENTS CONSIDERED

DOWNTOWN LRT ALIGNMENT	Proximity to Employment	Traffic, Access and Parking	LRT Operations	Construction Impacts	Cost	Comments
	+	+	+	o	o	Employment core is generally centered on Main; Maintains 2 through lanes on Main and Walnut
	o	+	+	o	o	Vine/Walnut alignment further from employment core; Maintains 2 through lanes on Vine and Walnut
	-	+	+	o	o	Race/Vine alignment further from employment core; Maintains 2 through lanes on Race and Vine
	+	-	+	+	+	Both tracks on same street would reduce capital cost; Walnut would be limited to local access only (1-lane); Construction limited to one street
	+	-	+	+	+	Both tracks on same street would reduce capital cost; Main would be limited to local access only (1-lane); Construction limited to one street
	+	-	-	-	o	Right angle turns would reduce LRT operating speed; Construction on multiple streets would add to cost; Negative impacts to traffic flow both N-S and E-W
	+	-	-	-	-	Right angle turns would reduce LRT operating speed; Construction on multiple streets would add to cost; Negative impacts to traffic flow both N-S and E-W; Sycamore LRT would require tunnel portal south of Liberty; (Closure of Sycamore between Liberty and 13th)

SOURCE: BRW, INC. based on studies completed by OKI, Metro and City of Cincinnati 2/8/01

\+ More positive effect relative to other alternatives

Figure 2.2-4
Downtown Alignments Considered