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1.0 Introduction / Summary of Recommendations

“What is the best public transit investment to connect the Wasatch Front region and Ogden’s destinations, including the new Commuter Rail station, Downtown Ogden, Weber State University, and McKay Dee Hospital?”

This question drives the Ogden / Weber State Transit Corridor Study (Study) and its resultant recommendation. The recommendation, if implemented, will physically improve Ogden’s transportation system and provide improved access between the regional transportation network, Ogden City, and Ogden’s key transportation origins and destinations. These improvements, in turn, will become regional assets, improving opportunities for growth in both Ogden City and Weber County.

Today, Ogden depends on an automobile based transportation system and on standard Utah Transit Authority (UTA) bus service to serve its key transportation origins and destinations (Downtown Ogden, Weber State University, and McKay Dee Hospital). This Study recommends a new public transit investment that connects these nodes and the new Ogden Commuter Rail station. The Commuter Rail station, in turn, will connect the recommended Ogden system to the entire Wasatch Front Regional Council (WFRC) region.

This Study recommendation includes:

- A 4.5 mile transit corridor and alignment with a minimum of 3.4 miles of dedicated lanes
- Six (6) high quality stations
- Modern rail based streetcars as a recommended transit technology and high quality bus rapid transit (BRT) as an alternative

Figure 1 shows the recommended corridor and station locations.

The next section of the report provides the Study background and an introduction to this report. The report will present the Study processes, findings, and conclusions based upon analysis, evaluation, and stakeholder team input. The appendices provide supplemental studies, papers, and information that further document the Study’s results.
Figure 1 – Study’s Recommended Alternative
2.0 Study Background

The goal of this Study was to refine the Ogden / Weber State University (WSU) transit project concept contained in WFRC’s 2004 - 2030 Long Range Plan. The corridor, as envisioned in WFRC’s plan, would serve the City of Ogden by connecting the Commuter Rail station, Downtown Ogden, Weber State University, and McKay Dee Hospital. The Study included determining feasibility and selecting a preferred corridor, station locations, and desirable transit mode(s). The Study area, bounded by 20th Street on the north, the Wasatch Mountains on the east, 40th Street and 4600 South on the south, and the railroad yards on the west, is shown in Figure 2.

The Study was conducted by WFRC and UTA, operating as Study leaders. Study partners included the City of Ogden and Weber State University (Project Team). In addition, the Study was reviewed at the beginning, the mid point, and at its conclusion by a Stakeholder Working Group representing the Ogden community. A consulting team, including Michael Baker Jr. Inc. and RG Consulting (Baker Team) served the Study partners and the Stakeholder Working Group by conducting technical analyses, developing reports, and preparing Study documentation, including this report.

The Study pursued its goal through a series of steps. The multi-agency Project Team, in consultation with a local Stakeholder Working Group:

- Determined project Purpose and Need by examining the Study area and local and regional plans and by obtaining community input from the Stakeholder Working Group,
- Identified a Long List of Alternatives that could meet the Purpose and Need,
- Identified a Short List of Alternatives from the Long List by identifying, first, two corridors and then the station areas that had the best opportunity to meet the Purpose and Need. All mode alternatives were retained in the Short List of Alternatives,
- Determined capital and operating costs for the short listed alternatives,
- Used the Purpose and Need and a process called Choosing by Advantages (CBA) to select a recommended alternative (and acceptable options) to be carried forward for further project development by UTA,
- Recommended “Next Steps” for implementation via this report.

This report presents the analyses and results from each of these steps.
Related information and prior studies that address or affect the study area and which influenced the Study’s analyses include:

- **Wasatch Front Urban Area Long Range Transportation Plan Update 2004 - 2030 (LRP)**

  The LRP, developed by WFRC with extensive input from throughout the region, projects growth and development plans and defines transportation improvements (highway and public transportation) that will ensure a coordinated transportation system and establish funding priorities. The LRP helped the Study Team define the study area.

- **Transit 2030 Plan**

  In July 2003, a WFRC appointed set of public and private representatives adopted the TRANSIT 2030 Plan. The two year long TRANSIT 2030 effort, among other things, created and applied a competitive regional process for rating transit projects and resulted in a transit system recommendation and corresponding financing plan that was later incorporated into the Wasatch Front Urban Area Long Range Transportation Plan Update, 2004-2030.

- **Weber County to Salt Lake City Commuter Rail Final Environmental Impact Statement**

  The focus of the Environmental Impact Statement is a proposed 44-mile commuter rail line between Salt Lake City and Pleasant View in Weber County. The project corridor is centered on the existing Union Pacific Railroad line through Salt Lake, Davis, and Weber Counties. The project will include a station at the Ogden Intermodal Transit Center on Wall Avenue at 23rd Street in downtown Ogden and will provide increased connectivity between Ogden City and Salt Lake City. UTA began construction of this project in the summer of 2005.

- **Ogden 24th Street Corridor Plan**

  The 24th Street Corridor has been the traditional entrance to downtown Ogden City, and the center spine of the West Ogden Community. The 24th Street corridor plan evaluates how historic decisions concerning land use and transportation connectivity have affected the community. The plan includes Corridor Vision Strategies that establish a guide to future land use patterns, transportation and desired attributes for the 24th Street corridor.
• Aerial Cableway Connector Feasibility Study

This Feasibility study examined the technical and economic feasibility of implementing an Aerial Cableway People Mover system in Ogden City for the transportation corridor between the Ogden Intermodal Transit Center on Wall Avenue, and Weber State University on Harrison Boulevard. The Study evaluated two potential routes between the Intermodal Center and Weber State University.

The Ogden / Weber State Transit Corridor Study incorporated the aerial cableway as a potential transit alternative and carried the alternative through the various public transit analyses using the Purpose and Need for this Study.

In addition to these plans, the Study considered development projects in Downtown Ogden that include the American Can Complex, the Ogden Entertainment Subdivision, River Crossing, and the Twin River Office Development.

This report presents the Study process and findings via the following chapters:

• Project Purpose and Need
• Long List of Alternatives
• Short List of Alternatives
• Capital and Operating Cost Analysis
• Choosing by Advantages
• Next Steps

In addition, this report includes a series of appendices that incorporate specific, detailed reports and documentation that were developed to support the various Study steps.
3.0 Project Purpose and Need

The project Purpose and Need is derived from the Study goal, from a set of Study objectives defined by the Study Team and the Stakeholder Working Group, and from an understanding of the socio-economic and land use characteristics of the Study Area. This information, ultimately, was used to produce the Project Purpose and Need Statement.

Study Goal

The Study goal is to refine the City of Ogden transit corridor plan contained in WFRC’s Long Range Plan for connecting the Commuter Rail station, Downtown Ogden, Weber State University, and McKay Dee Hospital. The Commuter Rail Station, in turn, will connect all of these Ogden City locations to the Wasatch Front. The Study determined feasibility and selected a preferred corridor, station locations, and desirable mode(s) for transit improvements in the corridor.

Study Objectives

The Study Team and Stakeholder Working Group, beginning with this goal, determined a specific set of Study objectives, as follows:

1. Define the transit needs in the Study Area
   - Stakeholder Desires
   - Market Analysis

2. Assess and screen various project alternatives
   - Ability to meet identified needs
   - Feasibility

3. Develop preferred alternatives where possible
   - Alignment
   - Stations
   - Transit Technologies

4. Adopt any recommendations into local plans

These objectives correlate closely with the defined Study steps and the organization of this report.
Socio-economic and Land Use Characteristics of the Study Area

WFRC prepared a detailed document entitled “Environment-Land use-Demographics-Travel Patterns” that describes the existing and anticipated characteristics that affect travel patterns and transit demand. This document also describes important study area characteristics. Important findings from this paper that affect travel and transit demand are summarized in the following paragraphs. The entire document accompanies this report as Appendix A. The findings from that document are grouped in the following paragraphs into three categories, (1) Background Information (based on the 2000 Census), (2) Population and Employment, and (3) Major Destinations.

Background Information (based on the 2000 Census)

- Work Travel within the Study Area (non-student)

In 2000, the Study Area had about 43,000 residents, 17,300 of whom are employed. Table 1 identifies where study area residents work. Of those staying in the region about 39 percent (6,700) of these employed residents of the Study Area work within the study area.

Table 1 - Where Study Area Residents Work (2000)

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Employees</th>
<th>Percent of Total Working Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Study Area</td>
<td>6,700</td>
<td>39%</td>
</tr>
<tr>
<td>Weber County outside of Study Area</td>
<td>6,500</td>
<td>38%</td>
</tr>
<tr>
<td>Northern Davis County</td>
<td>2,500</td>
<td>14%</td>
</tr>
<tr>
<td>Southern Davis and Salt Lake City</td>
<td>1,100</td>
<td>6%</td>
</tr>
<tr>
<td>South of Salt Lake City</td>
<td>500</td>
<td>3%</td>
</tr>
<tr>
<td>Total Working Residents</td>
<td>17,300</td>
<td>100%</td>
</tr>
</tbody>
</table>

Key Corridor Transit Characteristic – Residents working in the Study Area represent potential transit riders due to proximity to employment locations.

- Work Travel from Outside the Study Area (non-student)

Also in 2000, the Study Area had about 28,900 employees. 23 percent (6,700) of these employees live within the study area; 55 percent (15,800)
live in Weber County outside of the Study Area; 18 percent (5,200) live in northern Davis County; 2 percent (600) live in southern Davis County and Salt Lake City; and 2 percent (600) live south of Salt Lake City.

Table 2 - Where Study Area Employees Live (2000)

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Employees</th>
<th>Percent of Total Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Study Area</td>
<td>6,700</td>
<td>23%</td>
</tr>
<tr>
<td>Weber County outside of Study Area</td>
<td>15,800</td>
<td>55%</td>
</tr>
<tr>
<td>Northern Davis County</td>
<td>5,200</td>
<td>18%</td>
</tr>
<tr>
<td>Southern Davis and Salt Lake City</td>
<td>600</td>
<td>2%</td>
</tr>
<tr>
<td>South of Salt Lake City</td>
<td>600</td>
<td>2%</td>
</tr>
<tr>
<td>Total Study Area Employment</td>
<td>28,900</td>
<td>100%</td>
</tr>
</tbody>
</table>

Key Corridor Transit Characteristic – Study area residents, as well as non-residents from outside the Study Area working in the Study Area, represent potential transit riders if good transit connections and service are available. This Study will identify these better transit connections, both within the Study Area and with the region via Commuter Rail.

Population and Employment

- General Land Use Statistics (based on City of Ogden 2030 projections)
  - City of Ogden Study Area Population – 43,000 (in 2000) increasing to 53,000 by 2030.
  - City of Ogden Employment – 29,000 (in 2000), 45,000 (in 2030)
  - This population and employment growth in the Study Area will increase demand for public transit service by 2030, especially given the current trend that shows approximately 39 percent of the Study Area’s residents both live and work inside the Study Area.

- Household Densities (2002 and 2030) – shown on Figure 3
  - High household densities – along 23rd Street between Grant Avenue and Harrison Boulevard and east of Washington Blvd. between 22nd and 31st Streets
  - Zero car households generally concentrated in same areas
The increasing household densities between 2002 and 2030, particularly in the highest density zones closest to downtown, will increase the already high demand for transit in the Study Area.

- Employment Densities (2002 and 2030) – shown on Figure 4
  - High employment density projected west of Washington Blvd. Between 22nd Street and 26th Street
  - High employment density projected for the Weber State / McKay – Dee Hospital area
  - These increasing levels of employment, coupled with the increasing densities, will also increase the already high demand for transit in the Study Area.

Key Corridor Transit Characteristic – Transit service is important in the Study Area in 2005. It is noteworthy that UTA’s Route 603, which serves Downtown Ogden, Harrison Ave, and the Weber State / McKay – Dee Hospital area, is already one of the highest demand services in the entire UTA system in 2005. Thus, this Study will address provisions to meet increased 2030 transit demand, based on the increasing Study Area population, employment, and densities demonstrated above.

Major Destinations
- Downtown Ogden – In 2002, Downtown had 7,200 workers and 720 households. Approximately 1,100 of these employees live in the Study Area. As illustrated by Figures 3 and 4, it is estimated by Ogden City that the Downtown will have 13,200 workers (an 83% increase) and 1,226 households (a 70% increase) by 2030. Key destinations include:
  - Downtown businesses
  - Cultural venues -- Linquist Field, Ogden City Amphitheater, Ogden Egyptian Theater, and Union Station
  - Governmental sites – Ogden City and Weber County offices; several regional and Ogden offices of the State of Utah to include Corrections, District Court, Human Services, Motor Vehicle, Recovery Services, Tax Commission, and Workforce Services. Several Federal Offices including the Internal Revenue Service, Forest Service, Corrections, Postal Service, and the Social Security Administration are in Downtown Ogden. Nearly all of these governmental sites are located within a block of 25th Street.
  - Planned new developments include the Ogden Entertainment Subdivision, American Can Complex, the Twin River office development, and various medium to small projects.
Figure 3 – 2002 and Projected 2030 Households per acre by Traffic Analysis Zone
Figure 4 – 2002 and Projected 2030 Employees per Acre by Traffic Analysis Zone

2002 Employment per Acre

2030 Employment

Book2.2002emp

0.1 - 2.1
2.2 - 5.7
5.8 - 15.2
15.3 - 32.0
32.1 - 55.2

0.2 - 2.8
2.9 - 7.5
7.6 - 16.8
16.9 - 36.1
36.2 - 76.6
Weber State University – The Weber State University main campus is a largely undergraduate university on a 423-acre campus on the Ogden Bench between 36th Street and Country Hills Drive. Weber State has 19,000 students, and 1,900 faculty and staff. The campus also includes the Dee Events Center, Wildcat Stadium, and the Ogden Ice Sheet. Figure 5 shows a 2005 distribution of Weber State students’ mailing addresses by zip code.

McKay Dee Hospital – is a 317-bed hospital and ten affiliated clinics on a 26-acre campus. In 2005, the hospital campus had 2,400 workers and about 2,600 patients on the average weekday. At build-out, the hospital is anticipated to double in size. Figure 6 shows a 2005 distribution of McKay – Dee employees by their mailing zip code. Those located in 84403 and 84404 (north of downtown and adjacent to the hospital) are in the Study Area and comprise nearly one third of the current employees.

Key Corridor Transit Characteristic – Major travel destinations (existing, as well as those that are planned) can be attractive to potential transit riders if sufficient access is available. For example, walk access to a station of less than ¼ mile is generally attractive, as are good park and ride facilities. In general, access includes station / transit stop access within the Study Area. In addition, transit connections between the Commuter Rail station that is currently being developed and major destinations will serve that portion of the resident and employee population that lies outside the Study Area. Thus, this Study will address provisions to meet transit demand for access to employment and student destinations in the Study Area and to provide connection outside the Study Area via Commuter Rail station access.
Figure 5 - Weber State University Student Study Area Mailing Addresses
Figure 6 – Proportion of McKay-Dee (IHC) Employees by Zip Code

LEGEND
2 % of Emp. Residences
(#) # of Emp. (select zips)
- 20 to 15.1 percent
- 15 to 10.1 percent
- 10 to 5.1 percent
- 5 to 1.1 percent
- < 1.1 percent

PERCENT McKay-DEE EMPLOYEES BY ZIP

Brigham City

Eden

Mtn. Green

Transit Corridor Study Report 15
Project Purpose and Need Statement

Using the preceding Study goal, the Study objectives, and the socio-economic and land use characteristics of the Study Area, the Project Team developed the Project Purpose and Need Statement, which was reviewed with the Stakeholder Working Group and adopted for the project.

- The Purpose of the Proposed Major Transit Investment

  Provide a high quality transit service that connects the Ogden Intermodal Center, Central Business District (the area from 20th Street to 28th Street and from Adams Avenue to Wall Avenue), Weber State University, and McKay Dee Hospital.

- The Need for a Major Transit Investment

  I. Provide a transit project that increases ridership between the McKay Dee Hospital/Weber State University Area and Downtown Ogden.

  Increased transit ridership to WSU will help relieve existing and projected traffic congestion, neighborhood parking problems, and auto/pedestrian conflicts caused by student parking on the west side of Harrison Boulevard. It will also help to facilitate the economical expansion of the WSU Ogden Campus teaching facilities by reducing the need for additional parking facilities as the campus continues to grow. Increased transit ridership to McKay-Dee Hospital could facilitate the future growth of its medical campus.

  Increased transit ridership between these major destinations would help to decrease auto travel through Ogden City and support the continued ability to move people and goods throughout Ogden.

  A major transit investment could also stimulate the economic and lifestyle connections between the WSU/McKay-Dee Area and downtown Ogden to include home to work/school, school to work, and work to play connections. Of note, it could strengthen the synergy between WSU and Downtown Ogden event facilities and thereby increase Ogden’s ability to attract conventions and host special events.
II. Provide a coordinated collection/distribution service that connects with the Regional Commuter Rail and other major transit investments programmed for the region at the Ogden Intermodal Center.

The project will increase the transit options for people wishing to access the regional transit system from the highly transit dependent East Central Community and complement existing UTA Route 603 local bus service.

It will also provide a good transit connection from the regional Commuter Rail line to the major activity centers in Ogden. These include downtown Ogden, Weber State University, and McKay-Dee Hospital.

III. Create public transportation improvements that support downtown revitalization.

A major transit investment would act to extend the accentuated regional access and exposure that Commuter Rail provides to the Central Business District. It would also support travel to and from downtown event locations such as Linquist Field, the Ogden City Amphitheater, the Ogden Egyptian Theater, the Ogden Eccles Conference Center, and the planned Entertainment Subdivision between 22nd and 24th Streets just west of Washington Avenue.

IV. New service must be of a clearly better quality that should include many of the following characteristics: frequency, reliability, comfort, travel time, simple routing, capacity, convenience, and/or design.

The project will allow transit service to avoid future transit system reliability problems due to severe congestion projected for the vicinity of Weber State University and McKay-Dee Hospital. The project should also establish stations which are perceptively more accessible, safe, and comfortable. Additional improvements to transit service could include improved vehicles, decreased transit travel times, increased vehicle arrival frequencies, and simplified routing.

V. Create a more visible presence for transit in Ogden.

Experience has shown that a visible presence is important to increasing transit ridership. Capital improvements on a transit alignment create in the potential transit patron a sense of
comprehendability, permanence, and reliability that may not otherwise be perceived in transit. The visible presence reminds travelers that there is an option to the automobile on the alignment and gives a visual clue to homeowners and businesses that could benefit from good transit access.

VI. Improvements in transit service need to be implemented while maintaining the financial health of the UTA and its partners.

Affordability is a key to realizing any successful transit investment. Transportation needs generally far exceed available federal, regional, and local funding. For this reason project benefits must be commensurate with its costs and the costs should be allocated based upon benefits received.

This Purpose and Need Statement provided the Study Team with its direction throughout each of the subsequent Study phases:

- Long List of Alternatives
- Short List of Alternatives
- Capital and Operating Cost Analysis
- Choosing by Advantages
- Next Steps
4.0  Long List of Alternatives and Evaluations

After developing the Project Purpose and Need Statement, the Study Team proceeded to develop public transit alternatives intended to address the purpose and meet the needs. These alternatives incorporated three categories of transit characteristics; (1) corridor alignment, (2) station location, and (3) transit mode. It should be noted that mode and alignment alternative characteristics were set separately since any of the modes could be implemented over any of the alignments.

This Section addresses each of these alternative characteristics. After this discussion, the characteristics are molded into the Long List of Alternatives, which was then evaluated for the “best fit” in regard to the Purpose and Need and the project goals and objectives.

Corridor Alignment

Based on the results of the purpose and need analysis, a series of alignment alternatives were developed. Six were developed as conceptual corridor alignment alternatives. While meeting the purpose and need, these corridor alignments were developed to serve trip origins and destinations in the study area, to provide more consistent and rapid transit service, and to be constructible within the study area. The following provides descriptive information regarding the six corridor alternatives (each alternative shares a common link on Harrison Blvd. south of 36th Street):

- Alternative 1 (Wall/36th/Harrison)
  
  Wall Avenue - 23rd to 36th
  This street segment generally has an 84 foot pavement width and a 101 foot right-of-way width. It was recently reconstructed to current geometric standards.

  Wall Avenue has low pedestrian activity, except near Union Station and enjoys good signal coordination. Its traffic volumes are moderately heavy with a high percentage of commuter and truck traffic.

  36th Street - Wall to Adams Avenue
  This street segment generally has a 78 foot pavement width and a 101 foot right-of-way width. Like Wall Avenue, it was recently reconstructed to current geometric standards.
36th Street - Adams Avenue to Harrison
This street segment becomes very narrow having only a 40 foot pavement width and one 9 foot park strip/sidewalk in an 80 foot right-of-way width at its intersection with Monroe Boulevard. This segment abuts a small lot single-family area and a cemetery.

- Alternative 2 (23-24-25/Washington/36th/Harrison)

23rd, 24th, or 25th Streets – Intermodal Center to Washington
23rd Street, 24th Street, and 25th Street are very different physically and operationally west of Washington Boulevard. 23rd Street is direct and unobstructed; 24th Street is a State road with a bridge structure in the middle of the roadway between Lincoln Avenue and Wall Avenue; and 25th Street is a narrow pedestrian oriented Historic District.

23rd Street, therefore, is used to represent the corridor between Wall and Washington. This street segment generally has a 41 foot pavement width and an 80 foot right-of-way width. It is not built to current geometric standards.

Washington Blvd – 23rd Street to 36th Street
This street segment generally has an 84 foot pavement width and a 101 foot right-of-way width. It currently does not meet current geometric standards because of small corner radii.

The downtown section has heavy pedestrian activity, including mid-block crosswalks that could create conflicts and delays for some transit options. There are currently 12 signalized intersections along the segment that are interconnected, but have poor coordination.

36th Street – Washington to Harrison
This segment is described as part of Alternative 1.

- Alternative 3 (23-24-25/Monroe-Quincy/36th/Harrison)

23rd, 24th, or 25th Streets - Wall to Washington
This segment is described in Alternative 2.

23rd, 24th, or 25th Streets – Washington to Monroe
East of Washington Blvd. these three streets are physically and operationally fairly similar. A 23rd Street alignment is most direct, little trafficked, and has fairly wide park strips (14') with mature trees, but has 3 to 6 foot narrower pavement widths. 24th Street has the widest pavement widths of these three streets and has fairly wide park strips
(12’), but is more heavily trafficked, and has many mature trees in the park strip. 25th Street has 11 foot wide park strips and characteristics that fall between that of 23rd and 25th Streets.

23rd Street was used to represent this corridor segment mostly because it is distinct to this corridor alternative. 23rd Street pavement widths narrow from 63 feet west of Adams to 54 feet east of Adams. The 80 foot right of way width, however, is maintained between Washington and Monroe. It currently does not meet current geometric standards.

Monroe-Quincy Boulevards – 23rd Street to 36th Street
The northern portion of this street segment, 23rd to 30th Streets, generally has 55 feet of pavement width with two 21 foot parkstrips/sidewalks. The mid-section, primarily on Sullivan, has about 45 feet of pavement and an 8 to 10 foot park strip/sidewalk on one side of the street. The southern portion of this street segment generally has 40 feet of pavement width and two 10 foot parkstrips/sidewalks. It currently does not meet current geometric standards. Additionally, the transition to Quincy Avenue is narrow and involves two steep grade changes.

36th Street - Quincy to Harrison
This segment is described as part of Alternative 1.

- Alternative 4 (23-24-25/Harrison)

23rd, 24th, or 25th Streets - Wall to Monroe
This segment is described in Alternatives 2 and 3.

23rd, 24th, or 25th Streets – Washington to Harrison
East of Monroe Boulevard these three streets are physically and operationally similar.

23rd Street will continue to be used to represent the corridor. This street segment generally has a 53 foot pavement width and 18 foot parkstrips/sidewalks in an 80 foot right-of-way width. It is not built to current geometric standards.

Harrison Boulevard – 23rd Street to 36th Street
This street segment generally has a 75 foot pavement width and a 101 foot right-of-way width; however, the nature of the right-of-way varies, substantially, north and south of about 28th Street.
North of about 28th Street much of the surrounding area consists of older, single-family homes. Many of the homes on the west side of Harrison are fairly close to the back of the sidewalk. Sidewalks are generally present but park strips vary from non-existent to about 2 feet in width. Curb cuts for residential driveways are very common and Harrison is not built to current geometric standards due primarily to narrow corner radii.

South of about 28th Street much of the area transitions to civic or commercial uses. Structures are generally set farther back from the back of the sidewalk. Park strips and sidewalks are generally present and are about 12 feet wide. Curb cuts become somewhat less frequent and some of the major intersections in the area have been rebuilt to meet current geometric standards.

The signals are evenly spaced with a signal at all of the even numbered intersections, with the exception of 34th Street, and they are coordinated for good progression. Where pedestrian activity is heavy, it is primarily restricted to existing signalized intersections. Harrison Blvd. does carry a heavy commuter traffic demand, but that is the case for all of the alternatives under consideration.


23rd, 24th, or 25th Streets - Wall to Washington
This segment is described in Alternatives 2 and 3.

Washington Blvd – 23rd Street to 27th Street
The segment of Washington Blvd. between 23rd and 27th Streets is relatively consistent in most respects. This street segment generally has an 84 foot pavement width and a 101 foot right-of-way width. All the buildings appear to be set back at least 10 feet from the right-of-way.

Washington is not built to current geometric standards due primarily to short corner radii. Curb cuts are relatively infrequent as the area is commercial.

25th, 26th, or 27th Streets - Wall to Washington
25th Street, 26th Street, and 27th Street are fairly similar physically but are very different operationally. 25th Street has somewhat wider pavement but generally has more traffic and narrower park strips with more mature trees. 26th and 27th Streets appear to have wider right-of-way and are less trafficked but have somewhat less pavement width. Relatively fewer mature trees are planted in these wide park strips. 26th Street is less
residential and does provide for a signalized connection at Harrison Boulevard. Neither 25th Street nor 27th Street currently has a traffic signal. 26th Street was chosen to represent the broader corridor segment.

26th Street - Washington to Harrison
This street segment generally has a 53 foot pavement width and two 12 foot wide parkstrip/sidewalk areas in an 80 foot right-of-way width. 26th Street is not built to current geometric standards. Curb cuts are somewhat frequent, more so on the east end, as the street abuts a mix of commercial and residential uses.

Harrison Blvd – 25th Street to 36th Street
This segment is described in Alternative 4.

• Alternative 6 (23-24-25/Washington/30th/Harrison)

23rd, 24th, or 25th Streets - Wall to Washington
This segment is described in Alternative 2.

Washington Blvd – 23rd Street to 27th Street
This segment is described in Alternative 5.

Washington Blvd –27th Street to 30th Street
The segment of Washington Blvd. between 27th and 30th Streets is relatively consistent in most respects. This street segment generally has an 84 foot pavement width and a 101 foot right-of-way width. All the buildings appear to be set back at least 10 feet from the right-of-way and many are set back much further than that.

Washington is not built to current geometric standards due primarily to short corner radii. Curb cuts are relatively infrequent as the area is commercial.

30th Street – Washington to Harrison
This street segment generally has a 66 foot pavement width and 10 to 12 foot parkstrip/sidewalk areas within 80 foot right-of-way width. It is built to current geometric standards. Curb cuts are somewhat frequent, more so on the east end, as the street abuts a mix of commercial and residential uses.

Other corridor alternatives, such as Wall and 40th, Country Hills, and Foothills, were examined and then dropped from further consideration prior to establishing this list because they did not meet the purpose and need, were too
long or circuitous, or were not reasonably constructible. The Study team determined that these other corridor alignments presented substantial construction and community challenges. In addition, the six corridor alignments listed above were considered to be most responsive to the purpose and need.

Figure 7 shows the long list corridor alignments. The group of six corridors listed above was evaluated during the long list of alternatives screening process that is described in subsequent paragraphs.

**Corridor Alignment Evaluation**

The Study Team evaluated the six corridor alignments after presenting the various options to the Stakeholder Working Group in February 2005. The Study Team used a ranking system to score each of the corridor alignment alternatives in regard to the following categories:

- **Activity Center Access** – the Study Team evaluated this category by judging the corridor’s proximity to five major activity centers (including three central business district (CBD) locations, Weber State / McKay Dee Hospital, and Newgate Mall)
- **Trip Ends** – Trip ends were directly correlated to employment and to households within ¼ mile.
- **2030 Projected Riders per day** – this category was evaluated using WFRC estimates of travel demand based on model runs done specifically for this Study during March 2005.
- **End to End Travel Time** – this category was evaluated using data developed by WFRC for running times on each of the corridor alignments without stations.
- **Miles of 2030 alignment without severe congestion** – this category was evaluated using WFRC 2030 traffic modeling.
- **Constructability** – the Study Team evaluated this category qualitatively and provided rankings for each of the six corridors. WFRC compiled constructability rankings and developed the composite score that is presented in Table 3.
Figure 7 – Corridor Alternatives
Table 3 presents the corridor alignment rankings for each of the six corridors. The Study Team chose the two top ranking corridors, numbers 4 and 5, for the Short List of Alternatives.

### Table 3 – Corridor Alignment Rankings

<table>
<thead>
<tr>
<th>Quantitative Values</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3/9/2005</strong></td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Criteria Factor</td>
<td>Wall 36th 23rd Wash 36th 23rd Monroe 36th 23rd 23rd Wash 36th 3rd Wash 30th</td>
</tr>
<tr>
<td>Overall Rating</td>
<td>3.4 3.7 3.7 4.4 4.6 4.3</td>
</tr>
<tr>
<td>Activity Centers</td>
<td>2.2 5.0 2.8 2.9 4.7 4.9</td>
</tr>
<tr>
<td>Activity Center Access</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Percentile</td>
<td>1.0 5.0 3.0 3.0 5.0 5.0</td>
</tr>
<tr>
<td>Hundreds of 2030 Trip ends</td>
<td>203 299 154 166 266 287</td>
</tr>
<tr>
<td>2030 Projected Ridership</td>
<td>4.1 4.5 4.8 4.9 5.0 4.5</td>
</tr>
<tr>
<td>Boardings per day</td>
<td>4147 4543 4813 4902 4983 4543</td>
</tr>
<tr>
<td>Mobility</td>
<td>4.5 3.7 4.8 4.3 3.8 4.3</td>
</tr>
<tr>
<td>End to end travel time (mins)</td>
<td>11.6 13.3 11.9 11.6 12.7 12.6</td>
</tr>
<tr>
<td>Miles of 2030 alignment without severe congestion</td>
<td>1.7 1.1 0.8 2.0 1.5 0.9</td>
</tr>
<tr>
<td>Constructability</td>
<td>2.5 1.7 1.8 4.5 4.3 3.6</td>
</tr>
</tbody>
</table>

In summary, the rankings identified the most advantageous corridors for transit in the study area. Corridors 4 and 5 ranked highest due to their ability to serve the key activity centers. In addition:

- Corridor 4 provided the best potential travel time and offered adequate right of way for dedicated transit, without negatively affecting overall congestion on the corridor’s roadways.
- Corridor 5 provided strong potential ridership numbers, an uncongested right-of-way, and good constructability.

Corridor 6 offered several advantages similar to corridors 4 and 5, but was eliminated due to constructability concerns.
Station Location

After identifying the two most advantageous corridors, the Study investigated multiple station locations. Nine preliminary station locations per corridor were developed based on the community information contained in the Environment-Land use-Demographics-Travel Patterns report (Appendix A).

Figure 8 shows the preliminary station locations for the two corridors that were carried on to the short list of alternatives. The following paragraphs describe the station evaluation.

Stations

The Study Team evaluated the nine station locations per corridor for the two top ranking corridors (numbers 4 and 5). The Study Team used a ranking system to score each of the station alternatives in regard to the following categories:

- **2030 Trip Ends** – the Study Team evaluated this category by judging the station’s proximity to households and employers within ¼ mile. Rankings were based on the total number of trip ends within ¼ mile.
- **Ridership** – this category was evaluated using WFRC estimates of boardings and alightings per station, based on model runs done specifically for this Study during March 2005.
- **System Connectivity** – assesses the extent to which a station provides access into the UTA system, with greater access being awarded a higher score.
- **Number of transit commuters** – this category is based on 2000 Census job to work data and reflects the number of transit commuters within ¼ mile.

Table 4 presents the station rankings. The Study Team chose the top ranking stations (highlighted) for the Short List of Alternatives. The stations that were selected for the short list of alternatives generally provided strong ridership and the best service to the key activity centers and to the Commuter Rail station. These stations and their corresponding access benefits were:

- Ogden Intermodal (23rd and Wall) – provides Commuter Rail access
- 23rd and Washington – provides Downtown access
- 23rd and Monroe – provides Downtown access
- 26th and Washington – provides Downtown access
- 26th and Monroe – provides Downtown access
- Weber State University (approximately Edvalson, with location later refined) – provides WSU access
- McKay Dee Hospital and Events Center (approximately 4400 to 4600 South Harrison) – provides hospital access
## Table 4 – Station Rankings

### Corridor Alt 4

| Criteria          | Weight | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|-------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Factor            |        | 23rd Wall | 23rd Wash | 23rd Mon | 23rd Harr | 26th Harr | 30th Harr | 33rd Harr | Edval | McK | 23rd Wall | 23rd Wash | 23rd Mon | 23rd Harr | 26th Harr | 30th Harr | 33rd Harr | Edval | McK |
| Hundreds of '30 Trip Ends | 2.0 | 31 | 76 | 19 | 11 | 11 | 14 | 26 | 57 | 72 | 20 | 5.0 | 1.3 | 0.7 | 0.7 | 0.9 | 1.7 | 3.8 | 4.7 |
| 2030 Projected Activity | 3.0 | 1,310 | 360 | 375 | 347 | 232 | 169 | 186 | 1,570 | 354 | 4.2 | 1.1 | 1.2 | 1.1 | 0.7 | 0.5 | 0.6 | 5.0 | 1.1 |
| System Connectivity | 1.0 | 142 | 121 | 64 | 32 | - | - | - | 44 | 57 | 5.0 | 4.3 | 2.3 | 1.1 | - | - | - | 1.5 | 2.0 |
| '00 Transit Commuters | 1.0 | 8 | 39 | 35 | 9 | 37 | 19 | 16 | 12 | 8 | 1.0 | 5.0 | 4.5 | 1.2 | 4.7 | 2.4 | 2.1 | 1.5 | 1.0 |
| Total             |       | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |

### Corridor Alt 5

| Criteria          | Weight | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
|-------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Factor            |        | 23rd Wall | 23rd Wash | 26th Wash | 26th Mon | 26th Harr | 30th Harr | 33rd Harr | Edval | McK | 23rd Wall | 23rd Wash | 26th Wash | 26th Mon | 26th Harr | 30th Harr | 33rd Harr | Edval | McK |
| Hundreds of '30 Trip Ends | 2.0 | 31 | 76 | 95 | 21 | 11 | 14 | 26 | 57 | 72 | 1.6 | 4.0 | 5.0 | 1.1 | 0.6 | 0.7 | 1.4 | 3.0 | 3.8 |
| 2030 Projected Activity | 3.0 | 1,200 | 427 | 299 | 452 | 331 | 157 | 250 | 1,499 | 368 | 4.0 | 1.4 | 1.0 | 1.5 | 1.1 | 0.5 | 0.8 | 5.0 | 1.2 |
| System Connectivity | 1.0 | 142 | 30 | 155 | 44 | 32 | - | - | 44 | 57 | 4.6 | 1.0 | 5.0 | 1.4 | 1.0 | - | - | 1.4 | 1.8 |
| '00 Transit Commuters | 1.0 | 8 | 39 | 128 | 70 | 37 | 19 | 16 | 12 | 8 | 0.3 | 1.5 | 5.0 | 2.7 | 1.4 | 0.7 | 0.6 | 0.5 | 0.3 |
| Total             |       | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
Transit Mode

The Study investigated five new transit modes for applicability in the Study area. These modes included:

- Light Rail Transit (LRT)
- Streetcar
- Aerial Cableway People Mover (ACPM)
- Bus Rapid Transit, Type I (BRT I)
- Bus Rapid Transit, Type II (BRT II)

Bus service (defined as local bus, similar to the current UTA service) was defined as a baseline for comparison with the other proposed modes. However, this pre-alternative baseline bus service was not carried forward for further development because it did not meet purpose and need. Detailed analysis was not performed on the baseline bus alternative.

These modes are examined in greater detail in a “Mode Definition” technical paper prepared as part of this Study. The entire paper is included with this report as Appendix B. The following transit mode descriptions are extracted from the “Mode Definition” paper. Specific planning level design and operating characteristics for the Ogden to Weber State alternatives were developed as part of the Study and are presented in subsequent report chapters and in the Appendices.

- Light Rail Transit (LRT)

LRT is a form of rail transit that uses electrically powered trains of one to four cars operating over tracks that can be laid along dedicated rights of way, in tunnels, on elevated structures, or in public streets, either segregated from other traffic or in mixed traffic lanes. TRAX in Salt Lake City is an excellent example of LRT, which uses dedicated rights of way and both segregated lanes and mixed traffic lanes. LRT, in the right of way available in the Study area, would likely operate on a regularly scheduled frequency (headway) and at an average operating speed of approximately 20 miles per hour.
Stations
Same standard design as TRAX including: shelters; platforms; furniture; and 200 foot center platforms.

Vehicles
Similar to the TRAX vehicle shown previously.
LRV’s are assumed to accommodate 64 seated passengers and 36 standees each. Two car trains are assumed.

Overhead Contact System
LRT would use the same compound (two-wire) overhead contact system used by TRAX (as shown above).

Guideway
The guideway used by LRT would be built to the same standards and would appear similar to the guideways used by TRAX along the 400 South section of the University Line in Salt Lake City. The guideway would be segregated from general traffic, would involve significant excavation of the street roadbed, the relocation and rebuilding of underground utilities, and the reconfiguration of lanes, traffic control and pedestrian facilities. The guideway would be located in the center of the street to facilitate access into and out of driveways along the route.

Streetcar
Modern Streetcar is a form of rail transit that uses electrically powered cars operating over tracks that can be laid along dedicated rights of way or in public streets, either segregated from other traffic or in mixed traffic lanes. Although similar to LRT, streetcars are usually designed for lower volume, and more urban routes.
The Streetcar mode, like LRT such as TRAX on the University and Sandy lines (as discussed previously), would operate at a regularly scheduled headway and at an average operating speed of 20 miles per hour. Depending upon the number of riders that are forecast by the WFRC travel demand model, the headway could be adjusted to better meet the expected demand.

**Stations**

Similar design to TRAX including: shelters; platforms; furniture; and 60 foot center platforms.

**Vehicles**

Similar to the Portland vehicle shown at the right. Streetcars are assumed to accommodate 40 seated passengers and 50 standees each.

**Overhead Contact System**

Streetcar would use a simple one-wire overhead contact system.

**Guideway**

The guideway used by streetcar would be similar to the guideway used by TRAX along the 400 South section of the University Line in Salt Lake City, except it would use lighter “shallow slab” construction shown in picture to the right. The guideway would be segregated from general traffic only in high traffic congestion areas; elsewhere, general traffic would be able to drive on the track.

Shallow slab track construction would be faster and less expensive to build than LRT tracks and would not require the relocation and rebuilding of underground utilities.
and the reconfiguration of lanes, traffic control and pedestrian facilities. The guideway would be located in the center of the street to facilitate access into and out of driveways along the route.

- Aerial Cableway People Mover (ACPM)

The ACPM Cableway, which was previously studied by the City of Ogden, uses a completely automated, driverless, elevated, mono-cable gondola-type tramway system. The ACPM is the only transit mode studied that does not operate in the right-of-way as surface transit; it operates in an exclusive aerial right of way, separated from other modes, traffic and pedestrians. The selected style of gondola cabins can accommodate 10 passengers each and are attached to the cable using industry-standard, failsafe-gripping devices. Cabins are carried on the moving cable between stations and are detached from the cable and moved by a conveyor system through the stations at a slow speed that allows passengers to board and alight. The cabin then accelerates and reattaches to the cable after it has passed through the station. Average station to station operating speeds are less than 14 miles per hour.

Cableways are normally “walk up, board, and depart systems” with several vehicles in the station boarding area at all times. Vehicles enter and exit the stations every 15 seconds to 25 seconds depending on the cabin sizes and the designed passenger carrying capacity or operating capacity of the System. If there is no waiting line, the headway can be considered to be the time interval between the vehicles. If passengers arrive in a larger group, greater than the capacity of a cabin, as when a commuter train arrives at the Intermodal Center, then the waiting time will be equivalent to a longer headway.

Stations

Stations, as shown at the right, would consist of conveyor mechanisms to detach the cabins from the cable, decelerate them, move them along at
slow speed to allow passengers to board and then accelerate them and attach them to the cable. They would also have covered platform space for passengers to wait, ticket sales areas and communications and safety equipment. Each station would be staffed by an attendant to monitor and assist with the boarding / de-boarding process. Intermediate stations would be elevated above the street and stairs and elevators would be required. Stations, platforms, and passenger vehicles would be ADA accessible. End stations would contain the drive equipment for the cableway.

**Vehicles**

For the purpose of this analysis, the Cableway would use 10-passenger detachable grip gondola cabins; however, there are other choices in monocable cableway systems offering cabins that range from 6 passengers to 12 passengers. Cabins could be equipped with heating and air conditioning. Cabins would be fully ADA compliant.

**Overhead Contact System**

Not required for Cableway.

**Guideway**

The Cableway would travel along the centerline of the streets and use towers spaced every 375 feet (low profile) to 750 feet (high profile) to support the cable carrying the cabins. The towers would be 50 to 65 feet tall and 30 to 32 inches in diameter. The towers would, typically, be placed down the center of the street on which they are operating.

The Cableway system also requires angled, detaching / attaching terminals anywhere a turn must be made. These angle terminals can be in the form of either attended, passenger stations with platforms, or stand-alone, unattended detaching / attaching mechanical terminals.
• **BRT Type I – Mixed Traffic Operation**

BRT Type I uses a variety of site-specific improvements to speed bus service, but does not include bus lanes or busways. BRT Type I generally includes: better quality buses; stations that are more comfortable and substantial than typical bus stops; and transit priority features at congested locations to by-pass buses around delays. Since BRT Type I does not require significant right-of-way acquisition or infrastructure construction, it is quite flexible in how it can be routed.

The Ogden corridor BRT I alternatives are assumed to operate at a consistent headway all day. Depending upon the number of riders that are forecast by the WFR C travel demand model, this headway could be adjusted to better meet the expected demand. An average speed in the 15 mph range is expected.

**Stations**

Similar amenities to TRAX stations are anticipated. However, stations will be located along the curb lane instead of between the lanes in the center of the road. Platforms would be 60 feet long to accommodate articulated buses.

**Vehicles**

BRT Type I would use low-floor articulated diesel transit buses, modified with improved seating, parcel racks, and lighting. The buses used are assumed to have a capacity of 60 seated and 33 standing passengers.

**Overhead Contact System**

Not required for BRT.

**Guideway**

BRT Type I would operate on existing streets. As such, it would not use a guideway in the usual sense of the word. Transit priority improvements would be made along the route to make the service faster and more reliable than standard local bus service.

The improvements would include transit signal priority at all intersections, queue jump lanes (bus only lanes that allow buses to bypass regular traffic at intersections) at intersections where traffic tends to queue
for more than one cycle of the signals, bulb-outs (widened sidewalk areas that allow passengers to access buses) at stations, and priority left hand turns. Buses would primarily operate in the curb lane.

- **BRT Type II – Dedicated Bus Lane Operation**

BRT Type II uses both bus-only lanes and site-specific improvements to speed bus service and make it more reliable. BRT Type II generally includes: bus lanes along sections of the route where traffic congestion is significant, specialized BRT vehicles, stations that are more comfortable and substantial than typical bus stops, and transit priority features at congested locations to by-pass buses around delays.

The Ogden corridor alternatives are assumed to operate at a consistent and regular headway all day. Depending upon the number of riders that are forecast by the WFRC travel demand model, this headway could be adjusted to better meet the expected demand. Average operating speeds in the 15 to 20 mph range are anticipated in Ogden.

**Stations**

Station design would be similar to the concept shown at the right. Similar amenities and design standards to TRAX include: shelters, platforms, artwork and furniture. Platforms would be located between the lanes along sections with dedicated lanes and curbside where buses operate in mixed traffic. Platforms would be 60 feet long. Proof-of-payment fare collection equipment would be included to allow all door boarding similar to LRT and streetcar.

**Vehicles**

BRT Type II would use specialized BRT vehicles such as the NABI Compobus, the New Flyer Invero and the TransBus Civis. Buses would be articulated, 60-foot models with four double width doors to expedite boarding and alighting in conjunction with a proof of payment fare system similar to TRAX.
The specialized BRT vehicles are assumed to provide seating for 50 passengers and standing room for 40. Capacity of the Type II vehicle is slightly less than Type I because these vehicles include an extra set of doors to speed boarding and alighting.

**Overhead Contact System**

Not required for BRT.

**Guideway**

BRT Type II would utilize a center of the street two-direction set of bus lanes in most locations to improve speed, reliability and provide a strong physical presence for the service in the community.

**Mode Evaluation**

All modes were considered appropriate to serve the corridors and stations selected via the preceding process. Thus, all five modes were carried to the Short List of Alternatives.

**Results – Short List of Alternatives**

The Short List of Alternatives for the Study included two corridors (numbers 4 and 5), identified also as 23rd Street and 26th Street respectively. Both included the specific stations based on the corridor alignment location. All five modes were carried forward to the short list – LRT, Streetcar, Cableway, BRT I, and BRT II. Figure 9, shows the corridors and stations that were evaluated during the Short List evaluation phase of the Study.

Section 5.0 provides detail on the Short List phase evaluations and the methodology used to make the Study recommendation.
Figure 9 – Short List Corridors and Stations
5.0 Short List of Alternatives Evaluation

After reducing the alignment alternatives to two corridors and the five modes, work moved to selecting the preferred mode.

In addition to the corridor and station attributes discussed in Section 4.0, Table 5 identifies vehicle, guideway, maintenance facility, right of way requirements (determined via a GIS comparison of typical guideway cross sections and existing right of way widths), and other attributes for each of the alternatives.

Table 5 – Alternatives Attributes

<table>
<thead>
<tr>
<th></th>
<th>Stations (each)</th>
<th>Vehicles</th>
<th>Guideway Features</th>
<th>Maintenance Facility Requirements</th>
<th>Right of Way Needs (in Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LRT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4 23rd Street</td>
<td>5</td>
<td>6</td>
<td>64 seated Passenger, 2+ linked vehicles</td>
<td>Full 4.5 mile transit lane, double-wire overhead electrification</td>
<td>Extensive, new facility and access track</td>
</tr>
<tr>
<td>Alternative 5 26th Street</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Streetcar</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4 23rd Street</td>
<td>5</td>
<td>4</td>
<td>40 seated Passenger single car</td>
<td>3.4 mile transit lane, single-wire overhead electrification</td>
<td>Extensive, new facility and access track</td>
</tr>
<tr>
<td>Alternative 5 26th Street</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACPM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4 23rd Street</td>
<td>5</td>
<td>101</td>
<td>10 Passenger cars</td>
<td>Elevated, single wire overhead cable</td>
<td>Extensive, new facility and access track</td>
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<tr>
<td>Alternative 5 26th Street</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRT II</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4 23rd Street</td>
<td>5</td>
<td>5</td>
<td>50 seated Passenger specialized BRT vehicle</td>
<td>3.4 miles of dedicated in street bus lanes with transit signal priority at 18 intersections</td>
<td>Minimal UTA facility expansion</td>
</tr>
<tr>
<td>Alternative 5 26th Street</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BRT I</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4 23rd Street</td>
<td>5</td>
<td>5</td>
<td>60 seated Passenger Standard Articulated BRT vehicle</td>
<td>In street bus operations with queue jump (bypass lanes) at 18 intersections and transit signal priority</td>
<td>Minimal UTA facility expansion</td>
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<tr>
<td>Alternative 5 26th Street</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Study Team evaluated the 10 Short List alternatives by using the following criteria:

- **Demand Estimates** – Ridership on each of the mode alternatives was calculated using the WFRC travel demand model. With the alternatives developed to a greater degree of detail, more detailed modeling was possible during the Short List phase of work.

- **Capital cost** – Capital cost was calculated through the development of a catalog of unit costs, which was built using recent experience in other systems, national standards, recent UTA experience, and input from RG Consultants for the ACPM. A plan for each of the alternatives was developed and the costs assumed in the catalog applied.

- **Operating Cost** – Operating cost was calculated by first developing a conceptual service schedule for each alternative, then calculating the number of hours of service that were necessary to cover it, and finally developing an agreed-upon cost per service hour. The cost per service hour was developed using NTD data, verified by UTA financial data for LRT, Streetcar, and BRT. ACPM was estimated based on ACPM industry data provided by RG Consultants.

- **Annualized cost per new rider** – FTA standards for annualizing the cost of the various elements were used to determine the annual cost for capital improvements. The annual operating cost was calculated based on the daily, Saturday and Sunday/Holiday schedule of services. The WFRC model calculated the number of new riders.

The results of these assessments are presented in the following paragraphs. The information and results of these assessments, in turn, provide the basis for selecting the recommended alternative.

**Ridership Demand Modeling**

Operating characteristics of the corridors and station locations discussed in Section 5 were developed to support WFRC model runs, including running times, headways, frequencies, and feeder networks. These operating characteristics for each of the ten alternatives (corridors and modes) were used to support ridership demand estimation. WFRC modelers, in turn, used these characteristics to develop ridership estimates for the Short List alternatives. Table 6 summarizes the critical operating characteristics.
Table 6 – Operating Characteristics

<table>
<thead>
<tr>
<th>Mode</th>
<th>Total Time (mins)</th>
<th>Avg speed (mph)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4</td>
<td>14.2</td>
<td>20.2</td>
<td>15 min</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>15.8</td>
<td>18.0</td>
<td>15 min</td>
</tr>
<tr>
<td>Streetcar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4</td>
<td>13.9</td>
<td>20.7</td>
<td>8 min</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>15.5</td>
<td>18.4</td>
<td>8 min</td>
</tr>
<tr>
<td>ACPM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4</td>
<td>19.7</td>
<td>13.5</td>
<td>30 sec</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>20.7</td>
<td>12.9</td>
<td>30 sec</td>
</tr>
<tr>
<td>BRT II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4</td>
<td>13.7</td>
<td>20.9</td>
<td>10 min</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>15.3</td>
<td>18.7</td>
<td>10 min</td>
</tr>
<tr>
<td>BRT I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative 4</td>
<td>17.9</td>
<td>15.8</td>
<td>12 min</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>18.7</td>
<td>15.1</td>
<td>12 min</td>
</tr>
</tbody>
</table>

WFRC used these characteristics in combination with their standard modeling parameters to produce ridership estimates for the corridors. UTA produced a technical memo highlighting the key findings from the modeling effort and summarizing the results. This memo is included with this report as Appendix C. Table 7 summarizes the ridership estimates for weekday and annual boardings for the ten corridor and mode alternatives. New riders were also identified via the modeling. New trip estimates are presented in Table 10.

Table 7 – Ridership Estimates by WFRC

<table>
<thead>
<tr>
<th>Mode</th>
<th>Weekday Boardings 2030</th>
<th>Annual Trips 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23rd Street</td>
<td>26th Street</td>
</tr>
<tr>
<td>LRT &amp; Streetcar</td>
<td>4950</td>
<td>5300</td>
</tr>
<tr>
<td>BRT I</td>
<td>3200</td>
<td>3450</td>
</tr>
<tr>
<td>BRT II</td>
<td>3750</td>
<td>4000</td>
</tr>
<tr>
<td>ACPM</td>
<td>3900</td>
<td>4200</td>
</tr>
</tbody>
</table>

Capital and Operating Cost Assessment

Capital costs were estimated by breaking each alternative down into unit costs. Then, quantities for each element were estimated per alternative. The Study Team then developed a standard for how much each element would cost.
Finally, the quantities and estimated element/unit costs were totalled, producing the total cost. The cost elements used were:

- Stations
- Vehicles
- Overhead Catenary System (OCS) also called electrification system
- Guideway including various bus transit priority features, busways, light rail track, streetcar track and ACPM towers, cable and drive systems.
- Angles – For ACPM only
- Right-of-Way impacts
- Maintenance facility and maintenance facility access
- Contingency (30 percent at this preliminary level of analysis)

In setting the cost for each of the elements it was found that capital costs can vary widely from project to project around the country, even on similar cost items. Costs depend on local economic conditions, shortages of materials, demand for construction services and components, environmental conditions, political circumstances and many other issues. For this reason, the standard costs for each element were carefully researched and considered by the Study Team. Sources of cost data included other recent projects around the country, research papers, studies of average costs around the United States, recent UTA experience, and estimates prepared by UTA staff. Thus, the cost estimates for the various modes were developed specifically for the ten Ogden corridor and mode alternatives. Detail on the estimates for each of the alternatives and corridors is included with this report as Appendix D.

Table 8 summarizes the capital cost estimate and presents an annualized capital cost based on UTA and Federal Transit Administration (FTA) guidelines (using 2005 dollars):

Table 8 – Capital Cost Estimates (in $ Thousands)

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Via 23rd</th>
<th></th>
<th>Via 26th</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Alternative Cost (in $1,000’s)</td>
<td>Annualized Cost (in $1,000’s)</td>
<td>Total Alternative Cost (in $1,000’s)</td>
<td>Annualized Cost (in $1,000’s)</td>
</tr>
<tr>
<td>BRT I</td>
<td>7,357</td>
<td>730</td>
<td>7,356</td>
<td>732</td>
</tr>
<tr>
<td>BRT II</td>
<td>21,941</td>
<td>1,959</td>
<td>22,380</td>
<td>1,994</td>
</tr>
<tr>
<td>LRT</td>
<td>228,758</td>
<td>18,657</td>
<td>230,045</td>
<td>18,761</td>
</tr>
<tr>
<td>Streetcar</td>
<td>100,305</td>
<td>8,168</td>
<td>100,608</td>
<td>8,192</td>
</tr>
<tr>
<td>ACPM</td>
<td>45,297</td>
<td>3,702</td>
<td>47,897</td>
<td>3,913</td>
</tr>
</tbody>
</table>
Table 9 presents the UTA estimated operating costs based on the operating plan described in Table 6 (using 2005 dollars).

**Table 9 – Annual Operating Costs, by UTA (in $ Thousands)**

<table>
<thead>
<tr>
<th>Alternative 4 23rd Street</th>
<th>Alternative 5 26th Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRT</td>
<td>$2,547</td>
</tr>
<tr>
<td>Streetcar</td>
<td>$2,348</td>
</tr>
<tr>
<td>ACPM</td>
<td>$3,994</td>
</tr>
<tr>
<td>BRT II</td>
<td>$1,257</td>
</tr>
<tr>
<td>BRT I</td>
<td>$1,408</td>
</tr>
</tbody>
</table>

**Annualized Cost per New Rider**

The final criterion evaluates the alternatives using the preceding annualized capital and operating costs, expressed as a function of the number of new riders (i.e., riders who would use the new transit alternative who would not be transit riders under a “no build” scenario). Table 10 shows WFRC’s estimated number of new trips, extracted from the estimated total weekday boardings.

**Table 10 – Daily Ridership and New Trips**

<table>
<thead>
<tr>
<th></th>
<th>Weekday Boardings 2030</th>
<th>Weekday New Trips 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>23rd Street</td>
<td>26th Street</td>
</tr>
<tr>
<td>LRT or Streetcar</td>
<td>4950</td>
<td>5300</td>
</tr>
<tr>
<td>BRT I</td>
<td>3200</td>
<td>3450</td>
</tr>
<tr>
<td>BRT II</td>
<td>3750</td>
<td>4000</td>
</tr>
<tr>
<td>ACPM</td>
<td>3900</td>
<td>4200</td>
</tr>
</tbody>
</table>

Table 11 totals the annualized capital and operating costs, previously shown in Tables 8 and 9, into the total annual cost for each of the alternatives.
Table 11 – Annualized Capital and Operating Costs (in $ Thousands)

<table>
<thead>
<tr>
<th>Alternative Technology</th>
<th>Total Alternative Cost</th>
<th>Annualized Capital Cost</th>
<th>Annual Operating Cost</th>
<th>Total Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Via 23rd</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRT I</td>
<td>$7,357</td>
<td>$730</td>
<td>$1,408</td>
<td>$2,138</td>
</tr>
<tr>
<td>BRT II</td>
<td>$21,941</td>
<td>$1,959</td>
<td>$1,257</td>
<td>$3,216</td>
</tr>
<tr>
<td>LRT</td>
<td>$228,758</td>
<td>$18,657</td>
<td>$2,547</td>
<td>$21,204</td>
</tr>
<tr>
<td>Streetcar</td>
<td>$100,305</td>
<td>$8,168</td>
<td>$2,348</td>
<td>$10,516</td>
</tr>
<tr>
<td>ACPM</td>
<td>$45,297</td>
<td>$3,702</td>
<td>$3,994</td>
<td>$7,696</td>
</tr>
<tr>
<td><strong>Via 26th</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRT I</td>
<td>$7,356</td>
<td>$732</td>
<td>$1,470</td>
<td>$2,202</td>
</tr>
<tr>
<td>BRT II</td>
<td>$22,380</td>
<td>$1,994</td>
<td>$1,404</td>
<td>$3,398</td>
</tr>
<tr>
<td>LRT</td>
<td>$230,045</td>
<td>$18,761</td>
<td>$2,834</td>
<td>$21,595</td>
</tr>
<tr>
<td>Streetcar</td>
<td>$100,608</td>
<td>$8,192</td>
<td>$2,613</td>
<td>$10,805</td>
</tr>
<tr>
<td>ACPM</td>
<td>$50,497</td>
<td>$4,124</td>
<td>$4,319</td>
<td>$8,443</td>
</tr>
</tbody>
</table>

Finally, Table 12 presents the annualized cost per new rider:

Table 12 – Annualized Cost per New Rider

<table>
<thead>
<tr>
<th>Alternative Technology</th>
<th>Total Alternative Cost (in $1,000’s)</th>
<th>Annual New Rides</th>
<th>Annual Cost/Annual New Ride</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Via 23rd</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRT I</td>
<td>$2,138</td>
<td>217,540</td>
<td>$9.83</td>
</tr>
<tr>
<td>BRT II</td>
<td>$3,216</td>
<td>246,740</td>
<td>$13.04</td>
</tr>
<tr>
<td>LRT</td>
<td>$21,204</td>
<td>592,760</td>
<td>$35.77</td>
</tr>
<tr>
<td>Streetcar</td>
<td>$10,516</td>
<td>592,760</td>
<td>$17.74</td>
</tr>
<tr>
<td>ACPM</td>
<td>$7,696</td>
<td>275,940</td>
<td>$27.90</td>
</tr>
<tr>
<td><strong>Via 26th</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRT I</td>
<td>$2,202</td>
<td>262,800</td>
<td>$8.38</td>
</tr>
<tr>
<td>BRT II</td>
<td>$3,398</td>
<td>292,000</td>
<td>$11.64</td>
</tr>
<tr>
<td>LRT</td>
<td>$21,595</td>
<td>642,400</td>
<td>$33.62</td>
</tr>
<tr>
<td>Streetcar</td>
<td>$10,805</td>
<td>642,400</td>
<td>$16.82</td>
</tr>
<tr>
<td>ACPM</td>
<td>$8,443</td>
<td>321,200</td>
<td>$26.29</td>
</tr>
</tbody>
</table>

*Based on total alternative cost (in $1,000s) and annual new rides.

All of the preceding costs were carried into the final selection process, which was conducted using a process called Choosing By Advantages (CBA). LRT was not evaluated during the CBA process because its cost per annual new ride was
significantly greater than the FTA’s current project threshold of $22. The Study Team elected to carry ACPM into the CBA because of its unique characteristics and despite a cost per annual new rider that was somewhat higher than the FTA threshold.

**Choosing By Advantages (CBA)**

Choosing By Advantages (CBA) is a decision making process. The purpose of the CBA process is to simplify, clarify, and unify the decision making process. The fundamental principle of the CBA process is that decisions must be based on the importance of advantages.

To determine the advantages, the Study Team had to first determine a set of important factors and then summarize the attributes of each alternative as they related to the chosen factors. For this Study, the factors were developed directly from the purpose and need statement. For example, it was determined that increased transit ridership was needed to help reduce congestion and parking issues at Weber State University. Using this need, the Study Team chose ridership as a factor. The attribute that measures ridership for each alternative was the number of projected daily boardings, as determined by WFRC using their travel demand model. Each alternative would have a different projection for daily boardings, and therefore, some alternatives would have an advantage (more daily boardings).

After the factors were determined, the Study Team ranked the factors and gave them a weight on a scale from zero to one hundred. In other words, the factors/attributes which were most important for making a recommendation in the given Study area were given the highest weight. The factors/attributes were weighted based on discussion and input from the Study Team. Table 13 lists the factors, attributes, and the weighting results.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Attributes</th>
<th>Ranking</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership</td>
<td>Daily Boardings</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>Travel Time</td>
<td>Intermodal to WSU</td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>Connection to the CBD</td>
<td># of stops in the CBD</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>Economic Development</td>
<td>Uniqueness</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>Frequency</td>
<td>Headway</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Visible Presence</td>
<td>Fixed Guideway / Center Running</td>
<td>6t</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Permanence</td>
<td>6t</td>
<td>35</td>
</tr>
<tr>
<td>System Flexibility</td>
<td>Ease of Expansion</td>
<td>7</td>
<td>30</td>
</tr>
</tbody>
</table>
Next, the Study Team summarized the attributes of each alternative. The attributes determined the advantage of each alternative. The advantage was determined by comparing the alternative with the lowest scoring attribute to the rest of the alternatives. For example, the BRT I alternative on 23rd had an estimated ridership of 3200 daily boardings (the lowest estimated ridership alternative), compared to the Streetcar alternative on 26th which had an estimated ridership of 5300 daily boardings (the highest estimated ridership alternative). Making this comparison it was determined that the Streetcar alternative on 26th had an advantage of 2100 additional daily boardings. This same comparison was made for the rest of the alternatives to determine what ridership advantage each had.

Next, the Study Team had to determine the importance of each alternative’s advantage. This was accomplished by taking the alternative that had the most advantage and assigning it the weighting that was determined previously (Table 13). For example, using ridership again, it was determined that the Streetcar on the 26th alternative had the most advantage (2100 additional daily boardings). Therefore, it was assigned an importance of 100 (the previously agreed upon weighting for the ridership factor). The Study Team then looked at the rest of the alternatives and determined the importance of each advantage based on a scale from zero to the weighted score for the specific factor (zero being assigned to the alternative with no advantage and the factor weight being assigned to the alternative with the most advantage). For example, the BRT II alternative on 26th had an advantage of 800 daily boardings and was assigned an importance of 40. This was based on a scale from zero to 100 (the factor weight for ridership). Table 14 presents the advantages and the importance for the top weighted factor, ridership.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Attributes</th>
<th>BRT I 23rd</th>
<th>BRT I 26th</th>
<th>BRT II 23rd</th>
<th>BRT II 26th</th>
<th>Streetcar 23rd</th>
<th>Streetcar 26th</th>
<th>ACPM 23rd</th>
<th>ACPM 26th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridership Daily Boardings</td>
<td>3200</td>
<td>3450</td>
<td>3750</td>
<td>4000</td>
<td>4950</td>
<td>5300</td>
<td>3900</td>
<td>4200</td>
<td></td>
</tr>
<tr>
<td>Advantage &amp; Importance</td>
<td>0</td>
<td>250</td>
<td>12</td>
<td>550</td>
<td>27</td>
<td>800</td>
<td>40</td>
<td>1750</td>
<td>87</td>
</tr>
</tbody>
</table>

The Study Team went through this same exercise for each factor. Once this process was completed, the importance scores were totaled for each alternative using all the factors. Table 15 lists the total “importance of advantages” score for
each alternative. The top ranked alternative in the CBA evaluation was Streetcar on 26th Street. The scoring for each alternative is presented in Appendix E, which presents the full CBA evaluation matrix.

Table 15 – CBA Alternative Ranking

<table>
<thead>
<tr>
<th>Total Importance of Advantages</th>
<th>BRT I 23rd</th>
<th>BRT I 26th</th>
<th>BRT II 23rd</th>
<th>BRT II 26th</th>
<th>Streetcar 23rd</th>
<th>Streetcar 26th</th>
<th>ACPM 23rd</th>
<th>ACPM 26th</th>
</tr>
</thead>
<tbody>
<tr>
<td>79</td>
<td>156</td>
<td>202</td>
<td>274</td>
<td>307</td>
<td>377</td>
<td>223</td>
<td>298</td>
<td></td>
</tr>
</tbody>
</table>

The final step was to graph the total importance of advantages score against the cost per new rider and make a recommendation. Figure 10 shows the results graphically. Streetcar on 26th Street (Alternative 5) was found to offer highest advantage for the lowest cost per annual new rider. Other alternatives had lower costs per annual new rider. However, these lower cost alternatives offered less advantage. The second highest ranking alternative was BRT II on 26th.

Figure 10 – CBA Results Using Cost per New Rider
6.0 Study Recommendation and Next Steps

Based on the analyses presented in Chapter 5.0, the Study recommendation is Streetcar on Corridor #5 (the 26th Street Corridor). Figure 11 shows the recommended corridor and its stations. This corridor begins on the northern end of the Intermodal Transit Facility, follows 23rd Street between Wall Avenue and Washington Boulevard, turns east to Harrison Boulevard, and turns south along Harrison Boulevard to McKay Dee Hospital.

At McKay Dee Hospital, the corridor may ultimately terminate on either Harrison Boulevard or the hospital entrance. Planned stations include:

- Ogden Intermodal
- 23rd and Washington
- 23rd and Monroe
- 26th and Washington
- 26th and Monroe
- Weber State University
- McKay Dee Hospital and Events Center

BRT II on the same corridor received the second highest score relative to cost. Therefore, the Study Team recommended advancing BRT as an alternative mode on the same corridor.

These results were presented to the Stakeholder Working Group at a meeting in Ogden on June 23, 2005. At that meeting, several attendees expressed strong interest in the Aerial Cableway. The Study Team acknowledged the attendees interest, but affirmed the Study’s recommendation based on the accepted, transit oriented Purpose and Need. Those interested in the cableway were encouraged to pursue alternate funding sources, including private sources. Additionally, the Study Team provided those interested in the cableway with information regarding the schedules associated with Federal Transit Administration funded projects.

Next Steps

This Study concludes with the Study Team’s recommendation – Streetcar on the 26th Street Corridor, with six stations and an alternative – BRT II on the same corridor, with the same stations. This recommendation was reported to the Stakeholder Working Group on June 23, 2005 and, via this report, will be conveyed to Ogden City for acceptance. The City’s acceptance of the recommendation will then allow WFRC to incorporate this refined alternative into the Long Range Plan.
Responsibility for implementing the project after incorporation into the Long Range Plan will rest with UTA, working in cooperation with WFRC, Ogden City, other governmental agencies and entities, and the public at large.

This Study was conducted anticipating that the recommended alternative may be eligible for federal transit funding from the Federal Transit Administration (FTA). FTA funding provides a way to leverage local funding sources for capital needs. Future studies will be required to refine the recommended alternative and to determine the extent to which federal funds may be used.

The next step in the project development process will be to complete the alternatives analysis started by this study as part of an environmental study and, if appropriate, to initiate the FTA’s New Starts process. The alternatives analysis will include engineering and planning analyses to refine the streetcar concept (possibly including consideration of a “historic” streetcar alternative), as well as further evaluation the BRT II concept. When completed, the alternatives analysis will be incorporated into an appropriate environmental document that will meet FTA, state, and local requirements. Detailed engineering design, construction, and operation will follow the approvals that are incorporated into the environmental process and, if appropriate, the FTA’s New Starts process.
Figure 11 -- Study’s Recommended Alternative