



CITY OF ALBUQUERQUE  
CENTRAL AVENUE CORRIDOR BRT FEASIBILITY ASSESSMENT

**FINAL REPORT**

Prepared for  
City of Albuquerque Transit Department

Prepared by:  
InfraConsult, LLC  
July 25, 2011

The City of Albuquerque is considering a Bus Rapid Transit (BRT) plan for the Central Avenue Corridor from 98<sup>th</sup> Street to Tramway Boulevard . The desired funding for the BRT plan would include a mix of Federal Transit Administration (FTA) funds and non-federal funds.

The purpose of this Central Avenue Corridor BRT Feasibility Assessment is for the InfraConsult LLC team to provide an opinion on the feasibility of constructing a median running BRT in Central Avenue from 98<sup>th</sup> Street to Tramway Boulevard; to describe potential effects to vehicular traffic within the Corridor; and to identify which segments of the Corridor appear suitable for FTA funding under either the Small Starts or Very Small Starts programs.

This study analyzes potential impacts of a proposed median running BRT on Central Avenue. The selection of a locally preferred alternative (LPA) will occur at the completion of a FTA compliant Alternatives Analysis (AA) Study. The AA is anticipated as the next step in ABQ Ride's transit planning process for the Central Avenue Corridor.

The scope of services separated the project into three major tasks:

- Task 1 - Background Information
- Task 2 - Central Avenue Corridor Evaluation
- Task 3 - Identification of a Minimum Operating Segment

### **Task 1 – Background Information**

The initial task was to understand the unique characteristics of the Central Avenue Corridor. The information gained from this task was incorporated into subsequent tasks. Task 1 was divided into the following sub-tasks:

- Review Prior Studies
- Review Existing Transit and Traffic Information for Central Avenue
- Standard BRT Dimensions

Review Prior Studies – The study team reviewed two prior transit studies completed for the Central Avenue Corridor: the *Rapid Transit Project - Alternatives Analysis* completed in May 2006 and the subsequent *Modern Streetcar Project* initiated in the fall of 2006. Several working reports were reviewed from each of the completed studies.

The documents that proved to be the most useful for the Feasibility Assessment were the *Alternatives Analysis Report* and *Conceptual Design Report* for the Rapid Transit Project and the *Best Lane Analysis Report* for the Modern Streetcar Project.

Review Existing Transit and Traffic Information for Central Avenue – ABQ Ride staff provided the consultant team with ridership data, primarily boarding and alighting counts for each of the three routes – one local and two “rapid rides”, presently serving the Central Avenue Corridor. Because of the level of service and the density of uses along the corridor, the routes serving the corridor carry over 44% of the total system ridership. A high portion of the ridership on all three routes is concentrated between Louisiana and Unser. The ridership on the three routes exceeds 10,000 daily boardings, well above the FTA Very Small Starts threshold of 3,000 riders per day.

Without gathering new traffic data, gaining a clear picture of the current traffic conditions in the corridor is challenging. However, as the purpose of this study is to provide a qualitative assessment of the impact of adding a median running BRT to the existing Central Avenue cross-section, a thorough review of the *Rapid Transit Project Conceptual Design Plans* and the *Best Lane Analysis Report* for the Modern Streetcar Project, supported by two days driving the corridor, provided a clear picture of potential effects and pinch points.

Standard BRT Dimensions – This sub-task identified the major elements of BRT systems and the preferred BRT cross-section dimensions. This step was necessary because of the various forms taken by BRT projects around the country. The study team reviewed available information from the numerous BRT Projects included in the *FY2011 FTA Annual Report on Funding Recommendations – New Starts and Small Starts*, along with available industry research including *Characteristics of Bus Rapid Transit for Decision-Makers, February 2009* funded by the FTA, and *APTA Recommended Practice – Designing Bus Rapid Transit Running Ways*, October 2010.

While the implementation of BRT projects varies, there are several major BRT elements common to most projects. These elements include:

- Dedicated Running Way
- Stations
- Enhanced Vehicles
- Off-Bus Fare Collection
- Intelligent Transportation Systems (ITS)

#### Running Way

The recommended BRT running-way cross-section follows the Arterial Design Guidelines for a Median Busway as described in the *APTA Recommended Practice – Designing Bus Rapid Transit Running Ways*, October 2010, and is similar to a two-lane road, with a 12-foot wide lane in each direction divided from general purpose lanes by a pavement marking. APTA identifies many possible options for the design of physical separation ranging from a concrete median to striping. While a more substantial physical separation provides increased operational safety, it also requires a wider cross-section for shy distance. Given the urban context of much of the Central Avenue corridor we

recommend using a painted 1' wide mountable curb placed at the outside lane edge to define the corridor. The mountable curb provides a clear delineation of lanes and allows emergency vehicles access to the corridor without creating a visual and physical barrier from one side of the street to the other. Thus the standard dimension of the BRT guideway between stations would be 26 feet.

### Stations

Based on this preliminary assessment, the study team suggests that both center and split platform configurations be considered for future study. The recommended BRT station width for a center station is 14 feet with a constrained width of 12 feet. For a split platform configuration, the preferred width is 10 feet and a constrained width of 8 feet. Thus, the standard dimension of the BRT guideway at stations would range from 34 feet to 40 feet.

The placement of stations will be determined during later project phases; however, where available right of way exists, it is recommended that stations be set back from intersections for two reasons. First, when finished loading and unloading, buses should be able to pull out of the station allowing a bus behind to pull in and begin loading and unloading. Second, moving the station away from the intersection provides space for left turn lanes. Where right of way is limited, the study team recommends that split platforms be considered. The split platforms would be located near the intersection to minimize right of way requirements.

The stations should have a permanent look and feel with amenities such as shelters, seating, public art and trash receptacles. The stations should be raised (typically 14" above the roadway) to accommodate level boarding on low-floor buses. Level boarding speeds the boarding and alighting process for all riders and allows easier access for persons in wheel chairs, parents with strollers, young children and the elderly. Level boarding is required for all projects seeking either Small Starts or Very Small Starts funding.

### Vehicles

While the study team scope of services did not include ridership forecasting, based on the existing corridor ridership it is likely that the recommended vehicles will be articulated buses similar to those currently being operated on the Rapid Ride routes. The vehicle design and markings should include aesthetic enhancements so the BRT service has a distinct image. We also recommend low-floor buses to speed boarding and better serve the ADA community. Further study should be undertaken before determining the vehicle propulsion type.

### Fare Collection

We recommend an off-board fare collection system. Off-board fare collection allows passengers to board through multiple doors. This reduces boarding time and total travel time. The fare media and rate will be determined after further study.

## ITS

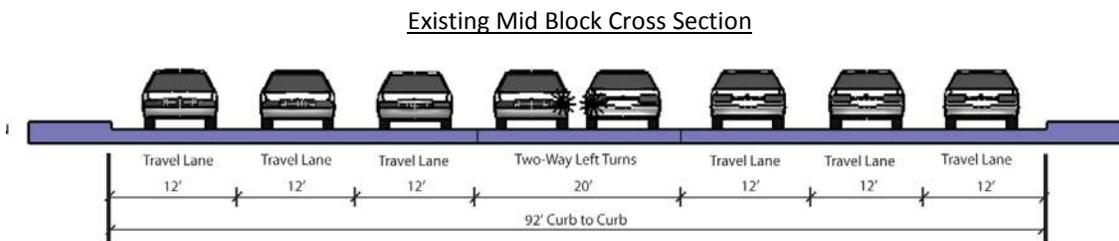
Intelligent transportation system technologies present a multitude of options to enhance the system and provided rider information. We recommend the project incorporate transit signal priority, automatic vehicle location, real-time traveler information, CCTV and emergency telephones.

## Task 2 – Central Avenue Corridor Evaluation

The focus of Task 2 was to evaluate the potential impact of adding a bi-directional median running BRT guideway to the Central Avenue cross-section including intersection operations, general-purpose travel lane size and configuration, and right-of-way availability. The evaluation is presented in segments that relate to the variable cross-section of Central Avenue. Where the evaluation identifies that implementation of the desired BRT corridor dimensions are not feasible, alternative BRT configurations are presented. A recommendation and key challenges are also presented for each segment. Please see the attached cross section and layouts for illustrations of the alternatives at the end of this report.

### Segment 1: Tramway Boulevard to Wyoming Boulevard

Central Avenue from Tramway to Wyoming covers a distance of approximately 3.2 miles. The roadway is approximately 92' wide from curb to curb and features a painted median with left turn bays and three driving lanes in each direction.



### Potential Impact of BRT

**Between Stations:** The introduction of the BRT guideway between stations would require the elimination of the continuous median, while still maintaining space for three driving lanes or two driving lanes and left turn lanes in each direction.

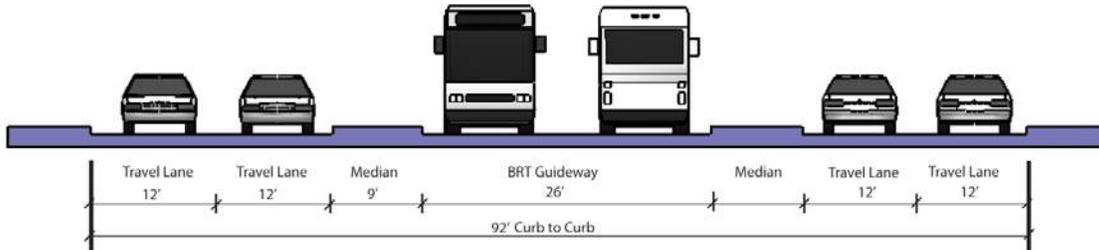
**At Stations:** The roadway would be reduced from six travel lanes to four travel lanes.

### Recommendation

Reduce the entire roadway cross-section to two driving lanes in each direction with a raised median separating the driving lanes from the BRT guideway. At signalized

intersections, left turn lanes would replace the raised median. The BRT would operate in the standard dimension guideway with center platform BRT stations.

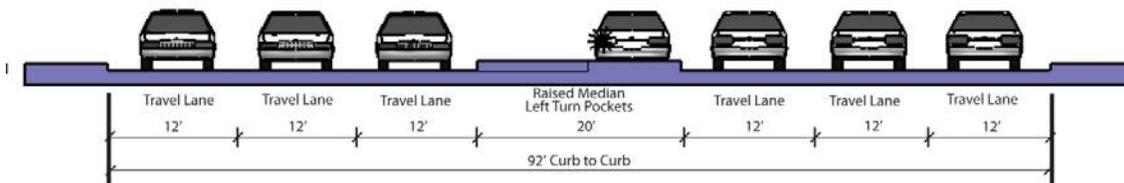
Recommended Mid Block Cross Section



Segment 2: Wyoming Boulevard to Jackson Street (Hiland Theater Area)

Central Avenue from Wyoming to Jackson covers a distance of approximately 2.3 miles. The roadway is approximately 92’ wide from curb to curb and features a raised median with left turn bays and three driving lanes in each direction.

Existing Mid Block Cross Section



**Potential Impact of BRT**

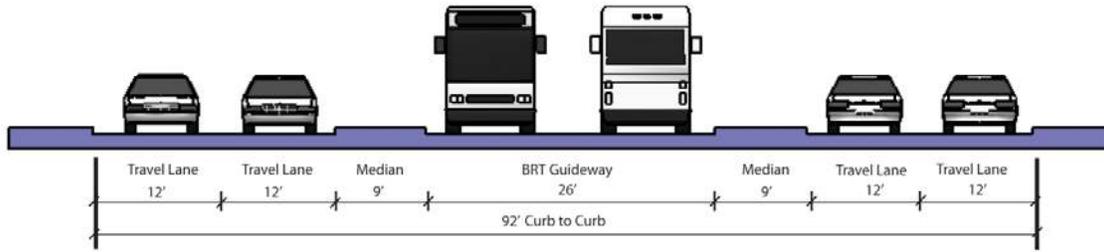
**Between Stations:** The introduction of the 26-foot standard dimension of the BRT guideway between stations would require the elimination of the continuous median, while still maintaining space for three driving lanes or two driving lanes and left turn lanes in each direction.

**At Stations:** The roadway would be reduced from six travel lanes to four travel lanes.

**Recommendation**

Reduce the entire roadway cross-section to two driving lanes in each direction with a raised median separating the driving lanes from the BRT guideway (shown below). At signalized intersections, left turn lanes would replace the raised median. The BRT would operate in the standard dimension guideway with center platform BRT stations.

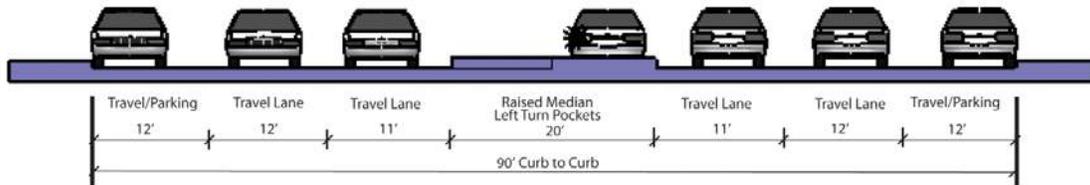
Recommended Mid Block Cross Section



Segment 3: Jackson Street to Carlisle Boulevard

Central Avenue from Jackson to Carlisle covers a distance of approximately two miles. The roadway is approximately 90’ wide from curb to curb and features a raised, landscaped median with left turn bays, two driving lanes in each direction and a third lane in each direction that alternates between on-street parking and a driving lane.

Existing Mid Block Cross Section



Potential Impact of BRT

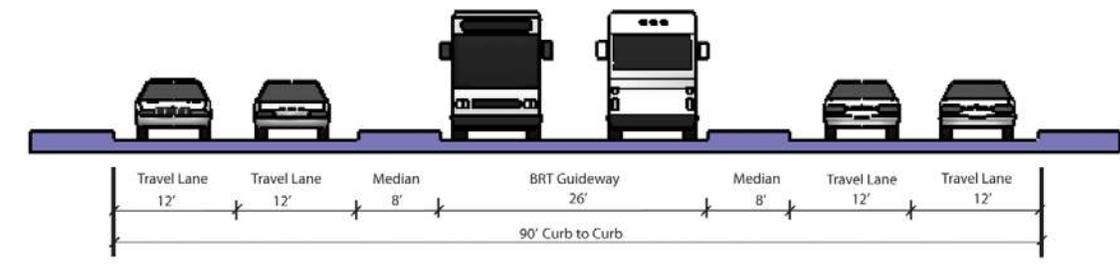
Between Stations: The introduction of a median BRT guideway between stations would require the elimination of the continuous median, while still maintaining space for three driving lanes or two driving lanes and left turn lanes in each direction.

At Stations: The roadway would be reduced from six travel lanes to four travel lanes.

Recommendation

The median running BRT with center stations as described above is recommended.

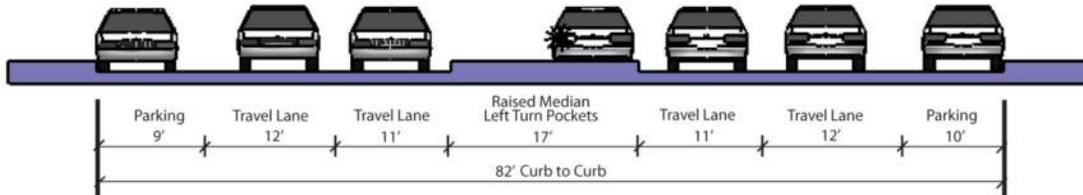
Recommended Mid Block Cross Section



**Segment 4: Carlisle Boulevard to Girard Boulevard (Nob Hill)**

Central Avenue from Carlisle to Girard covers a distance of approximately 0.6 miles. The roadway is 82’ wide from curb to curb and features include a wide landscaping median with left turn pockets, two driving lanes in each direction and on-street parking on both sides.

Existing Mid Block Cross Section



**Potential impacts of BRT**

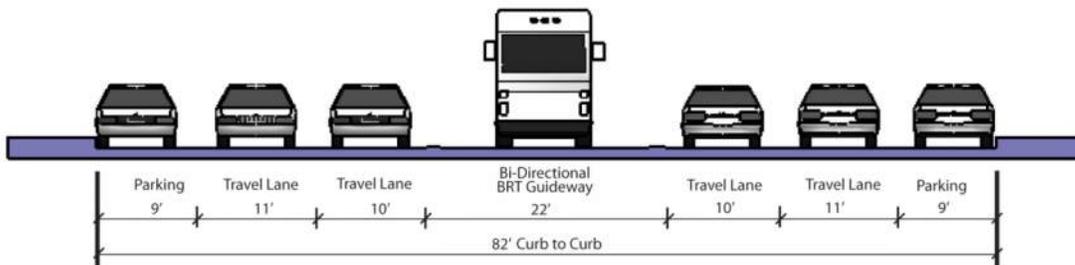
**Between Stations:** The introduction of a median BRT guideway would maintain two travel lanes in each direction while requiring the elimination of the median (left turn bays) and the elimination of one side of on-street parking. At intersections, left turn bays would replace the remaining side of on-street parking.

**At Stations:** The roadway would be reduced to two travel lanes in each direction.

**Recommendation**

The study team believes that the removal of on street parking from either side of Central Avenue would cause an adverse impact to the local businesses. Therefore, the recommendation is to maintain on street parking on both sides of Central Avenue and reduce the width of the BRT guideway.

Recommended Mid Block Cross Section

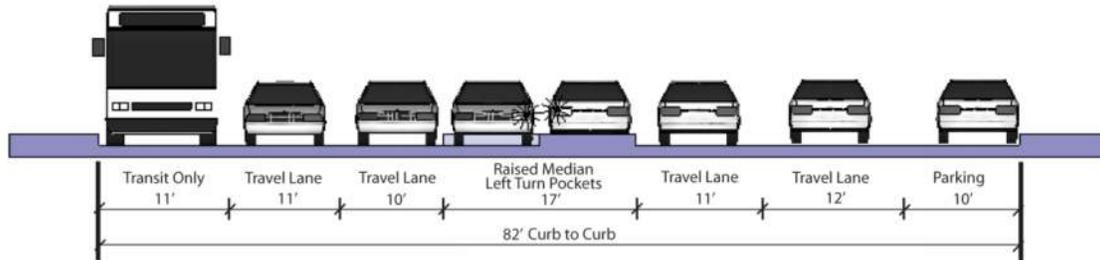


**Segment 5: Girard Boulevard to University Boulevard (University of New Mexico)**

Central Avenue from Girard to University covers a distance of approximately 0.8 miles. The roadway is 82’ wide from curb to curb and features include a wide landscaping median with left turn pockets, two driving lanes in each direction. Additionally, the

eastbound side has curbside on-street parking and the westbound side, fronting on the University of New Mexico campus, has a curbside transit only lane.

Existing Mid Block Cross Section



Potential impacts of BRT

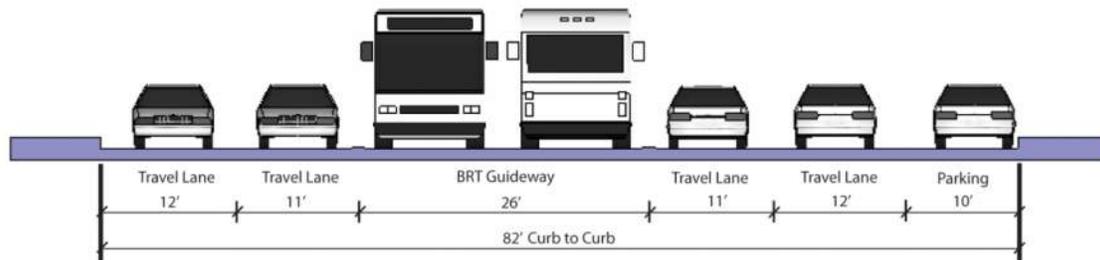
Between Stations: The introduction of a median BRT guideway would require the elimination of the median (left turn bays) and the westbound transit only lane would be eliminated. At intersections, left turn bays would replace on-street parking.

At Stations: The roadway would be reduced to two travel lanes in each direction.

Recommendation

The median running BRT with center station is recommended.

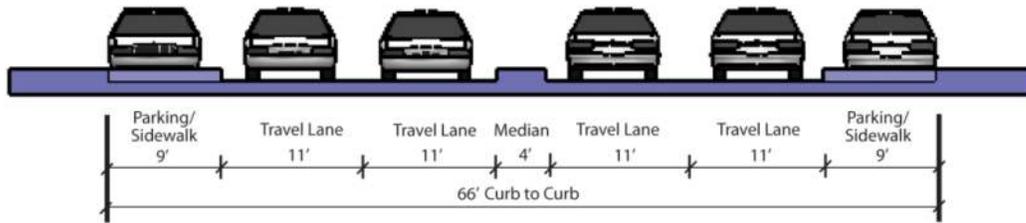
Recommended Mid Block Cross Section



Segment 6: University Boulevard to 1<sup>st</sup> Street (EDo)

Central Avenue from University to 1<sup>st</sup> Street covers a distance of approximately 1.2 miles and includes undercrossings of Interstate 25 and the State of New Mexico Railway tracks. The roadway is 66’ wide from curb to curb. The existing cross section varies with intermittent parking, raised medians and turn lanes, while consistently maintaining two driving lanes in each direction.

Existing Mid Block Cross Section



The East Downtown (EDo) Neighborhood Association board of directors prefers a lane reduction on Central Ave. between I-25 and Broadway.

**Potential Impacts of BRT**

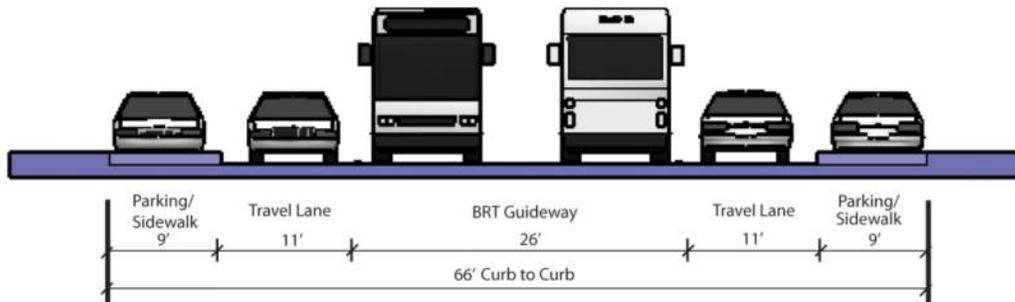
**Between Stations:** If Central Avenue travel lanes are not reduced from I-25 to Broadway the introduction of a median guideway would require: removal of on-street parking; reduction in sidewalk widths to an average width of approximately seven feet; and elimination of the median to maintain two travel lanes in each direction from Broadway to Interstate 25. From University to Interstate 25 the introduction of the median guideway would eliminate the existing median while also requiring the removal of some on-street parking and perhaps a reduction to some sidewalk widths. Widening of the roadway under the railway underpass is impractical due to the significant cost of reconstructing the overpass.

**At Stations:** The roadway would need to be widened to accommodate a station.

**Recommendation**

For current planning purposes the study team is illustrating a reduction in driving lanes through this section with the BRT being placed in the median of Central Avenue from Broadway to Interstate 25. However, the option of placing the BRT in the existing curb lanes should also be studied further.

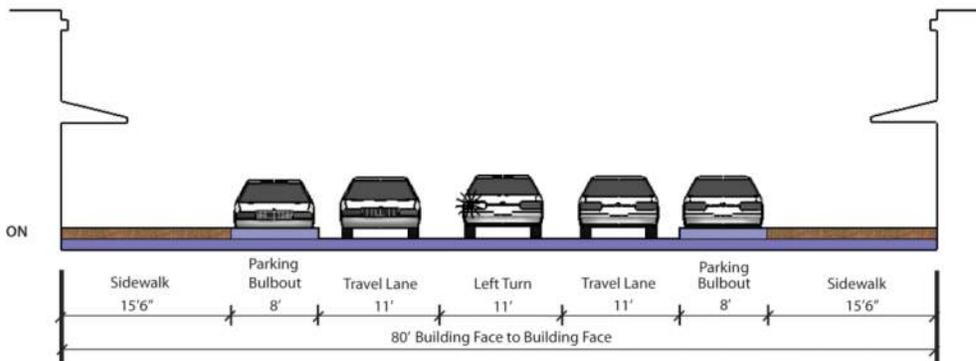
Recommended Mid Block Cross Section



### Segment 7: 1<sup>st</sup> Street to 8<sup>th</sup> Street (Downtown)

Central Avenue from 1<sup>st</sup> Street to 8<sup>th</sup> Street covers a distance of approximately 0.5 miles. The roadway is 50' wide and includes one travel lane in each direction, a center turn lane and curbside on street parking in each direction. Delivery vehicles serving the local business along Central Avenue often use the center lane. This section of the alignment also features a roundabout at Eighth Street.

Existing Mid Block Cross Section (Central Ave.)



#### Potential Impact of BRT

**Between Stations:** The introduction of median BRT would eliminate curbside on-street parking from both sides of the street and would eliminate left turns. The Study team believes that this may be a severe impact and recommends looking at alternative alignments through the downtown.

**At Stations:** The roadway would need to be widened into the existing sidewalks at stations.

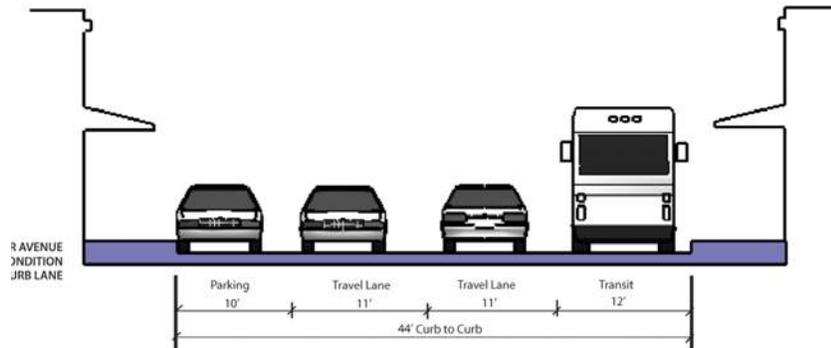
**Roundabout:** During field examination of the 8<sup>th</sup> Street Roundabout the study team did not observe posted vehicle restrictions while noting mountable curbs on the interior of the roundabout. The lack of restrictive signs and the fact the articulated buses to be used for this project typically have a tighter turning radius than standard forty foot transit buses, lead us to believe that the BRT buses could operate through the existing roundabout with minimal modifications, however, the study team recommends a field test with an articulated bus.

#### Recommendation

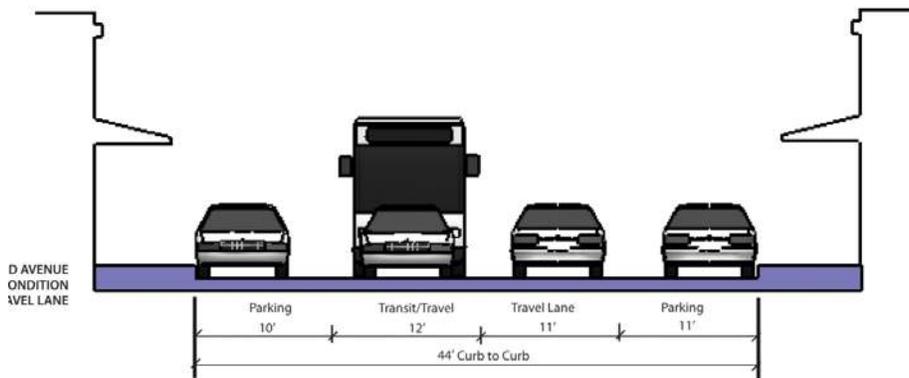
There are two options for BRT on Central Avenue through downtown and in the Downtown area; Option 1 is to operate BRT on Central Avenue in the existing curbside lanes during peak hours by restricting parking during those times. During the off-peak, the BRT would operate in mixed traffic in the existing travel lane. While the provision of traffic signal priority for the BRT at signalized intersections is key to the ultimate success

of BRT throughout the corridor, it is essential for BRT operations through the downtown. Option 2 is to not operate on Central Avenue but instead use Copper Ave for westbound travel through the Downtown and use Gold Avenue for eastbound travel through the Downtown. The Study team recommends Option 2 for the best travel time results but that both options advance for further study.

Recommended Mid Block Section Copper



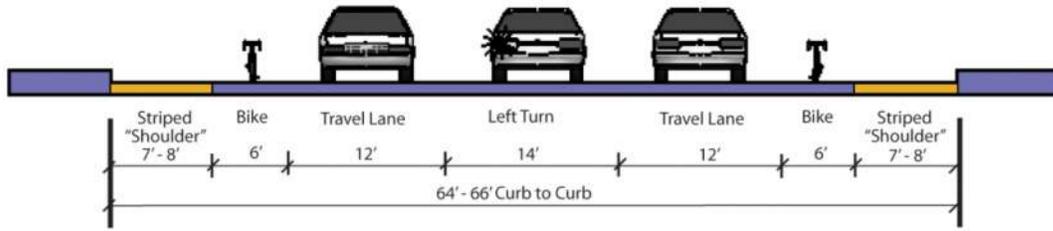
Recommended Mid Block Section Gold



Segment 8: 8<sup>th</sup> Street to Lomas Boulevard

Central Avenue from 8<sup>th</sup> to Lomas covers a distance of approximately 1.1 miles. The roadway is 64'-66' wide from curb to curb. The current configuration from 8<sup>th</sup> to Laguna is experimental and was recommended by the West Central Avenue Corridor Concept Plan commonly referred to as the "Road Diet Plan". The section from 8<sup>th</sup> to Laguna includes one travel lane in each direction, a continuous striped center median, bike lanes on both sides with paved shoulders between the bike lanes and the curb. The section from Laguna to Lomas includes two travel lanes and bike lanes in each direction, a continuous striped center median, and intermittent on street parking in the eastbound direction.

Existing Mid Block Cross Section



Potential Impact of BRT

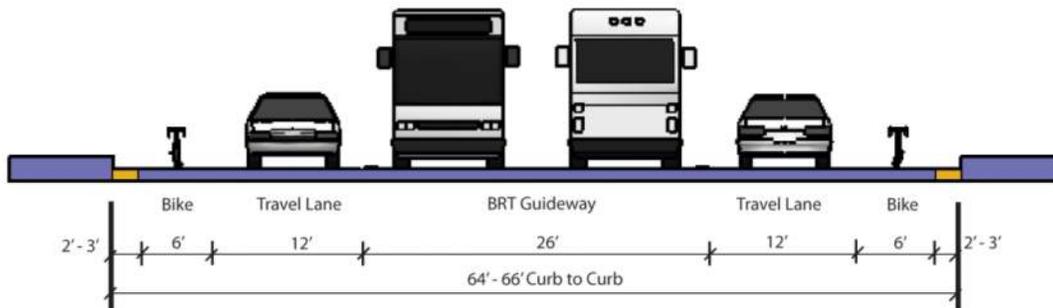
Between Stations: The introduction of a median BRT would eliminate the continuous left turn lane, while leaving one travel lane in each direction plus an additional 14'-16' of pavement that could be used for bike lanes, on-street parking or left turn lanes.

At Stations: The roadway would be reduced to one travel lane in each direction.

Recommendation

The median running BRT with split stations is recommended. This allows the bike lanes to be maintained throughout the section.

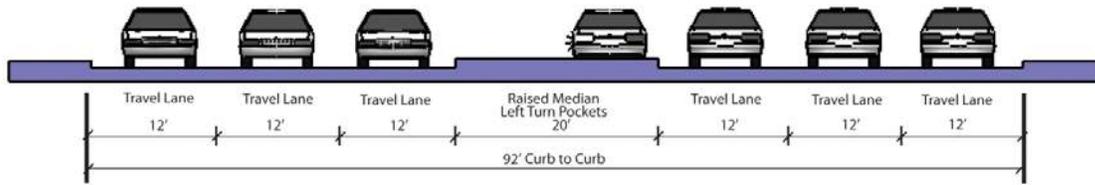
Recommended Mid Block Cross Section



Segment 9: Lomas Boulevard to Atrisco Drive

Central Avenue from Lomas to Atrisco covers a distance of approximately 1.3 miles and crosses over the Rio Grande. The roadway is approximately 92' wide from curb to curb and includes three travel lanes in each direction and a raised median with left turn bays and landscaping. Between New York and the river Central Avenue's curb to curb width tapers from the typically 92' to about 76' in front of the Botanical Gardens.

Existing Mid Block Cross Section



Potential Impact of BRT

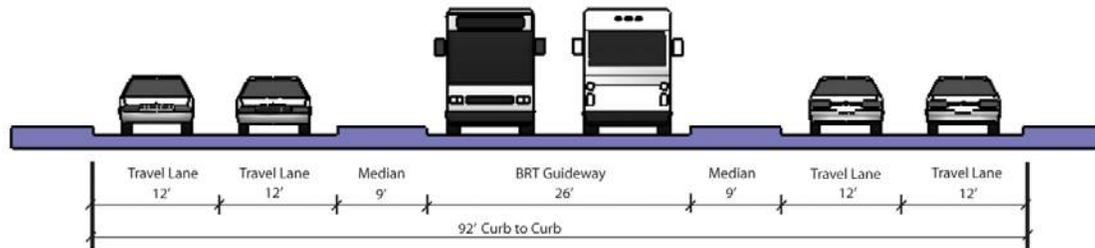
Between Stations: The introduction of a median BRT guideway between stations would require the elimination of the continuous median, while maintaining space for three driving lanes or two driving lanes and left turn lanes in each direction. Travel lanes on the existing bridge over the river would be reduced to two travel lanes in each direction.

At Stations: The roadway would be reduced from six travel lanes to four travel lanes.

Recommendation

The median running BRT with center station is recommended.

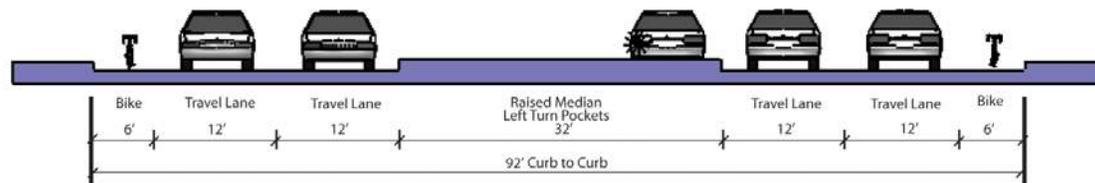
Recommended Mid Block Cross Section



Segment 10: Atrisco Drive to 98<sup>th</sup> Street

Central Avenue from Atrisco to 98<sup>th</sup> Street covers a distance of approximately 3.4 miles. The roadway is approximately 92' wide from curb to curb and includes two travel lanes and bike lanes in each direction and a wide landscaped median with left turn bays.

Existing Mid Block Cross Section



### Potential Impact of BRT

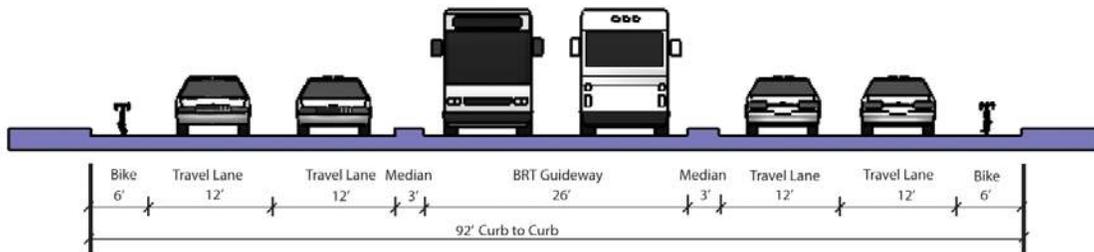
**Between Stations:** The introduction of a median BRT guideway would eliminate the majority of the existing median while maintaining space for the existing travel and bike lanes. Left turns could be accommodated at signalized intersections.

**At Stations:** The roadway would maintain two travel lanes in each direction. Further study is needed to determine if additional ROW is required to maintain the existing bike lanes.

### Recommendation

The median running BRT with center station is recommended.

#### Recommended Mid Block Cross Section



### Task 3 – Minimum Operating Segment

The focus of Task 3 was to identify a Minimum Operable Segment (MOS) including terminal locations, station locations, fleet size, headways, and to provide a cost estimate by major component.

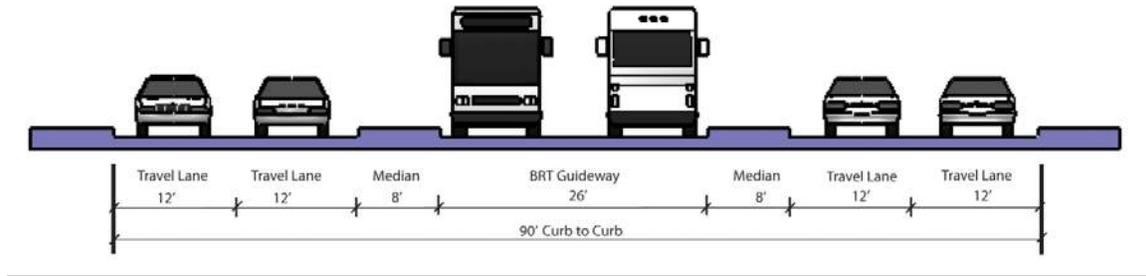
#### Minimum Operable Segment

Based on current corridor ridership and existing and planned development, **the project team suggests the Minimum Operable Segment extend from Unser to Louisiana**, a distance of approximately 9.5 miles. Based on the analysis prepared for Task 2, the recommended configuration of the BRT by section is provided below:

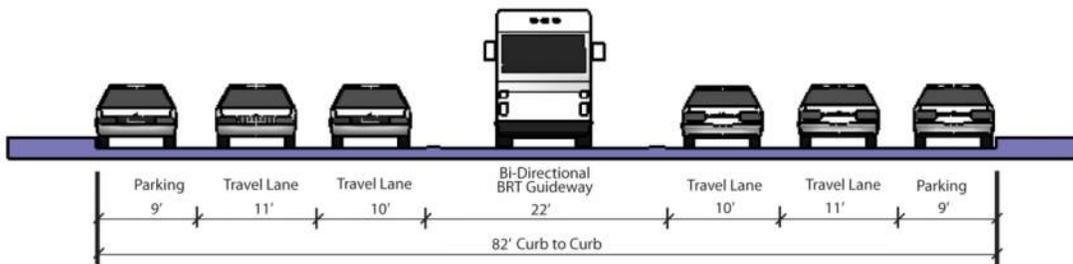
#### Louisiana Boulevard to University Boulevard

Two-lane guideway located in the median of Central Avenue with center stations. The Central Avenue cross-section would consistently provide two travel lanes in each direction and dedicated left turn bays at signalized intersections. This configuration leaves additional space for on-street parking or planted medians along the guideway. One or a combination of the following mid-block cross sections could be used.

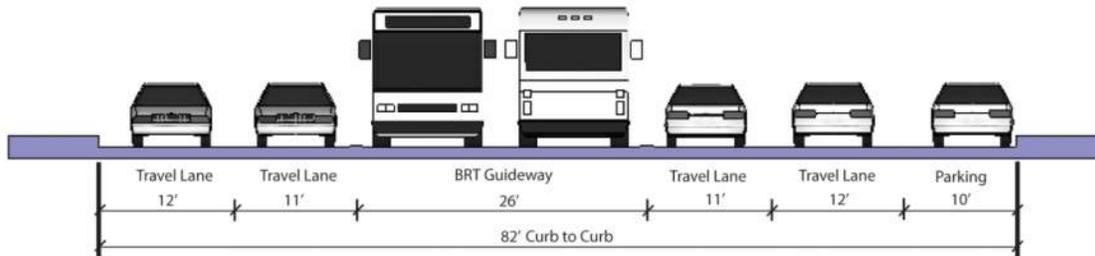
Recommended Section Louisiana to Carlisle



Recommended Section Carlisle to Girard



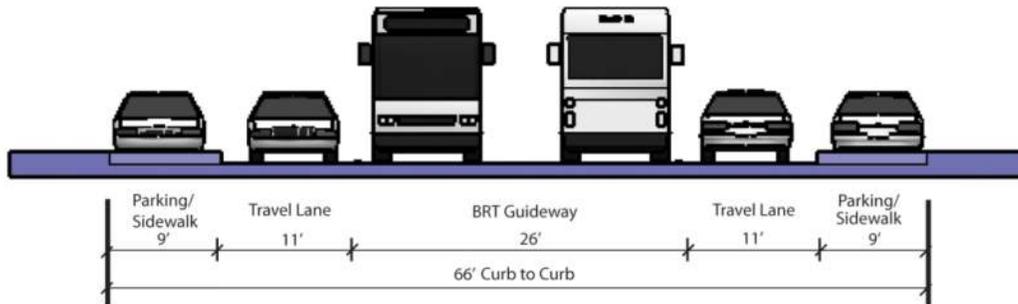
Recommended Section Girard to University



University Boulevard to 1<sup>st</sup> Street

There are two options from placement of the BRT from University to Interstate 25. Option 1 is to place the BRT in the median of Central Avenue. Option 2 is to place the BRT in right of way currently used for on-street parking and bulb-outs. The study team recommends that the driving lanes be reduced through this section and that BRT be placed in the median of Central Avenue from Broadway to Interstate 25. However, the option of placing the BRT in the existing curb lanes should also be studied further.

Recommended Sections University to 1<sup>st</sup> Street



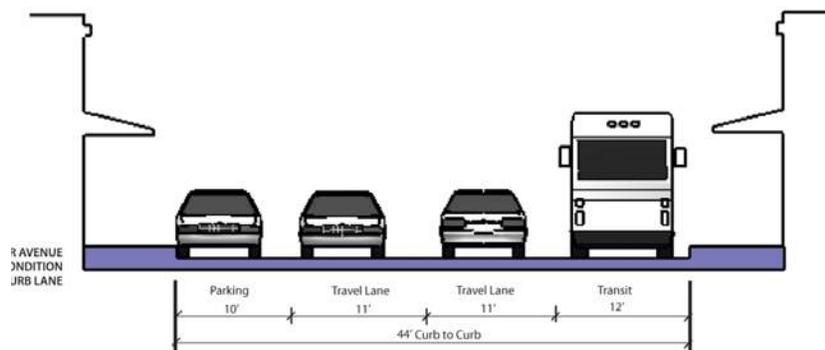
The Central Avenue cross-section would continue to have two travel lanes in each direction. From University to Broadway the roadway would be widened throughout to create the exclusive lane during peak hours. During off-peak hours, the BRT could operate in the current outside lane and enter queue-jumper lanes around signalized intersections. On-street parking would be allowed away from signalized intersections.

1<sup>st</sup> Street to 8<sup>th</sup> Street

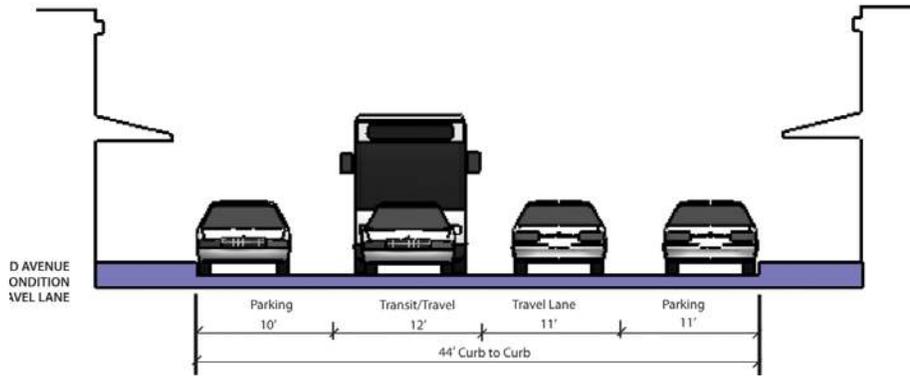
There are two options for BRT on Central Avenue through downtown and in the Downtown area; Option 1 is to operate BRT on Central Avenue in the existing curbside lanes during peak hours by restricting parking during those times. During the off-peak, the BRT would operate in mixed traffic in the existing travel lane. Option 2 is to not operate on Central Avenue but instead use Copper Avenue for westbound travel through the Downtown and use Gold Avenue for eastbound travel through the Downtown. On Copper the BRT would operate in the westbound curb lane. This would require the elimination of a small amount of on street parking. On Gold, BRT would operate in mixed traffic. The Study team recommends Option 2 for the best travel time results.

Recommended Sections 1<sup>st</sup> Street to 8<sup>th</sup> Street

Recommended Section Copper



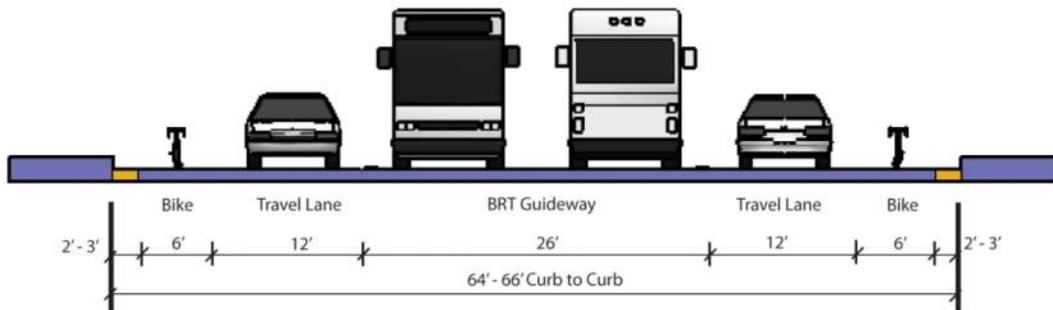
Recommended Section Gold



8<sup>th</sup> Street to Lomas Boulevard

Two-lane guideway located in the median of Central Avenue with split platform stations. The Central Avenue cross-section would have one travel lane and bike lane in each direction with left turn bays at intersections.

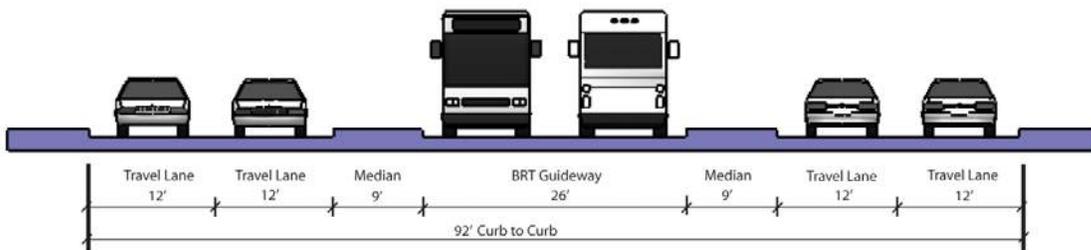
Recommended Section 8<sup>th</sup> Street to Lomas



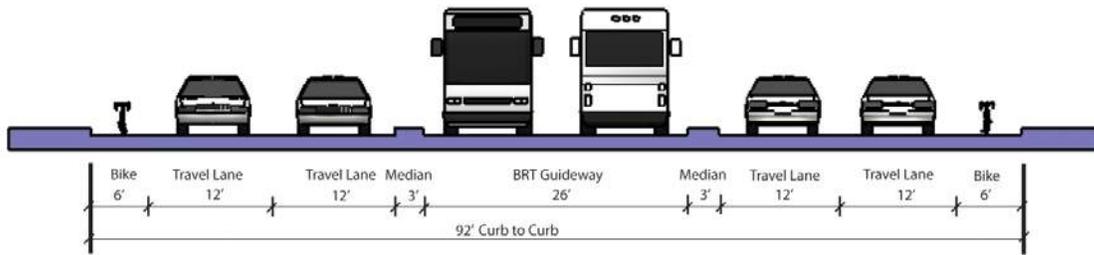
Lomas Boulevard to Unser Transit Center

Two-lane guideway located in the median of Central Avenue with center stations. The Central Avenue cross-section would be a uniform two travel lanes in each direction with bike lanes on both sides for the majority of the section. Left turn bays would be provided at intersections.

Recommended Section Lomas to Atrisco



### Recommended Section Atrisco to Unser Transit Center



### Terminal Locations

The western terminus would be the Unser Transit Center. The location of the eastern terminus is not as clear-cut as the western terminus. The project would be well served by terminating at a park and ride or transit center near Louisiana and the Fairgrounds. The terminal location will be identified during the Alternatives Analysis Study.

### Station Locations

Station locations should be selected after further study of both ridership and development potential. For the purposes of developing both an operating plan and cost estimate the project team recommends the city consider 10 station pairs with locations similar to current Rapid Ride stations.

### Fleet Size and Headways

Since the City plans to pursue federal funding through the FTA Small Starts or Very Small Starts programs the project team recommends peak headways of 10 minutes and base headways of 15 minutes with service operating at least 14 hours per day. Based on an operating plan prepared by ABQ Ride staff, nine vehicles would be needed for the service, including seven vehicles to operate the service and two spare vehicles.

### Cost Estimate

The Cost Estimate for the Minimum Operable Segment is an order of magnitude estimate. The estimate was developed to assess the financial feasibility of the project and potential eligibility for FTA Small Starts or Very Small Starts funding.

The estimate is divided into categories that are generally consistent with the FTA's Standard Cost Categories. The line item costs were developed from local, state and national sources.

Cost Estimate for Minimum Operable Segment in 2015

Element	Cost (000) in 2015\$	
	Low	High
Guideway	\$13,300	\$28,500
Stations	\$2,500	\$4,000
ITS	\$4,000	\$4,500
Landscaping and Lighting	\$4,750	\$4,750
Right of Way	\$2,000	\$3,000
Vehicles	\$8,100	\$9,900
Professional Services	\$6,138	\$10,438
Contingency	\$12,236	\$19,526
Subtotal	\$53,024	\$84,614
Escalation to 2015	\$11,427	\$18,235
<b>Total Project Costs</b>	<b>\$64,451</b>	<b>\$102,849</b>

**Conclusion**

**In the opinion of the InfraConsult LLC study team that constructing a BRT guideway in the median of Central Avenue is feasible and worthy of further study.**

**Next Steps**

Going forward the City of Albuquerque and ABQ Ride want to investigate the projects ability to receive Section 5309 Capital Investment Grant funding through the Federal Transit Administration (FTA) Small Starts funding.

In order to qualify as a Small Start project, the total project cost must be less than \$250 million, with no greater than \$75 million in requested Section 5309 Capital Investment Grant funding. In addition, a project must meet one of the following guideway criteria:

1. Be a fixed guideway for at least 50% of the project length in the peak period – AND/OR-
2. Be a corridor-based bus project with the following minimum elements:
  - Substantial Transit Stations
  - Signal Priority/Pre-emption (for Bus/LRT)

- Low Floor / Level Boarding Vehicles
- Special Branding of Service
- Frequent Service - 10 min peak/15 min off peak
- Service offered at least 14 hours per day

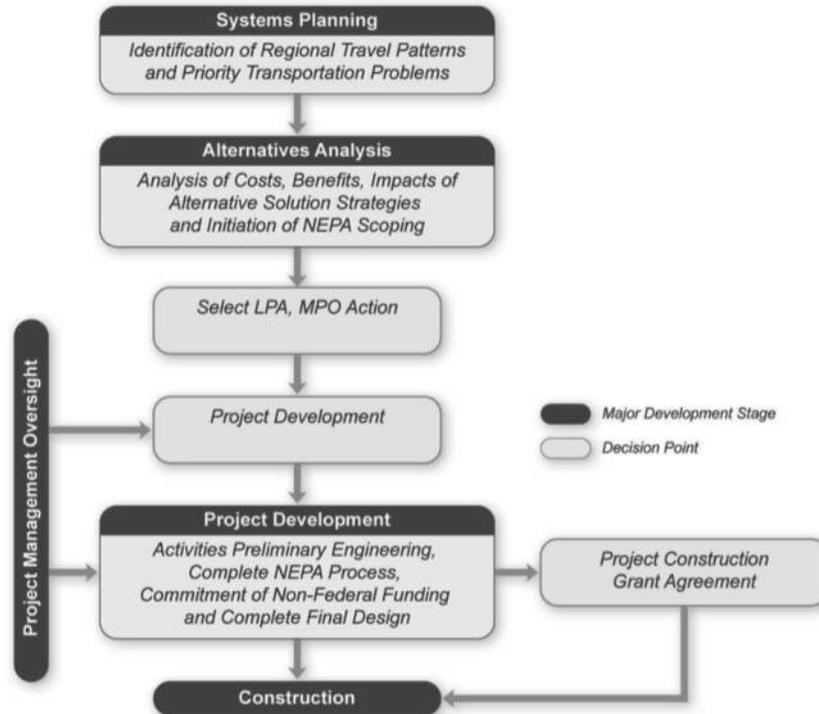
The FTA Section 5309 Capital Investment Grant program also includes a project category called “Very Small Starts.” These projects are simple, low-risk projects that qualify for a highly simplified project evaluation and rating process by FTA.

In order to qualify for the streamlined Very Small Starts evaluation and rating process, a project must be a bus, rail or ferry project and contain the following features:

- Transit Stations
- Signal Priority/Pre-emption (for Bus/LRT)
- Low Floor / Level Boarding Vehicles
- Special Branding of Service
- Frequent Service - 10 min peak/15 min off peak
- Service offered at least 14 hours per day
- Existing corridor ridership exceeding 3,000/day
- Less than \$50 million total cost
- Less than \$3 million per mile (excluding vehicles)

**Based on the above criteria, the median running BRT on Central Avenue described in this report meets the basic requirements for consideration as a Small Starts project. With minor modifications, it may also be eligible for consideration for the Very Small Starts program.**

The process to become eligible for either Small Starts or Very Small Starts funding is well defined. Both funding programs follow the project Development Process illustrated below:



During the planning and project development process, FTA evaluates the project's justification and local financial commitment and the sponsor addresses any remaining planning, environmental, engineering, and design issues and requirements. FTA is required by law to approve the initiation of project development and to make funding recommendations after project development is complete.

Early in the Project Development Process, the City will need to identify the type of procurement method to be used for the design and construction of the future BRT line. The City will also need to determine how it wants to operate and maintain the line.

There are several types of Alternative Project Delivery processes available to the City. Alternative Project Delivery approaches have the potential to provide time-savings, cost savings, and more innovative, higher quality projects with reduced risks in some instances. The types of project delivery approaches most frequently used by other US transit systems are described below. The first approach described is the traditional design-bid-build approach to project delivery.

#### Design-Bid-Build

Design-Bid-Build (DBB) is the traditional form of project delivery in which the design and construction of the facility are awarded separately to private sector engineering and contracting firms. As a result, the DBB process is divided into two separate phases for design and construction. In the design phase, the City could perform the design work itself, if qualified resources are available or contract with an architectural and/or engineering firm or firms to prepare the preliminary engineering plans and

environmental clearance, which typically results in a project plan at the 30 percent completion stage, and the final drawings and specifications for the project.

Once the design phase is complete, the City separately contracts with private construction firms through a competitive bidding process. Under a DBB delivery approach, the City, not the construction contractor, is solely responsible for the financing, operation, and maintenance of the facility and assumes the risk that the drawings and specifications are complete and free from error.

The DBB selection process is based on negotiated terms with the most qualified firm for the design phase; while the award of the construction contract typically is based on the lowest responsible bid price. The majority of surface transportation projects, including most transit capital projects, currently use the DBB approach.

#### Design-Build

Unlike DBB where the design and construction phases of a project are procured using two separate contracts with little or no overlap in the respective project work phases, the Design-Build (DB) delivery approach combines the design and construction phases into one, fixed-fee contract. Under a DB contract, the design-builder, not the project sponsor, assumes the risk that the drawings and specifications are free from error. While the design and construction phases are performed under one contract. The DB selection process may be based on a negotiation with one or more contractors or a competitive process based on some combination of price, duration, and qualifications. Increasingly DB contracts are being awarded on the basis of best value, considering each of these factors.

DB is best suited for complex projects where private sector innovation and potential schedule acceleration add value. While the DB process provides some key benefits compared to a DBB process, DB projects also have some key issues to consider including less public control over project design; public uncertainty may drive cost increases; financial risk stays with the City; long term structural risks stays with the City; and, there is no transfer of life-cycle costing to private sector.

#### Design-Build-Operate-Maintain

Under a Design-Build-Operate-Maintain (DBOM) delivery approach, the selected contractor is responsible for the design, construction, operation, and maintenance of the facility for a specified time. The contractor must meet all agreed upon performance standards relating to physical condition, capacity, and ride quality. The potential advantages of the DBOM approach is the increased incentives for the delivery of a higher quality plan and project because the private partner is responsible for the performance of the facility and for maintaining the project, in its complete and fully operational state, for a specified period of time after construction. Potential disadvantages are that the City has limited control over the look and feel of the project and they also have limited control over service delivery.

Design-Build-Finance-Operate-Maintain (DBFOM) delivery approaches is a variation of the DBOM approach. The major difference is that in addition to the design, construction, and operation of the project, the contractor is also responsible for all or a major part of the project's financing. The potential advantages of the DBFOM approach are the same as those under the DBOM approach but also include the transfer of the financial risks to the private partner during the contract period. While the City retains ownership of the facility, the DBFOM approaches attract private financing for the project that can be repaid with revenues generated during the facility's operation. All or a portion of the revenue used to repay the private financing can be generated by the facility itself, but revenue generated by the public sector through taxes or other public sources can also be used to repay all or a portion of the private financing. Utilizing long-term public sources of revenue to pay down privately financed projects allows the public sector to enjoy some of the benefits available with a leveraged project without issuing bonds or otherwise incurring debt on its balance sheet.