ALTERNATIVE ALIGNMENTS IDENTIFICATION AND ASSESSMENT

UNM/CNM/Sunport Transit Study

Prepared for:

Mid-Region
Council of Governments
809 Copper Ave. NW
Albuquerque, NM 87102
505-247-1750

Prepared by:

Parsons Brinckerhoff, Inc.

in Association with:

Better Foundations, LLC
Planning Technologies, LLC
Dekker / Perich / Sabatini

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1.0 Introduction

This document summarizes the process followed to identify and screen potential route alternatives for a proposed bus rapid transit (BRT) route serving the UNM/CNM/Sunport corridor in southeast Albuquerque. The study is a collaborative effort involving the Mid-Region Council of Governments (MRCOG), Rio Metro Regional Transit District (RMRTD), City of Albuquerque, University of New Mexico (UNM), and Central New Mexico Community College (CNM) main campus. MRCOG is the lead agency for the study phase. For the purposes of this paper, the reference to UNM includes the UNM main campus, the University of New Mexico Health Sciences complex, UNM Science and Technology Park, and the UNM Athletics Complex.

A scoping/feasibility study that focused on transportation and parking problems within the UNM/CNM/Sunport corridor was completed by MRCOG in 2011. The findings of that study resulted in a recommendation to investigate enhanced transit to improve the identified mobility, accessibility, and parking problems found within the subject corridor. For this reason, the primary focus of the alternatives analysis (AA) was to further assess transit solutions and to identify a preferred transit investment and parking strategy within the study corridor. The AA study also identified strategies to better integrate pedestrian, bicycle, and land use with the transit system. The culmination of the AA was the identification of a locally preferred alternative (LPA) and the preparation of a potential service plan and initial cost estimates for project construction, vehicle acquisition, and annual operations and maintenance cost for the LPA. Recommended parking, land use, and travel demand management (TDM) policies were also developed for consideration and implementation by local governments and major institutions. The study was funded in part by Federal Transit Administrations (FTA) Alternatives Analysis funds (section 5339) and was, therefore, conducted following the latest available FTA guidelines and procedures.

Several related technical studies were conducted that are referenced in and supplement the information summarized in this AA report. These studies were documented in a series of technical supplements and are on file with the MRCOG. These documents include:

- *Summary of Existing Transit Routes*, January 2013
- *Public Participation Summary Report*, September 2013
- *Demographic Profile for the UNM / CNM / Sunport Corridor*, September 2013
- *Ridership Analysis Summary Report*, October 2013
- *Travel Demand Management Strategies*, October 2013
- *Land Use and Economic Development Opportunities*, December 2013
- *Conceptual Design Plans for Project Alternatives*, December 2013

The AA concluded with the recommendation of a locally preferred alternative. The preferred alternative consists of a bus rapid transit route operating in a mixture of median bus only lanes and curbside business access transit lanes. The overall route is approximately 6.5 miles in length with termini near University Boulevard/Menaul Boulevard on the north end and the Sunport Airport Terminal on the south end. In general, the route follows University Boulevard (except where the alignment penetrates the UNM Main campus between Lomas Boulevard and Dr. Martin Luther King Jr. Avenue), Avenida Cesar Chavez, and Yale Avenue. A detailed description of the recommended alternative is provided in Chapter 4.

1.1 Background Information

The study corridor is located in the south-central portion of the Albuquerque metropolitan area, about one mile east of downtown Albuquerque. Located in an older and established portion of the City, the study area contains a mixture of land uses including established neighborhoods, several large institutional uses, a regional collegiate and professional sports complex, and a diverse mix of shops, restaurants, and service businesses near UNM. In addition, several remote large surface parking lots and large parcels of undeveloped land are located within the area. The study area is generally bounded by Menaul Boulevard on the north, Girard Boulevard on the east, Sunport Boulevard on the south, and Interstate 25 on the west. Figure 1 on page 3 illustrates the study area.

The activities and employment associated with the institutions and regional airport make this corridor the largest activity center in the Albuquerque metropolitan area as well as the overall state. The education, research, and medical facilities alone have a daytime population of approximately 62,200 students, faculty, staff, and visitors to UNM Hospital. When area residents and the employees of local businesses and the Sunport are considered, the overall population within the study corridor is close to 101,500.

The large population of students, faculty, staff, other employees, and residents within the study corridor generate a high amount of daily travel. While auto travel is very high, there is also significant travel on the transit system, by bicycle, and by foot. Travel surveys indicate that approximately 30% of UNM students and 18% of CNM students travel to campus using these alternate modes. Transit services are provided by both ABQ Ride and the UNM Parking and Transportation Services (PATS). Total transit ridership within the study corridor is approximately 20,150 trips per weekday split between ABQ Ride and a shuttle service provided by UNM Parking and Transportation Services (PATS). The PATS service is focused on shuttle service between the main campus and four large park and ride lots, three north of the main campus and one to the south. Shuttle service is also provided to Lobo Village, a large off-campus student housing complex located in the south campus area.

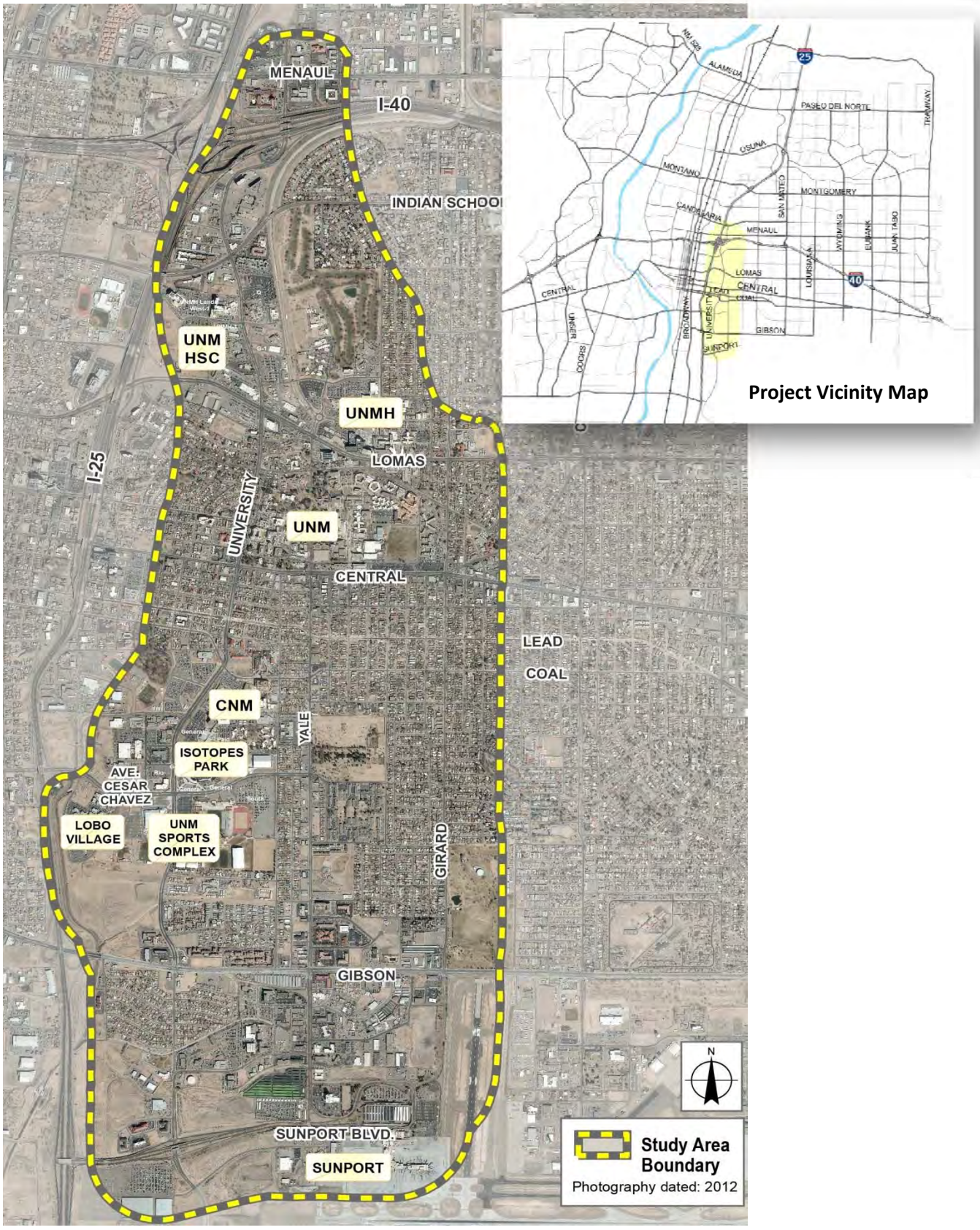
1.2 Purpose and Need

The purpose of the proposed project is to improve transit accessibility to, from and within the study corridor described above. Detailed information on the factors that supports the need for the proposed BRT service are provided throughout this report but key factors and information germane to the transportation needs within this corridor are discussed below.

First, the study area captures the state's premiere higher education and health care institutions, the state's major commercial airport as well as the state's premier sporting venues. Collectively, these elements make the area the largest activity center in New Mexico and of significant importance to the City, County, and State. The study area includes the UNM Main, North and South campus areas, UNM Hospital, the CNM campus, and the Sunport. The estimated daytime population of these areas includes approximately 62,200 students, faculty, staff, and visitors, plus approximately 14,400 workers at the Sunport and non-campus jobs. While the sum number is significant, how the populations are concentrated along the corridor at several activity centers is important. Populations include:

- UNM Main, North, and South Campuses with a student, faculty, and staff population of about 39,460 when school is in session.
- UNM Hospital/Health Sciences complex that includes the regions only level 1 trauma hospital plus various related medical facilities. The staff and visitor population of this area is about 8,400.

Figure 1 – Study Area



- CNM, with a student, faculty, and staff population of about 14,340 when school is in session.
- UNM South Campus and the Science and Technology Park. This area includes a significant job base plus a regional sports complex for the UNM basketball, football, tennis, soccer, track and field, and baseball venues. Isotopes Field — a Triple A professional baseball park — is also in this area. With almost 68,000 seats between the baseball, football, and basketball stadiums, the population of this subarea increases significantly during sporting events.
- Albuquerque International Airport (Sunport) and other businesses with an employment base of about 7,200 in the Sunport area and 7,200 at various non-campus job locations.
- Other entertainment venues including cultural events at Popejoy Hall (1,985 seats), plus numerous shops, restaurants, and nightclubs near UNM and in the nearby Downtown and Nob Hill areas adjacent to the University area. These venues are visited by thousands each day.

In addition to the populations associated with the institutions and major employers, the study area is home to approximately 24,900 residents and numerous small businesses each having their own travel needs. When these residents and workers are considered, the daytime population of the corridor is estimated to be about 101,500, not including special or sporting events.

Convenient and affordable access to the education, health care and employment opportunities offered by UNM/CNM are essential for these institutions to achieve their missions. At the same time, the transportation connections providing this access impact the surrounding residential and commercial uses as well as the outlying parts of the regional transportation system.

The level of activity associated with this area has created significant issues associated with auto traffic. While traffic congestion occurs sporadically around the UNM and CNM campuses and on several of the areas arterials at certain times of the day, the daily search for parking adversely impacts adjacent neighborhoods and local businesses as students and visitors circle through the area looking for an available space.

According to data from travel data collected by UNM and CNM, about 66% of UNM students and 82% of CNM students commute by auto to campus. These two institutions have a combined total of about 25,600 parking spaces (including patient parking and sporting event parking) spread across 91 surface lots and 5 parking structures. Approximately 5,000 of these spaces are associated with university sports, although they are also used as part of the UNM park and ride system. Estimates of current travel markets indicate a market size of approximately 149,000 daily trips generating 1.3 million vehicle miles of travel (VMT) daily — a value that is approximately 5% of all VMT in the Albuquerque Metro area.

Existing transit service to the UNM main campus area is very good on two major east west routes (Central Avenue and Lomas Boulevard) and is used at rates much higher than the urban areas as a whole. Transit service to the UNM north, main, and south campuses is also provided by UNM Parking and Transportation Services (PATS). This service consists of university-operated shuttle buses that travel between several large park and ride lots, remote student housing areas, and campus destinations. Current transit usage of the combined ABQ Ride and UNM Shuttle service is about 20,150 daily transit trips — a mode share of about 15%. However, north-south service in the area is poor, minimizing the potential of the east-west routes to efficiently serve the other major destinations within the study area, i.e., CNM, UNM South, portions of UNM North, and the Sunport. Ridership on the UNM shuttle system is quite good; however, the service is not available to the general public, hospital patients and visitors, and CNM riders (note: UNM Hospital provides a limited on-demand shuttle service for patients traveling

between the medical clinics and the hospital). Moreover, the UNM bus fleet provides less than ideal conditions for those with disabilities. While local bus routes provide some service to CNM, UNM south, and the Sunport, the routes are inefficient and have long headways. Surveys conducted on both the UNM and CNM main campuses identified better transit service as a need.

The study area is projected to grow significantly over the next 20 years, including several million additional square feet of new academic, research and health related facilities. Population and employment is also projected to increase significantly and the future daytime population of the area is estimated at 130,000. While the anticipated growth of UNM has been carefully planned (UNM Master Plan and UNM Health Sciences Master Plan), it assumes the number of parking spaces will grow only slightly and, to create space for new buildings, much of the existing surface parking will need to be consolidated in structures. More transit service and improvements to bicycle and pedestrian facilities will be necessary to offset the increased travel demand to the area and to fulfill major objectives of area plans.

In addition to the changes in land use and parking, UNM has adopted a goal to reduce the University's 2006 greenhouse gas (GHG) emissions level by 80% by 2030 and to achieve carbon neutrality by 2050. This goal is defined by the American College & University President's Climate Commitment (ACUPCC). Achieving significant reductions in GHG emissions will require a significant drop in VMT — an objective that can be advanced by additional and more efficient transit service.

Preliminary analysis of potential ridership for the proposed BRT system indicates that it will carry about 17,300 trips per day, more than double the ridership on Route 66 — ABQ RIDE's highest ridership route. Major markets utilizing the service include UNM and CNM faculty, staff and students, visitors and students utilizing remote parking, area residents, including students in housing too far from the institutions to walk, health care patients and visitors, patrons of local business and students, faculty and staff utilizing regional transit routes to access the corridor. In addition, north-south service in this corridor will provide a distribution system for future east-west routes or other regional transit services to connect with. Because the service will connect all of the major destinations in the study area with frequent efficient service, new routes need only to intercept the line at a single location to serve all destinations. This framework is much more efficient than the alternative, which is deviating major transit routes in the corridor to serve each destination.

As noted above the study corridor is planned for significant growth. This growth includes major expansions to the UNM Health Sciences facilities, the UNM Main Campus area, CNM campus, UNM South Campus area, and commercial developments on UNM-owned lands south of the regional sports complex. Planned growth on UNM lands is directed by the plans and policies specific in the UNM Consolidated Master Plan. A City of Albuquerque sector development plan was recently completed for the South Yale corridor. This sector plan established development policies for the segment of Yale Boulevard south of the UNM Main Campus and east of the CNM campus. The predominant development type targeted for this area is mixed use retail/commercial/residential and allows up to 3 to 4 story buildings. Transit is a central component of both the UNM Master Plan and the South Yale Sector Plan. Several developments in the corridor are planned for the near term and not too distant future that could be heavily influenced by a BRT investment. This includes several developments currently in the planning stages through Lobo Development and other private and institutional facility expansions including the new UNM Hospital. These developments and others in the future could unfold in a more transit and pedestrian oriented manner if the BRT investment becomes a reality.

Finally, there has been an unprecedented level of cooperation between UNM, UNMH, CNM, the City of Albuquerque, Bernalillo County and the Rio Metro Regional Transit District on this project. All entities have contributed to fund the study, and the results have been vetted at the highest levels. There is a clear understanding amongst the parties that this project and service creates a number of new opportunities for orderly growth and development in this portion of the City. And, for the first time, meaningful discussions are taking place about shared parking, a comprehensive parking pricing strategy for the area, the implementation of Travel Demand Management strategies, and future financial participation in the capital and operating phases of the service. All parties recognize that a continuation of the transportation status quo in the corridor will result in increased impacts to the adjacent neighborhoods, increases in traffic congestion, significant new investments in structured parking, and ultimately very limited opportunities for the educational and health institutions and local businesses to grow and prosper.

2.0 Alternatives Identification and Screening

The identification and screening of potential route alternatives was a collaborative and iterative process. The initial set of alternatives was developed by the project team (transportation engineers and planners) in collaboration with an interagency technical advisory committee (TAC) — a group comprised of representatives from the stakeholder institutions and local agencies. Input from the public was also a key consideration.

2.1 Identification of Alternatives

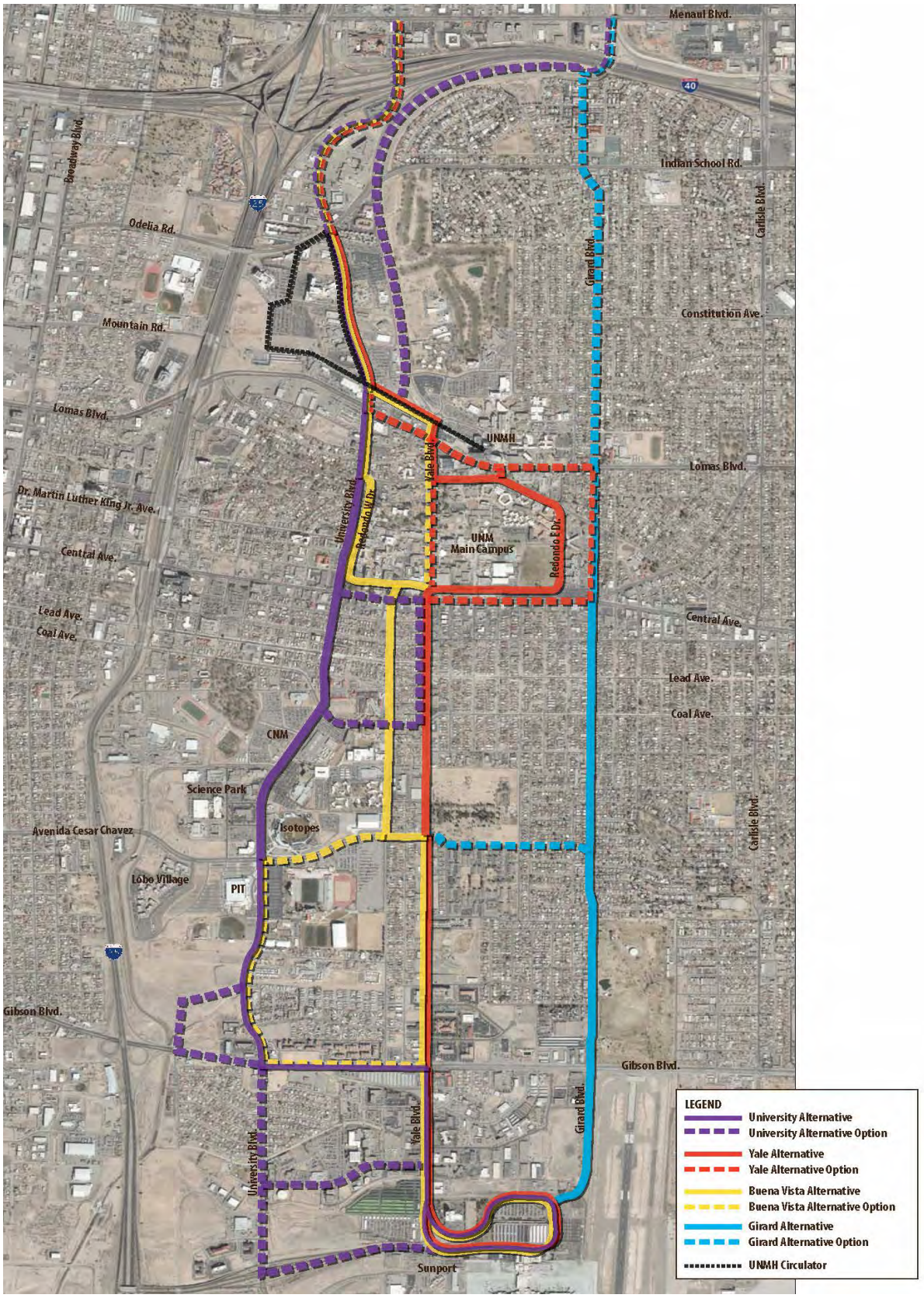
As a starting point, the identification of alternatives were developed in consideration of the overall goal of the study — *to identify and implement a transit/parking/land use strategy that serves the institutions, residents, businesses, and other stakeholders within the study area.* The identification of alternatives also assumed the following:

- Alternatives should provide efficient access to and connectivity between the major destinations and activity centers within the corridor, i.e., UNM, UNMH, CNM, and the Sunport.
- Alternatives should connect to other existing major transit routes that serve the metro area as well as interface with the UNM shuttle service.
- New transit service would consist of bus rapid transit (BRT) technologies or other similar types of premium bus service capable of serving high rider volumes efficiently and cost effectively. Buses would operate in dedicated bus only lanes to the extent feasible.
- Routes should cover the area from Menaul Boulevard on the north to Sunport Boulevard on the south. Menaul Boulevard was used on the north end due to its connectivity to existing east-west bus service operating on this roadway.

A workshop was held with the TAC on January 10, 2013. Participants in the workshop included representatives from UNM Planning and Campus Development, UNM Hospital, UNM Parking and Transportation Services, Lobo Development, ABQ Ride, City of Albuquerque Planning Department, City of Albuquerque Council Services, City of Albuquerque Sunport, Bernalillo County Public Works Department, MRCOG, Rio Metro, and the project consultant team. The route recommendations developed at this workshop are illustrated in Figure 2 and are referenced as the “Long List” of alternatives. In general, the routes developed included:

- A route focused on University Boulevard. This route follows University Boulevard from Menaul Boulevard to Sunport Boulevard. In addition to the primary route, several alternatives to this route were identified that connect University to Yale Boulevard via Central Avenue, Coal Avenue, Avenida Cesar Chavez, Gibson Boulevard, and Randolph Road.
- A route focused on Yale Boulevard. This route follows University Boulevard from Menaul Boulevard to Tucker Avenue and then follows Tucker to Yale. From this point, the alignment follows Yale Boulevard to its terminus at Sunport Boulevard. This route would result in a new segment of Yale across the UNM main campus area between Roma Avenue and Redondo Drive. Two variations to this route were identified including an option that would follow Campus Boulevard and Redondo Drive to the east of Yale Boulevard, and a route that would follow Lomas Boulevard, Girard Boulevard, and Central Avenue east of Yale.
- A route focused on Buena Vista Drive. This route follows University Boulevard from Menaul Boulevard to Lomas Boulevard. From Lomas it follows Yale Boulevard to Las Lomas and then

Figure 2 – Long List of Alternative Alignments



crosses the main campus via Las Lomas and West and South Redondo Drives. It joins Buena Vista Drive just west of Yale Boulevard and then follows Buena Vista Drive south to Avenida Cesar Chavez. From this point, the Buena Vista Drive alternative has two optional paths: (1) a route that follows Avenida Cesar Chavez to the west where it joins the University Boulevard alternative or (2) a route on Avenida Cesar Chavez to the east where it joins the Yale Boulevard alternative.

- A route focused on Girard Boulevard. This route begins at Menaul Boulevard and would cross I-40 at the AMAFCA North Diversion Channel. After crossing I-40, the route joins Girard Boulevard and follows this route south to the Albuquerque Sunport. One variation of this alternative was identified — an east west connection to the Yale Boulevard alternative following Santa Clara Drive.
- In addition to the above routes, use of the AMAFCA North Diversion Channel was identified, which extends from Menaul Boulevard south to Lomas Boulevard. At Lomas Boulevard, the route could connect to University Boulevard, Yale Boulevard, or the Buena Vista Drive alternatives.

2.2 Initial Screening Assessment – Long List of Alternatives

The long list of alternatives was evaluated using a tiered screening process. Initial screening was based on qualitative and quantitative criteria selected to assess route responsiveness to the project objectives, productivity, and feasibility. The following metrics were used:

- Daytime population of UNM, UNMH, and CNM students, faculty, and staff within a 5-minute walk from the route centerlines
- Number of off-campus jobs within a 5-minute walk
- Number of persons using remote parking lots served by the UNM PATS
- Number of arrivals at major existing transit stops within a 5-minute walk (limited to transit stops with 100 or more daily arrivals)
- Residential population within 5-minute walk of routes (populations not associated with UNM, UNMH, and CNM)
- Student population at UNM dormitories/student housing within 5-minute walk
- Number of seats at major sporting/entertainment venues within a 5-minute walk
- Overall route length
- Total population within 5-minute walk per route mile
- Feasibility to implement a dedicated busway within existing right-of-way and/or without major impacts to existing development
- Feasibility to implement a dedicated busway without major impacts on traffic flow and/or impacts to transit travel times
- Neighborhood compatibility

The data for the above metrics were compiled from databases maintained by UNM, UNMH, CNM, ABQ Ride, and MRCOG. To enhance the precision of the analyses, the daytime population of students, faculty, and staff were allocated to each of the specific buildings on the campuses. Likewise, the data for parking lots, transit arrivals, dormitories and other student housing, and special event venues was location specific. This approach provided precise data for each of the metrics being evaluated.

Walk access times to/from the route alignments and/or bus station locations were estimated using the Transportation Accessibility Model (TRAM). TRAM is a GIS based tool that measures travel distances from a point, or series of points, on a transportation network. The model can be used for all modes of surface transportation including auto, walk, bicycle, and transit, and is applied to the detailed network database for the region that describe the locations of facilities that can accommodate these travel modes. For this analysis, TRAM was used to calculate walk travel time contours in 2.5, 5, 7.5, and 10 minute increments. The contours display the geographic coverage that can be reached within a specific time from potential station locations and for all points along route alternatives. The travel time contours are GIS polygon features and were overlaid on the data described above.

Because the character of the corridor is highly variable with regard to land use, development densities, transportation facilities, parking lots, and other features, the overall study area was separated into seven segments with each segment corresponding to the major east-west arterial cross streets traversing the study area. This approach allowed the independent evaluation of major subareas, i.e., UNM north, main, and south campus areas, CNM, and Sunport area. The findings of the initial screening assessment are summarized in Tables 1 through 7 in Appendix A. Notable findings are as follows:

University Boulevard Alternative and Options

- Walk access to major destinations from this alignment is generally very good, especially for CNM and the UNM South Campus area. Walk access to the UNM main campus is also good, although for this metric, it did not perform as well as the Yale Boulevard alternative.
- In general, right-of-way is adequate to accommodate a busway without taking lanes. Areas where right-of-way may be needed are generally used for parking lots. Few impacts to buildings would occur.
- The relatively low number of intersecting driveways and side streets would not result in access conflicts that would impede bus travel time.
- With one exception, this alignment would not have substantial impacts to residential neighborhoods. The exception is the segment south of Gibson Boulevard which would pass through the Kirtland neighborhood. Early comments from this neighborhood indicated opposition to a bus route on University Boulevard south of Gibson Boulevard.

Yale Boulevard Alternative and Options

- For the primary route, walk access to the UNM north and main campus areas is very good for this alignment. Access to CNM and the UNM South Campus area is moderate to poor.
- Walk access productivity for the two options that traverse the east side of the main campus on Redondo and Girard is moderate to poor due to the much longer route length combined with fewer campus destinations along these routes.
- Right-of-way along Yale Boulevard is constrained from Central Avenue south to Gibson Boulevard. This segment would not accommodate a busway without taking an existing general purpose lane.
- Conflicts from driveways and side streets are moderate. Bus travel time would be acceptable but would be affected by side friction.

Buena Vista Drive Alternative

- Walk access is high for all major destinations including the north, main, and south campuses of UNM and the CNM main campus.

- Because Buena Vista is a collector street, it has narrow right-of-way. Implementation of a busway on this street would require its dedication as a busway or operation in mixed flow traffic.
- This route passes through a mixture of commercial, institutional, and residential areas. Conflicts with residential areas would be moderate.
- Conflicts from driveways and side streets would be moderate. Bus travel time would be acceptable but would be affected by side friction.

Girard Boulevard

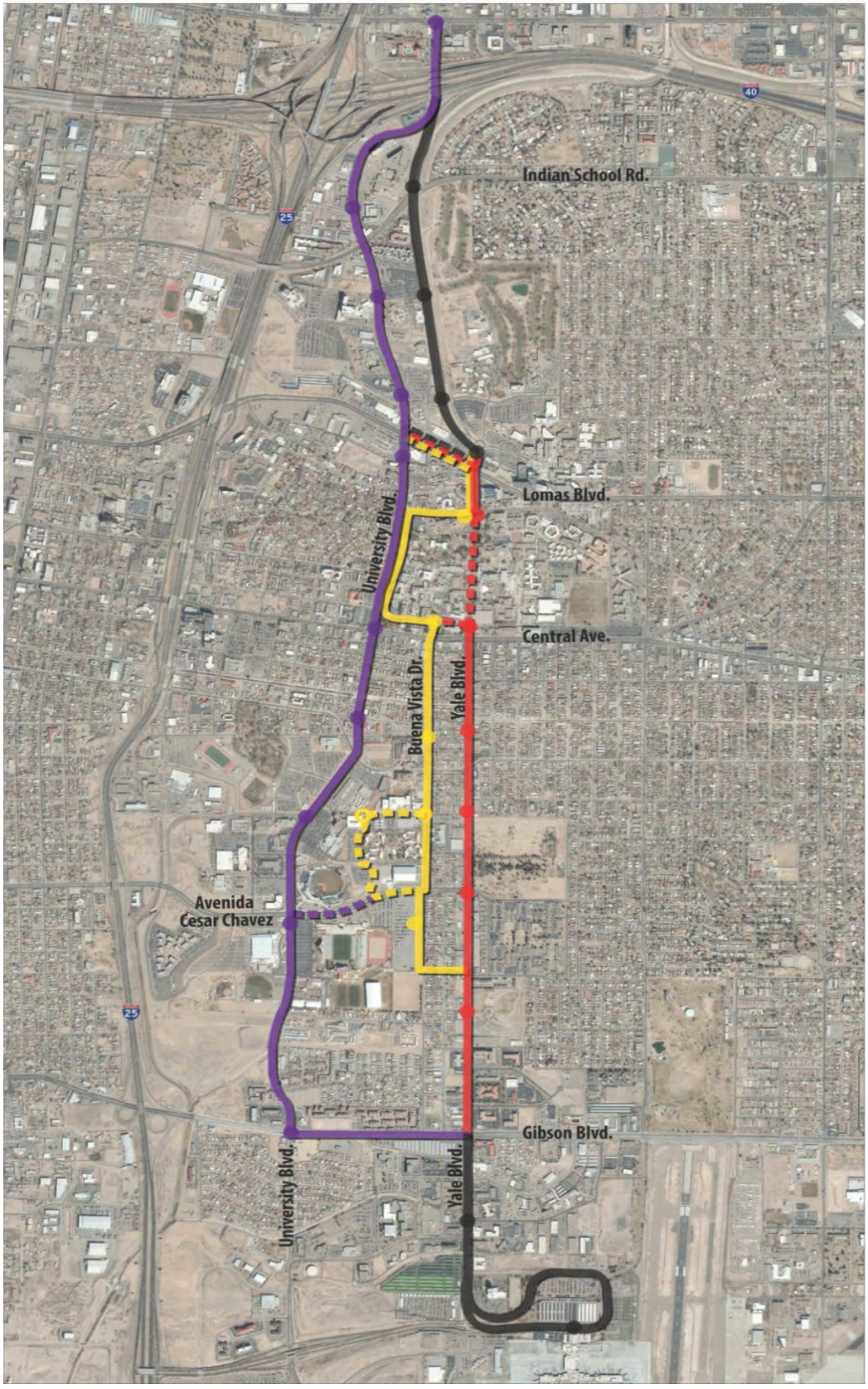
- Walk access from this route was generally very poor. Most major destinations within the study area are well beyond a 5 and 10 minute walk access contour.
- Girard Boulevard traverses several neighborhoods. The potential for intrusion and conflicts with residential areas is moderate to high.
- Limited right-of-way would not allow implementation of a busway without significant takes of private property. But operation would likely be limited to mixed flow.
- This route has a very high number of intersections with driveways and side streets. Side friction would impede efficient travel times.
- Crossing I-40 would be difficult and costly and would rely on the AMAFCA North Diversion Channel

2.3 Screening Assessment – Short List of Alternatives

The long list of alternatives and findings of the initial screening assessment were presented to the general public at three public meetings held in late April and early May, 2013. At the meeting, the project team recommended the elimination of one primary route and several of the route options and segments. These included the Girard Alternative, which includes the Santa Clara Street connection, the portions of the Yale Alternative that follow East Redondo and Lomas/Girard/Central to traverse the east side of the UNM Main Campus, and the south extension of University Boulevard from Gibson Boulevard to Sunport Boulevard. These alternatives and options were recommended for elimination due to their poor performance and/or potential impacts to residential neighborhoods. The University Boulevard, Buena Vista Drive, and Yale Boulevard routes were recommended for further consideration. The draft "short list" of alternatives presented to the public is shown in Figure 3 on the following page. Public comments were received on the draft short list of alternatives presented at the public meetings. Comments germane and specific to alternatives include the following:

- Concurrence with the recommendations to eliminate the Girard Boulevard/Santa Clara Street route and the South University segment
- Concern with the segment of the Yale Boulevard route that passes through the center of the UNM Main Campus area
- General support for the University Boulevard alignment (with the exception of the segment south of Gibson Boulevard)
- General support for the Yale Boulevard Alternative, although some concerns were expressed regarding potential conflicts with on-street parking proposed by the South Yale Sector Plan and the use of this route for a busway.
- Few comments were received either supporting or disagreeing with the route on Buena Vista Drive.

Figure 3 – Draft Short List of Potential Route Alternatives



Subsequent to the public meetings, a recommended final short list of alternatives was developed by the project team. The final list incorporated the comments received at the public meetings and comments from members of the TAC. The recommended final list of alternatives included the following changes to the draft short list:

- *Elimination of the Buena Vista alignment* – This change was made in response to comments from TAC representatives for CNM that the location of Buena Vista Drive towards the rear of the campus would reduce its use by CNM students, faculty, and staff. In addition, other TAC members expressed concern that the location of the transit route on a collector street could limit the economic development potential of this route. Public comments expressed concern with the potential conflict of a major transit route with the residential area along Buena Vista Drive south of Coal Avenue where the homes front the street.
- *Elimination of the North Diversion Channel Alignment north of Indian School Road* – This alignment option was eliminated due to engineering challenges and accessibility difficulties stemming from the elevation difference between University Boulevard and the channel top which is approximately 60 feet higher than the adjacent roadway.
- *Eliminating the segment of the Yale Boulevard Alignment between Roma Drive and South Redondo Drive* – This change was made in response to concerns from UNM representatives that a busway along this alignment would conflict with a heavily used pedestrian corridor and would be in conflict with other UNM objectives to eliminate motorized vehicle travel within the campus core area.

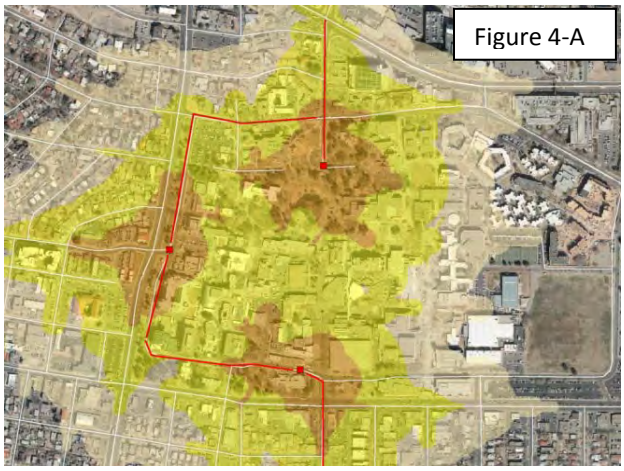
Because the segment of Yale Boulevard between Lomas Boulevard and South Redondo Drive had the highest ridership potential of all of the routes evaluated, additional analyses were conducted to identify alternative routes with the potential to serve this part of the UNM main campus. Figures 4-A and 4-B show the alternative routes identified. The analysis was limited to an estimate of potential riders within walk access from likely station locations along each route. Figure 4-A depicts a route that follows Yale Boulevard, Las Lomas Road, West Redondo Drive, and South Redondo Drive. Figure 4-B shows a similar route, although the alignment joins University Boulevard at Dr. MLK Jr. Boulevard and the third station is at the intersection of University Boulevard and Central Avenue. Figure 4-C illustrates the original route that passes directly through the main campus area.

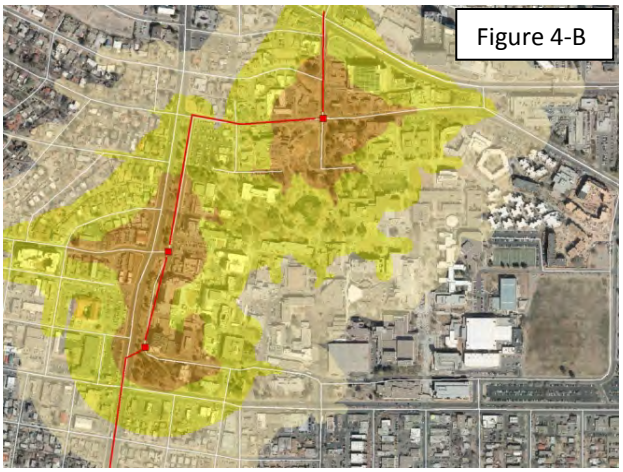
The objective of the analysis was to compare the total UNM Main Campus population (students, faculty, and staff) within a 7.5-minute walk access contour from station areas along each route. Stations were located near the intersections of Yale Boulevard/Las Lomas Road, Dr. Martin Luther King Jr. Avenue/W. Redondo Drive, and Yale Boulevard/South Redondo Drive.

Walk access contours were generated in 2.5 minute increments for each of the 3 options. The findings of the analysis are summarized in Table 1. As shown in this table, the total UNM population within a 7.5 minute walk is similar for all of the three routes evaluated. While the direct connection of Yale Boulevard has the highest population within a 7.5 minute walk, the other two alternatives would also be within reasonable walk access for a high number of students, faculty, and staff.

Based on the findings of the initial screening analysis, the supplemental analysis, and comments from public and agency stakeholders, the route that passes directly through the main campus was eliminated from further consideration.

The resulting list of alternatives considered for further evaluation includes two primary routes plus two optional segments. The general alignments for each alternative and option are illustrated in Figure 5.





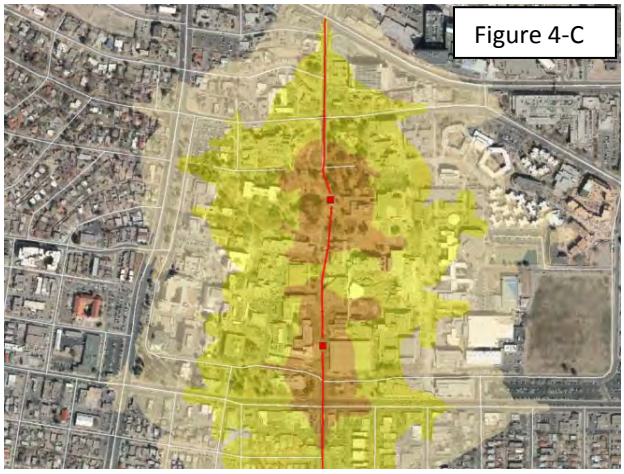


Table 1: Total UNM Main Campus Population within Walking Distance of Stations

	Las Lomas/West and South Redondo Dr.	Las Lomas and W Redondo to University Blvd.	Yale Boulevard Direct Connection
Under 2.5 Minute Walk	3,416	8,503	2,879
2.5 to 5.0 Minute Walk	22,924	6,186	23,634
5.0 to 7.5 Minute Walk	7,527	17,387	9,877
Total	**33,867**	**32,076**	**36,390**

Figure 5 – Final List of Route Alternatives

3.0 Final Alternatives Analysis

As discussed in the previous section, the alternatives advanced from the screening analysis included two primary alignments plus two segment options (see Figure 5). The first alternative follows University Boulevard, Gibson Boulevard, and Yale Boulevard. The second alternative follows the same route as Alternative 1 from Menaul Boulevard south to Lomas Boulevard. At Lomas Boulevard, the route follows Yale Boulevard, Las Lomas Road, West Redondo, and South Redondo to serve the UNM main campus area and then follows Yale Boulevard south to its terminus at the Sunport. The two segment options follow routes between University and Yale Boulevards to improve accessibility and connectivity to the UNM Hospital, UNM main campus, and the UNM South campus.

Prior to the start of the final evaluation process, the two alignment alternatives and segment options shown in Figure 5 were reconfigured to represent four distinct alignments. The resulting alternatives and the major streets they follow are illustrated in Figures 6 through 9 and are described below.

- *Alternative 1*– This route, referred to as the University Boulevard Alternative, starts on University Boulevard just north of Menaul Boulevard. The route follows University Boulevard south to Las Lomas Road. At Las Lomas, the route shifts to W. Redondo Road and then follows W. Redondo to Dr. Martin Luther King, Jr. Avenue. At this point, the route shifts back to University Boulevard and continues south to Gibson Boulevard. At Gibson, the route turns east to Yale Boulevard where it turns south and continues on to its terminus at Sunport Loop Road. Figure 6 illustrates this alternative.
- *Alternative 2* – Alternative 2 follows the same route as Alternative 1, except it follows a different route to cross the UNM main campus area before rejoining University Boulevard at Dr. Martin Luther King, Jr. Avenue. From the intersection of University Boulevard and Lomas Boulevard, the route follows Lomas Boulevard to Yale, Yale to Las Lomas, Las Lomas to W. Redondo, and W. Redondo to Dr. Martin Luther King, Jr. Avenue where it rejoins University Boulevard. Figure 7 illustrates this alternative.
- *Alternative 3* – This alternative follows the same route as Alternative 2 to Avenida Cesar Chavez. At Avenida Cesar Chavez, the route turns east to Yale Boulevard and then follows Yale to the southern terminus at Sunport Loop Road. Figure 8 illustrates this alternative.
- *Alternative 4* – Alternative 4 follows the same route as Alternatives 2 and 3 to Dr. Martin Luther King, Jr. Avenue. However, instead of shifting back onto University Boulevard, the route follows W. Redondo and S. Redondo around the UNM main campus to Yale Boulevard. At this point, the route follows Yale Boulevard south to Sunport Loop Road. Figure 9 illustrates this alternative.

In addition to their alignments, the definition of alternatives included assumptions for the physical and operational characteristics specific to each alternative. The physical characteristics of alternatives include their proposed termini, overall route length, proposed busway configuration (i.e., median guideway, curbside lane, or operation in mixed flow traffic), and location of stations and park and ride lots. Operational characteristics include the hours of bus service and frequency of service. This information was used as the basis for assessing the performance and impacts of each alternative. For this phase of the alternatives analysis, the assessment focused on physical impacts to the underlying street and properties adjacent to the street, impacts to traffic operations, and the operational performance of the proposed bus service. In addition to the assessment of impacts and performance, capital costs and operations and maintenance costs were estimated for each alternative.

Figure 6 – Alternative 1: University/Gibson

Figure 7 – Alternative 2: University/Lomas/Gibson

Figure 8 – Alternative 3: University/Lomas /Avenida Cesar Chavez

Figure 9 – Alternative 4: University/Yale

3.1 Operational and Design Assumptions

Impacts to the street system and adjoining properties were based on conceptual design plans prepared for each alternative. The development of conceptual design plans required operational and design assumptions regarding how and where buses would operate, the type and location of stations, and the size and location of park and ride lots. Assumptions for the design of busways, stations, and parking lots followed criteria published by the American Public Transportation Association (APTA) and the Transit Cooperative Research Program (TCRP). The definitions and design criteria assumed for the impact assessment is discussed below.

Bus Guideway/Lane Design

BRT vehicles can operate in dedicated lanes within the roadway median or curbside. They can also operate in mixed flow lanes for short distances when dedicated lanes are not feasible. However, travel speed and reliability are critical considerations in congested corridors. Lanes dedicated exclusively to BRT vehicles are less affected by congestion than mixed-use lanes and therefore offer greater service reliability. In addition to their physical placement, BRT lanes may be guided (physically separated from adjacent traffic), or non-guided (not physically separated from adjacent traffic). The various types of busways and lanes that may be implemented on this project are described below and shown in the typical sections on the following pages.

A **guided busway** is separated from non-BRT traffic by a physical barrier such as a curb or other physical feature. The use of a physical barrier prevents non-BRT traffic from entering the busway and thereby provides greater service reliability. Barriers also enable the use of automated bus guidance systems, although this is an optional element. Guided busways can be located in the roadway median or offset to one side of the roadway. For this particular analysis, guideways are limited to the median area; the use of curbside guideways is not anticipated.

American Public Transportation Association (APTA) Standards for Designing Bus Rapid Transit Running Ways (APTA-BTS-BRT-RP-003-10) recommends 11-foot wide bus lanes for separated busways in constrained areas. For barrier separated busways, APTA states that lane widths can be reduced to as narrow as 8’10” for short runs on straight street sections. On curved sections, 10’6” should be considered the absolute minimum width and only applied for short runs. Figure 10 shows a typical section for a guided median BRT.

A **non-guided BRT lane**, typically located within the roadway median, does not have a physical barrier between the bus lanes and outside traffic. Instead, a painted stripe and rumble strip are used to delineate the busway from adjacent traffic lanes. APTA Standards recommend 11-foot wide bus lanes and 1’6” wide separator spaces on each side of non-guided busway. See Figure 11 for a non-guided median BRT typical section.

A **BRT curb lane** is a dedicated lane adjacent to the outer curb of the street. This lane is not separated from other traffic by a barrier and may also be used as an access lane for traffic exiting the roadway. When also used for access, this arrangement is commonly referred to as a Business Access and Transit (BAT) lane. BRT curb lanes and BAT lanes may also serve as a right-turn lane at intersections. Signing and pavement markings are used to delineate a BRT bus-only lane or BAT lane. The lane width of a BRT curb lane or BAT lane is the same as a mixed-use lane.

APTA recommends a minimum width of 12 feet for BRT curb lanes/BAT lanes and mixed-use lanes. Figure 12 shows a typical section of a BRT curb lane/BAT lane or mixed-use lane. Where on-street

bicycle lanes are provided, the bicycle lane should be a minimum of 6 feet in width and located between the BRT curb lane and general traffic lanes. In mixed-use lane situations, on-street bicycle lanes should remain in the typical location adjacent to the outer curb and meet the standards of the local governing agency.

In locations where BRT curb lanes or mixed-use lanes are used, queue bypass lanes (i.e., queue jumps) may be warranted to facilitate preferential BRT operations at signalized intersections. Queue jumps can also be limited to a transit signal priority where a separate signal phase for transit vehicles allows buses to advance ahead of other traffic. Queue jumps can be used with a queue bypass lane or may operate from a regular traffic lane. Figure 1, from TCRP Report 90, illustrates how queue jumps may be incorporated into intersections. Traffic analysis will determine where queue jumps are warranted and the required length of the queue jump lane. Queue jump lanes are typically a minimum of 10 feet wide and should be long enough to allow buses to avoid queues during peak hours. They may be combined with bicycle lanes under certain circumstances. They may also be combined with general purpose right-turn lanes. Queue jumps should be used sparingly as they require enforcement to restrict use from general traffic.

Design Vehicle

The BRT busway design assumes a 60-foot articulated bus as the design vehicle. AASHTO designates this vehicle as Articulated Bus (A-BUS). Busway alignments, intersection areas, and turning movements will be configured to enable this vehicle to be accommodated at all locations along the route. Figure 14 shows the dimensions of a common type of articulated bus and its minimum turning path.

Alignment Design

APTA has developed standard design criteria for BRT systems that are applicable to this project. Selected APTA criteria are included in Table 2 and were used for conceptual design of the BRT alignments. Because the BRT alignments are located on existing roadways, they are constrained by the existing roadway features and rights-of-way. The criteria in Table 2 will be used where feasible, but may vary due to existing condition constraints.

Station Design

For the conceptual design of alternatives, basic station footprints are used to assess needs and impacts. Station length and layout assume simultaneous docking of two articulated buses at level or near-level boarding height. For median stations, it is assumed they can be served by bus vehicles that have left and right side doors. The types of stations that will be used for the conceptual design are a median station and a curb-side station. Design criteria are listed in Table 3. Figures 17 and 18 illustrate typical dimensions of median and curbside stations.

A **median station** (see Figure 15) is located in the center of a median busway between bus lanes and simultaneously provides service for both directions of the busway. An advantage of median stations is that a single station can serve a given stop. However, a disadvantage of this type of station is that it either requires buses to have dual or left-side doors, or requires buses to cross to the opposite side at the stations and then cross back over once they leave the station. Median stations will typically require a wider than normal median to accommodate the station and busway.

A **curb-side station** (see Figures 16) is located along the side of a busway or BAT lane and can be used with a BRT curb lane/BAT lane or mixed-use lane. Curb-side stations provide service for one direction and therefore require separate stations for each direction of travel as well as additional roadside space beyond the normal sidewalk width. Curb-side stations are typically located on the far side of

intersections (after passing through the intersection). This allows turn lanes to be placed on the near side and works well with signal prioritization.

Park-and-Ride Lots

Park-and-ride lots may be relocated or added as part of the project. The design of park-and-ride lots will depend on the shape and size of the site and location along the route (see Figure 19 for a typical layout). A general rule of thumb is that approximately 100 parking spaces can be provided for each acre of available land. The number of parking spaces will be maximized as required by demand and located as closely as possible to the adjacent station. A kiss-and-ride, or passenger drop-off/pick-up lane, will also be provided within the park-and-ride lot as near as practical to the station. Handicapped parking spaces will be provided in accordance with Americans with Disabilities Act (ADA) requirements.

Table 2: Selected APTA Design Criteria for Separate BRT Busways

Design Parameter	Non-Guided Busway	Guided/ Separate Busway
Design Speed (MPH)	Match Existing Street	30-50
Alignment		
Stopping Sight Distance (ft.)	Per Design Speed/AASHTO Standards	
Desirable Min. Curve Radius (ft.)	Match Existing Street	500
Absolute Min. Curve Radius (ft.)	265	265
Max. Super-elevation (Between Stations)	Match Existing Street	3%
Max. Super-elevation (At Stations)	2%	2%
Min. Tangent at Station/Platform Ends (ft.)	65	65
Gradient		
Desirable Maximum	Match Existing Street	5%
Absolute Maximum	8% (run of 500 ft. or less)	8% (run of 500 ft. or less)
Range at Stations	0.5%-2%	0.5%-2%
Minimum	Match Existing Street	0.30%

Table 3: BRT Station Standard Dimensions

Station Type	Median Stations	Curbside Stations	Parking Lot Stations
Overall Station Width	30 ft. maximum 20 ft. minimum	16 ft. maximum 10 ft. minimum	20 ft. maximum 14 ft. minimum
Clear Platform Width	12 ft. desired 10 ft. minimum		
Platform Height	14.5 in. - 15.5 in.		
Length	140 ft.		
Taper Length (Approach)	1.5 times bus length		
Taper Length (Departure)	1 times bus length		

Source: American Public Transportation Association (APTA) Standards for Designing Bus Rapid Transit Running Ways (APTA-BTS-BRT-RP-003-10) and the Transit Cooperative Research Program Report 118

Figure 10 – Guided Median BRT Busway Typical Section

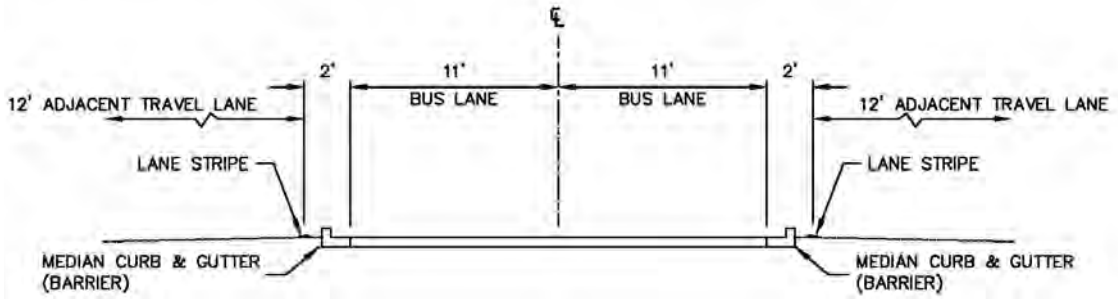


Figure 11 – Non-Guided Median BRT Busway Typical Section

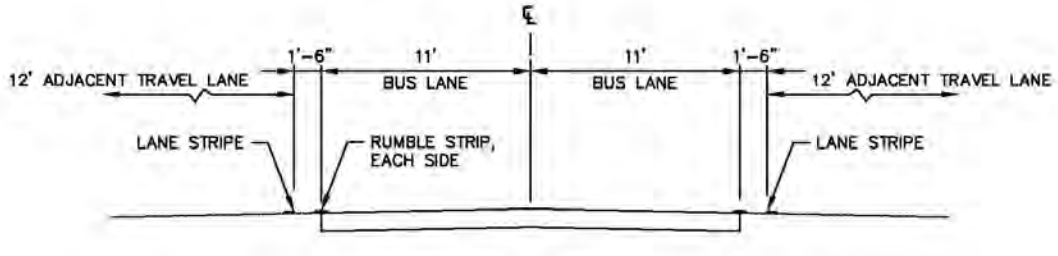


Figure 12 – BRT Curb Lane/BAT Lane, or Mixed-Use Lane Typical Section

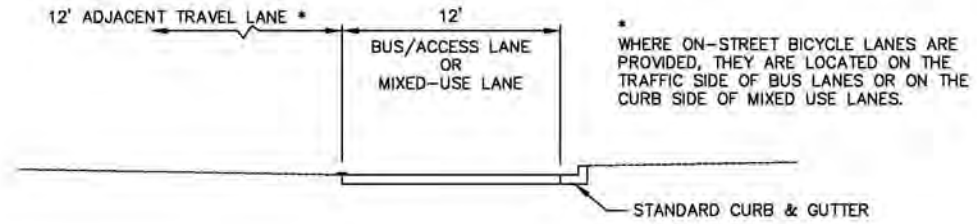


Figure 13 – Schematic of Queue Jump Lanes at Intersections

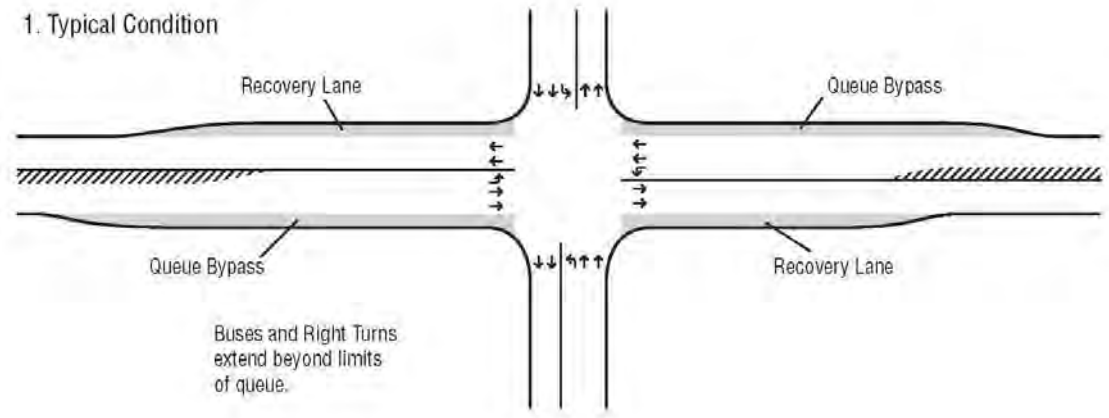


Figure 14 – Articulated Bus (A-BUS) Dimensions and Minimum Turning Path

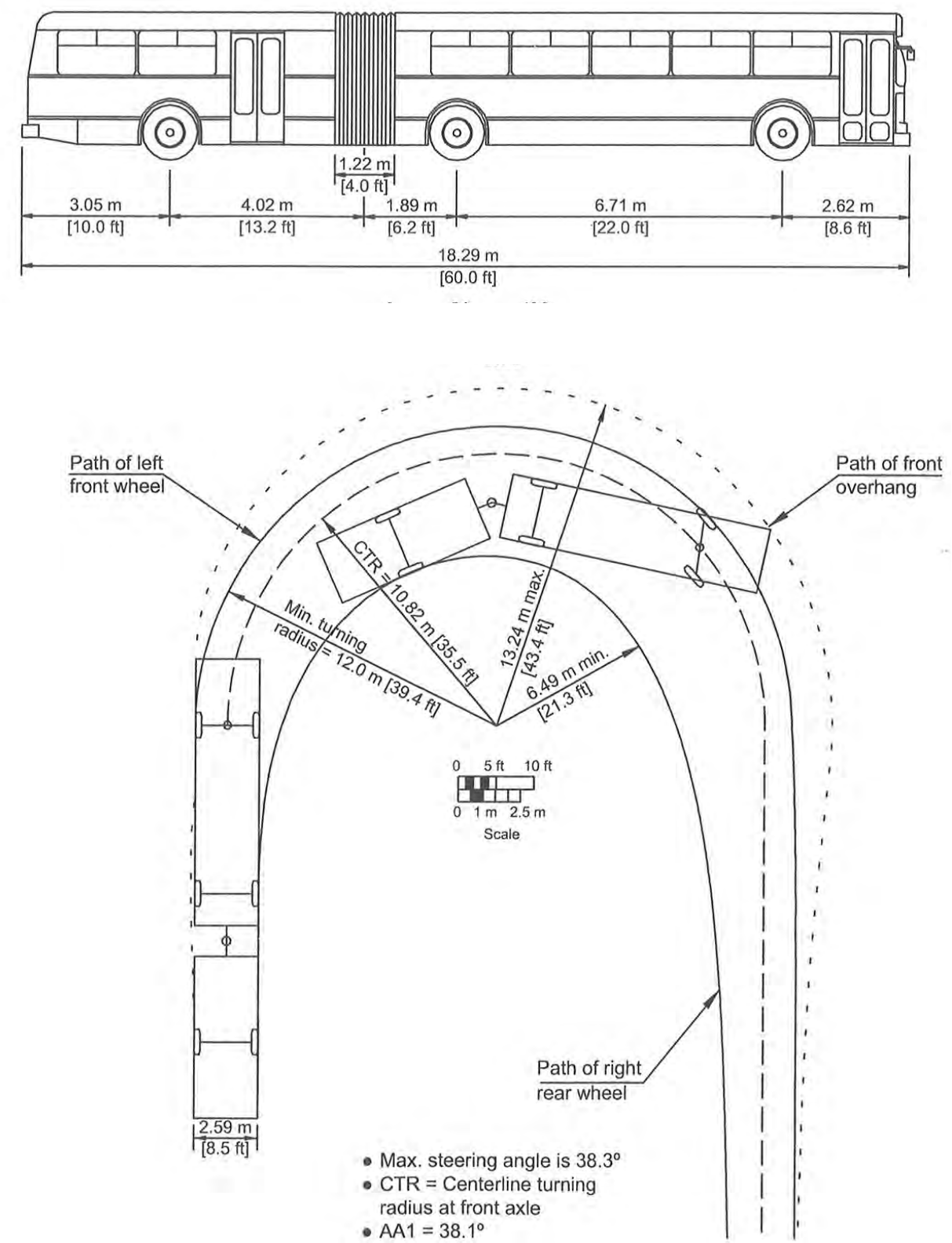


Figure 15 – Example of a Median Station

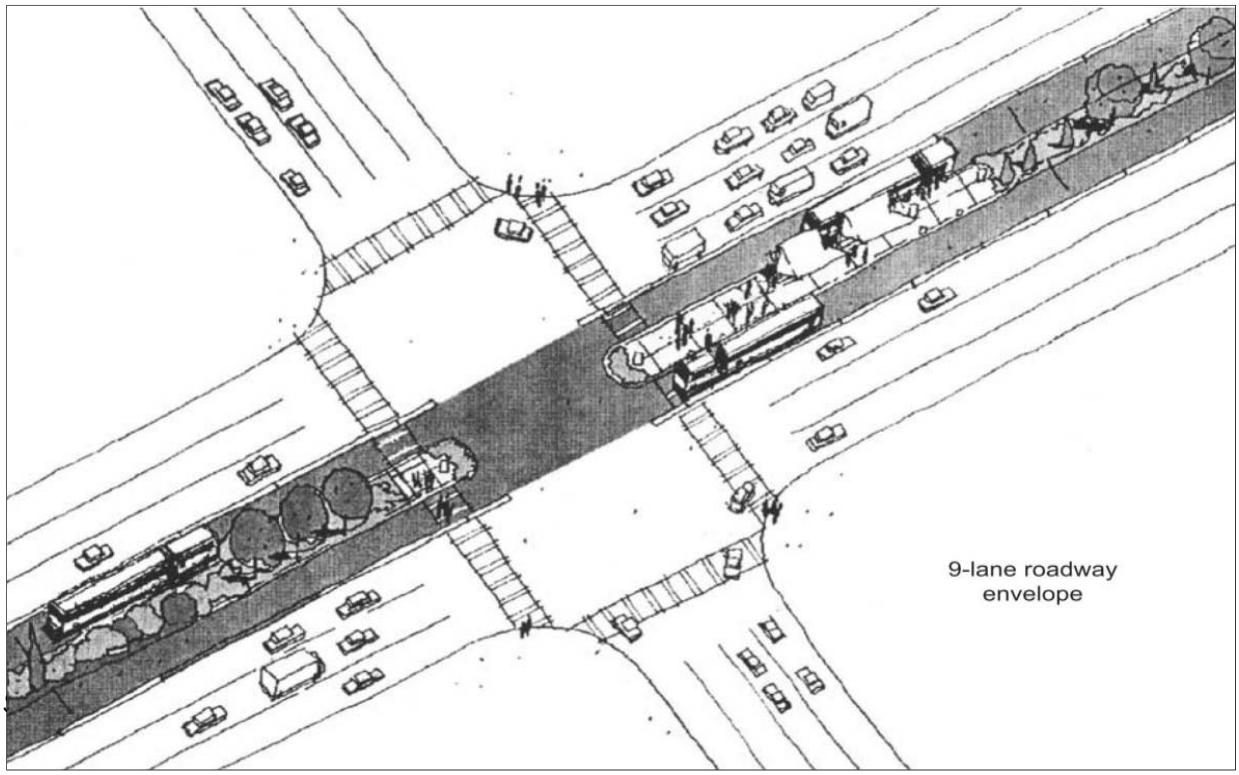


Figure 16 – Example of Curb-Side Stations

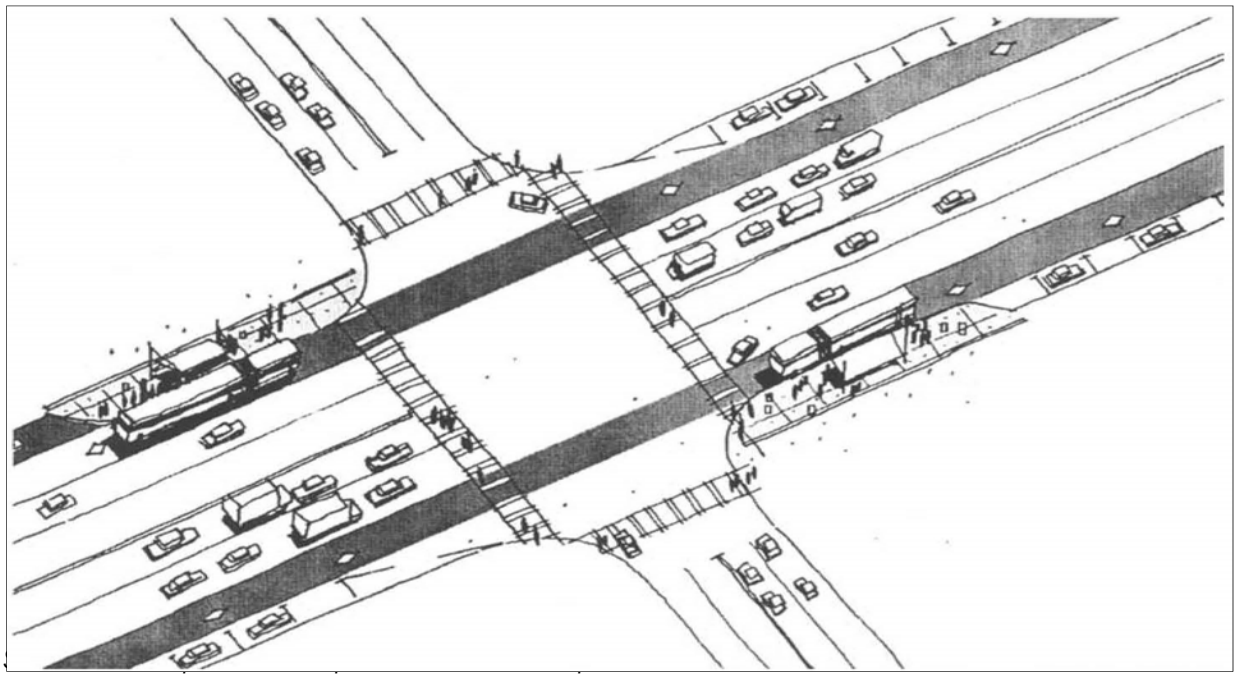


Figure 17 – Median Station Dimensions

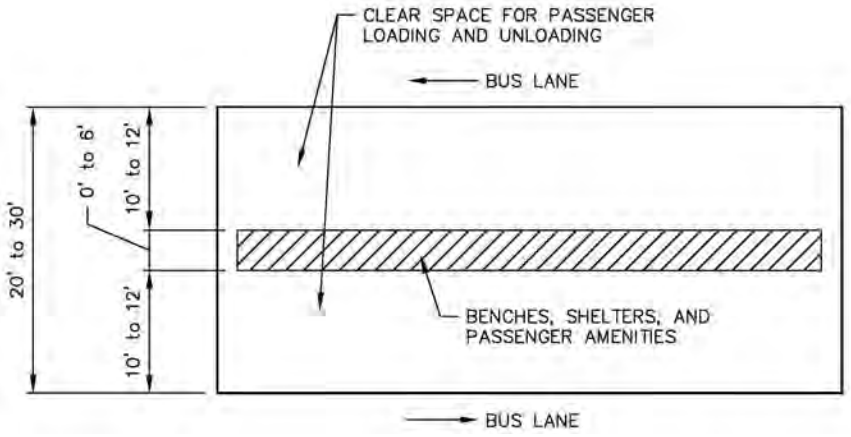


Figure 18 – Curb-Side Station Dimensions

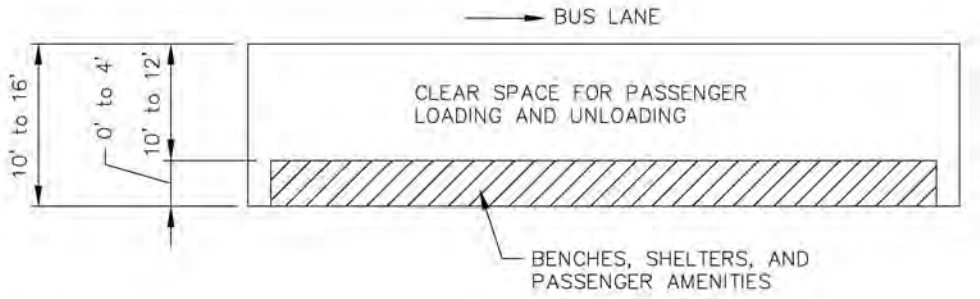
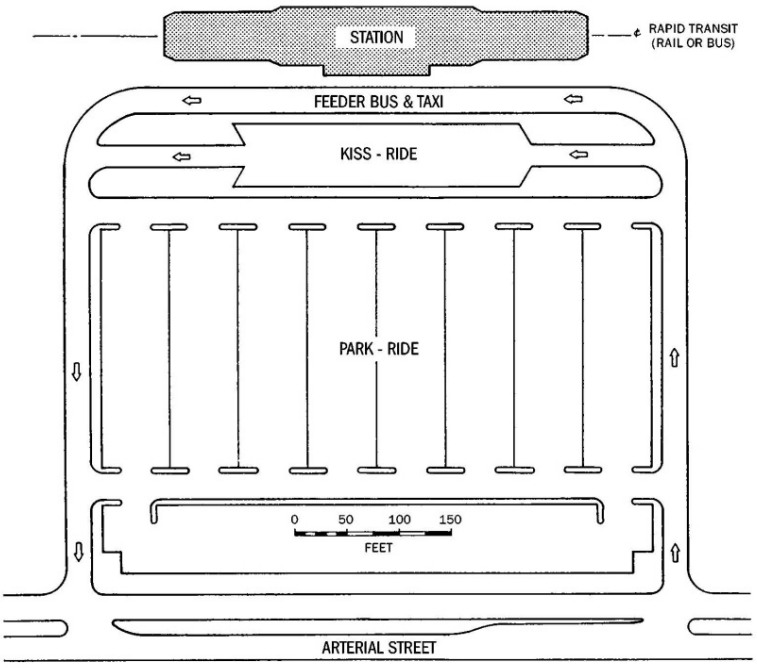


Figure 19 – Example of a Park-and-Ride Lot



(SOURCE: Levinson et al., 1975)

Source: TCRP Report 90, Bus Rapid Transit, Volume 2: Implementation

3.2 Conceptual Design Plans

Using the definitions and BRT design criteria described above, conceptual design plans were developed for each of the four alternatives. The concept design was limited to typical sections for each major route segment and layouts in plan view to illustrate and assess the alignment and location of BRT lanes and stations. The actual lane configurations and station locations are for initial planning and evaluation purposes only — refinements and additional detail will be necessary as the project advances. The typical sections and plan view drawings for each alternative are shown in the document — *Conceptual Design for Project Alternatives*, January 2013. This document is available from the MRCOG.

The concept design plans were used as the basis of cost estimates, right-of-way needs, and physical impacts. The findings of each of these parameters are summarized below.

3.3 Capital Costs

Table 4 summarizes the initial implementation costs for each alternative. Construction costs were estimated using major cost categories found in typical BRT projects. While other cost categories, such as demolition, clearing, earthwork, and environmental mitigation, are part of cost estimates, these categories were not included in the preliminary estimates due to the early phase of the analysis. Cost categories included in the estimate were:

- guideway construction
- station platforms
- park and ride lot construction
- temporary facilities
- traffic signalization
- communications (passenger information systems)
- fare collection system and equipment
- real estate costs for right-of-way and park and ride lots
- vehicle costs
- maintenance facility expansion

To compensate for the unknowns and limited engineering information, a 40% contingency and design was assumed in the costs. The contingency was applied to the construction costs, vehicles, and maintenance facility expansion.

Table 4: Preliminary Capital Cost Estimates

Alternative	Construction Costs	Vehicle Costs	Contingency at 40%	Maintenance Facility Exp.	Park and Ride Lots	Total
1	$27.95 M	$10 M	$15.2 M	$4 M	$5 M	$62.1 M
2	$30.0 M	$10 M	$16.0 M	$4 M	$5 M	$65.0 M
3	$30.4 M	$10 M	$16.2 M	$4 M	$5 M	$65.6 M
4	$27.6 M	$10 M	$15.0 M	$4 M	$5 M	$61.6 M

Construction costs include guideway, signals, stations, and right-of-way
Vehicle costs based on 10 buses

3.4 Operations and Maintenance Costs

The cost of operating and maintaining the proposed BRT system was also estimated. The assumptions used for the estimate were:

- bus hours of operation would be for 16 hours a day for Monday through Saturday and 12 hours on Sundays and holidays
- weekday service in the core area (park and ride lot south of Indian School Road to the park and ride lot south of Cesar Chavez) assumes 8 hours at 5 minute headways during peak hours and 8 hours at 10 minute headways for off-peak hours
- weekday service in the north and south ends of the corridor assume 8 hours at 15 minute headways during the peak hours and 8 hours at 30 minute headways for off-peak hours
- Saturday service frequency would be at 15 minute headways for 16 hours
- Sunday service frequency assumes 15 minute headways for 12 hours
- dwell time of 20 seconds per stop
- operating cost of $85 per hour
- non-revenue time (deadhead time, report time, and turn-in time) assumed to be 5% of revenue hours

Using the above assumptions, operations and maintenance costs range from $3.2 to $3.5 million per year. Alternative 1 has the lowest O&M costs at $3.2 M and Alternative 4 has the highest cost at $3.5 M. Alternatives 2 and 3 are the same at $3.3 M per year.

3.5 Right-of-Way Impacts

In general, the guideway and bus lanes as proposed can be constructed within existing street rights-of-way, not including the land needed for park and ride lots. However, the acquisition of land beyond the existing street rights-of-way would be needed for a new park and ride lot, curb-side stations, and in several spot locations where the added guideway/bus lanes and/or sidewalks would extend beyond the existing sidewalks. The spot locations are limited to narrow slivers of land at three locations.

Right-of-way impacts common to all of the alternatives would occur along University Boulevard from Mesa Vista Road (one block south of Lomas Boulevard) to Camino de Salud north of Lomas Boulevard. The affected property is limited to a depth of about four feet along both sides of the street. The affected properties are used for street-side parking and small landscaped areas in front of buildings. In addition to the parking areas, the wider street section would affect on-site traffic circulation for two properties. These include the buildings immediately north of Lomas Boulevard on the west and east sides of University Boulevard. On the west side, the property between the street and the building is used as an access drive between the north and south sides of the building. Alternative access is available at the primary driveway located about 700 feet to the west. The building on the east side is a storage facility used by the UNM Office of Contract Archaeology. Access to this structure would be eliminated and it is likely that the storage areas would be impacted.

With Alternatives 1 and 2, right-of-way impacts would also occur along University Boulevard between Sunshine Terrace and Avenida Cesar Chavez. The affected property is owned by UNM and would include several feet along both sides of University Boulevard. The affected property is currently used for parking and landscaping at the UNM basketball arena and football stadium.

With Alternative 3, right-of-way impacts would occur along Avenida Cesar Chavez between University Boulevard and the main access drive to the UNM Football stadium. The proposed improvements would extend several feet beyond the existing sidewalks and would eliminate parking spaces that front the roadway.

Additional right-of-way would also be needed for a new parking lot along University Boulevard north of Menaul Boulevard. With all four build alternatives, approximately 6 acres of private property would be acquired in this area. This land is currently undeveloped.

Right-of-way would also be needed for curb-side station platforms. For each stop location, an area of approximately 10 to 12 feet in depth and 140 feet long would extend beyond the street curb. Depending on the alternative, the number of curbside station platforms varies with ten included with Alternative 1, fourteen with Alternatives 2 and 3, and eighteen with Alternative 4. While some parking and/or landscaping may be affected, the location of stations can be adjusted to avoid buildings.

3.6 Traffic Impacts

The effects of implementing dedicated bus service on the major streets within the study area were assessed using planning level traffic analysis methods. This method involved calculating the volume to capacity ratio (V/C) for each roadway segment used for the BRT system. The analyses were based on existing traffic volumes and the lane capacities specific to the roadway functional class and degree of access. Traffic data for the morning and evening peak hour by direction were obtained from data bases compiled by the MRCOG. The findings of the V/C analysis are summarized in Table 5. The numbers highlighted in yellow are the roadway segments where traffic volumes exceed the roadway capacity.

Table 5: Traffic V/C for the AM and PM Peak Hours

Roadway	Peak Direction	Peak-hour Volume	Existing No. of Lanes	Proposed No. of Lanes	V/C
Yale Boulevard[(1)]	AM NB	494	3	2	0.22
Sunport to Gibson	AM SB	960	3	2	0.43
	PM NB	1099	3	2	0.49
	PM SB	645	3	2	0.29
Gibson to Avenida Cesar Chavez	AM NB	431	2	2	0.29
	AM SB	352	2	2	0.23
	PM NB	569	2	2	0.38
	PM SB	395	2	2	0.26
Avenida Cesar Chavez to Coal	AM NB	563	1	1	0.75
	AM SB	777	1	1	**1.04**
	PM NB	806	1	1	**1.08**
	PM SB	1210	1	1	**1.61**
Coal to Lead	AM NB	280	1	1	0.37
	AM SB	356	1	1	0.47
	PM NB	374	1	1	0.50
	PM SB	609	1	1	0.81
Lead to Central	AM NB	268	1	1	0.36
	AM SB	202	1	1	0.27
	PM NB	327	1	1	0.44
	PM SB	451	1	1	0.60

(1) Minor arterial with a capacity of 750 vehicles per hour per lane

(2) *Principal arterial with a capacity of 800 vehicles per hour per lane*

Table 5: Traffic V/C for the AM and PM Peak Hours (Continued)

Roadway	Peak Direction	Peak-hour Volume	Existing No. of Lanes	Proposed No. of Lanes	V/C
University Boulevard[(1)]	AM NB	463	2	2	0.31
Gibson to Avenida Cesar Chavez	AM SB	218	2	2	0.15
	PM NB	279	2	2	0.19
	PM SB	401	2	2	0.27
Avenida Cesar Chavez to Coal	AM NB	721	3	2	0.48
	AM SB	309	3	2	0.21
	PM NB	703	3	2	0.47
	PM SB	676	3	2	0.45
Coal to Lead	AM NB	498	3	2	0.33
	AM SB	926	3	2	0.62
	PM NB	799	3	2	0.53
	PM SB	1017	3	2	0.68
Lead to Central	AM NB	1118	3	2	0.75
	AM SB	715	3	2	0.48
	PM NB	862	3	2	0.57
	PM SB	828	3	2	0.55
Central to Dr. MLK Jr.	AM NB	735	3	2	0.49
	AM SB	898	3	2	0.60
	PM NB	1111	3	2	0.74
	PM SB	1111	3	2	0.74
Dr. MLK Jr. to Lomas	AM NB	741	3	2	0.49
	AM SB	942	3	2	0.63
	PM NB	1172	3	2	0.78
	PM SB	1172	3	2	0.78
Lomas to Indian School Rd.	AM NB	540	2	2	0.36
	AM SB	1619	2	2	**1.08**
	PM NB	1643	2	2	**1.10**
	PM SB	738	2	2	0.49
Indian School Rd. to I-40	AM NB	471	2	2	0.31
	AM SB	1154	2	2	0.77
	PM NB	1360	2	2	0.91
	PM SB	529	2	2	0.35
I-40 to Menaul	AM NB	618	2	2	0.41
	AM SB	853	2	2	0.57
	PM NB	1078	2	2	0.72
	PM SB	633	2	2	0.42
Lomas Boulevard [(2)]	AM EB	1655	3	3	0.69
Yale to University	AM WB	1104	3	3	0.46
	PM EB	1537	3	3	0.64
	PMWB	1309	3	3	0.55
Avenida Cesar Chavez[(1)]	AM EB	962	3	2	0.64
University to Yale	AM WB	474	3	2	0.32
	PM EB	644	3	2	0.43
	PMWB	787	3	2	0.52
Gibson Boulevard[(2)]	AM EB	1724	3	3	0.72
University to Yale	AM WB	670	3	3	0.28
	PM EB	985	3	3	0.41
	PMWB	1606	3	3	0.67

(1) Minor arterial with a capacity of 750 vehicles per hour per lane

(2) *Principal arterial with a capacity of 800 vehicles per hour per lane*

Based on the screening analysis, adverse impacts to traffic flow on the roadways used for the project alternatives would not occur — traffic flow would continue to operate at reasonable levels of service. A volume to capacity ratio of 0.89 or less generally reflects a level of service of C or better. Only 2 roadway segments are expected to have a V/C ratio greater than 0.9. These include the segment of Yale Boulevard from Avenida Cesar Chavez to Coal Avenue and the segment of University Boulevard from Lomas Boulevard to Indian School Road. For the segment of Yale Boulevard, congested conditions occur in both the northbound and southbound lanes and during the morning and evening commute periods. For University Boulevard, congestion exists in the peak direction of travel.

In both of the locations described above, congestion is not a consequence of the proposed bus service; the conditions described are due to existing traffic flows. Because buses would operate in mixed flow lanes on the segment of Yale Boulevard north of Avenida Cesar Chavez, a BRT system using this street would likely exacerbate existing congestion. For University Boulevard, the busway would be in addition to the existing traffic lanes. For this reason, BRT service would not be expected to add to existing congestion. Because the proposed bus service will shift some travel from automobiles to transit, traffic performance may be improved in this segment of University Boulevard.

The evaluation of traffic was limited to a planning level assessment for this stage of the alternatives analysis. A more detailed analysis will be necessary if the project advances into the project development phase. That analysis would include an assessment of intersection operations, changes to access and traffic circulation, and signal improvement needs.

3.7 Environmental and Community Impacts

The assessment of environmental and community impacts was limited to qualitative analysis and issues identified through public involvement activities. A more detailed assessment will be conducted during project development and will include field investigations and consultation and coordination with state and federal agencies. Environmental and community issues of concern are generally the same for all of the alternatives.

- *Natural resources and water* quality – because of the urban character of the project, impacts to these resources are unlikely.
- *Air Quality and Greenhouse Gas Emissions* – adverse impacts to air quality and GHG emissions would not be expected. One objective of the proposed BRT system is to provide more efficient transit service and parking. Accomplishing this objective would result in lower VMT within the project area as well as a reduction of tailpipe emissions. As discussed in Section 2.6, adverse impacts to traffic flow would not occur as a result of the proposed BRT; thus, no increase in carbon monoxide would be expected at intersections.
- *Noise* – traffic noise would not change nor would it be expected to exceed FTA noise abatement thresholds. While bus-generated noise would increase as a result of the higher number of bus operations, the net increase would likely be negligible due to the high background noise from other traffic operating on the streets. Concerns with noise at bus maintenance facilities have been raised by some residents. This will be evaluated and mitigation measures will be identified, as needed, during project development.
- *Hazardous Materials* – hazardous materials are likely to exist within the project area due to existing and previous land uses that used and/or stored solvents, gas, and other chemicals. However, because of the limited right-of-way takes, the presence of “recognized environmental

concerns (RECs)" would not likely constrain project implementation. Measures to protect worker safety during construction may be needed if hazardous materials are found within construction zones.

- *Socioeconomic Issues* – major adverse impacts to neighborhoods are not anticipated. Minor impacts from changes to access and activity at station areas are likely to occur. Changes to access and minor right-of-way takes would likely occur to some businesses. Measures to mitigate impacts, as appropriate, will be identified during project development.
- *Environmental Justice* – low income households and disadvantaged minority populations exist within the project area. Disproportionate impacts to these groups are not expected. Benefits to these populations are likely as a result of improved access to the proposed BRT service.
- *Historic/Cultural resources* – Much of the project area is within older neighborhoods. It is likely that some buildings will meet criteria for historic eligibility. Cultural resource surveys and consultation with the SHPO will be needed during project development.

An environmental document will be prepared during project development. Based on the screening assessment and concept design, it is likely that the project will qualify for a categorical exclusion with supporting analyses and documentation. The level of effort and issues to be assessed will be determined in consultation with FTA.

3.8 Ridership Performance

Differences in the ridership potential of alternatives were determined by comparing the walking proximity near station areas for the target market segments within the study area. Targeted market segments include:

- Students, faculty, and staff of UNM, UNM Hospital and Health Science facilities, UNM south campus area, and CNM;
- Off-campus workers in the Sunport area and at other businesses within the study area;
- Persons using remote park and ride lots that would be served by the proposed service;
- Riders transferring from other major transit routes that would intersect with the proposed service; and,
- The number of seats at the major sports facilities including the UNM football and basketball arenas, and Isotope field (AAA baseball).

Walk access contours were generated for the above trip types using the TRAM model — a GIS-based model used by MRCOG to evaluate accessibility. The findings of the walk access for the 5 minute and 7.5 minute walk contours are summarized in Tables 6 and 7.

As shown by the walk access estimates, accessibility to station sites for target populations is significantly higher with Alternatives 2 and 3 than with Alternatives 1 and 4. Key findings include:

- Alternative 1 does not provide good access to the UNM Hospital and main campus areas. This is due to the alignment staying on University Boulevard between Lomas Boulevard and Dr. Martin Luther King Jr. Avenue, which skirts some of the higher density population areas at these locations.
- For both the 5 minute and 7.5 minute contours, Alternative 4 does not serve CNM well. Less than 150 students, faculty, and staff are within a 5 minute walk access to CNM locations with

this alternative. While accessibility increases at the 7.5 minute contour, it is still only about 35% of the population with access under Alternatives 1, 2, and 3.

- Access to existing park and ride lots within the 5 minute contour is also poor for Alternative 4.
- Access to special event venues is very good for Alternatives 1, 2, and 3, but very poor with Alternative 4.

Table 6: Target Population within a 5 Minute Walk to Station Areas

Target Markets	Alternative 1	Alternative 2	Alternative 3	Alternative 4
UNM Hospital/H.S. Workers	308	308	308	308
UNM Students, Faculty, and Staff	1,667	7,596	7,561	11,314
CNM Students, Faculty, and Staff	3,404	3,404	3,404	144
Near Campus Student Housing	0	0	0	0
Other Non-Campus Employment	4,010	4,079	3,894	4,070
Transit Riders	2,835	2,835	2,835	2,773
Remote Parkers	4,964	4,493	4,493	800
Total without Special Events	**17,188**	**22,715**	**22,495**	**19,408**
Special Event Venue Seats	67,334	67,334	67,334	1,985

Table 7: Target Population within a 7.5 Minute Walk to Station Areas

Target Markets	Alternative 1	Alternative 2	Alternative 3	Alternative 4
UNM Hospital/H.S. Workers	308	2,545	2,545	2,545
UNM Students, Faculty, and Staff	7,596	17,039	16,994	20,257
CNM Students, Faculty, and Staff	7,961	7,961	7,961	2,855
Near Campus Student Housing	981	981	981	117
Other Non-Campus Employment	5,278	5,280	5,219	4,920
Transit Riders	2,990	3,560	3,560	3,560
Remote Parkers	6,029	6,029	6,029	6,029
Total without Special Events	**28,310**	**43,395**	**43,289**	**40,283**
Special Event Venue Seats	67,334	67,334	67,334	1,985

In addition to the estimate of target populations with reasonable walk access to stations, preliminary ridership was estimated for the top two performing alternatives. While the estimate was based on Alternative 3, the alignment for Alternative 2 is the same as Alternative 3 in areas adjacent to primary target populations. Therefore, ridership for Alternatives 2 and 3 are likely to be very similar.

The preliminary ridership estimates were developed using existing databases that were expanded and corroborated to reflect total rider populations. Several data sources were used to provide the basis for developing a marketing profile of potential travel markets served by the proposed BRT system. The databases used included:

- On-Board Survey of all ABQ Ride riders (April, 2012)
- Surveys of UNM Students, Faculty and Staff (2010)

- Survey of CNM Students (2012)
- Residence locations for all UNM Student, Faculty and Staff (2010)
- Residence locations for all UNM Hospital Staff (2010)
- Residence location for all CNM Students, Faculty, and Staff (2010)
- PATS Ridership on pertinent routes in operation (2010 thru 2012)
- INFO-USA Inventory of Businesses, by address and NAICS (2010)
- Data from the MRCOG regional travel model, where relevant.

Two principal sources of ridership for BRT exist: (1) existing transit ridership currently onboard ABQ Ride and UNM PATS buses operating in the study area that will take advantage of the new service, and (2) new ridership from increases in existing transit modal shares that result from the overall improvement in service and increased access to destinations not currently served.

Using the above data sources and assumptions, the estimated ridership for the proposed BRT service is around 17,300 daily riders when both UNM and CNM are in session. About 12,400 of these riders are on existing routes serving the area (particularly PATS). An additional 4,900 riders are expected to be induced through increased service within the study area. The most prominent ridership market segment (about 40%) will be UNM students, faculty, and staff parking in remote lots, as it is today on PATS. Other strong market segments include UNM students commuting from near-campus housing locations and riders traveling to CNM and UNM Hospital and other non-campus locations.

Ridership estimates using an approved model and/or methodology will be required during project development to comply with FTA procedures. Nonetheless, the initial estimates indicate a strong market exists for a BRT system operating on either Alternative 2 or Alternative 3.

4.0 Summary and Recommendations

Four alternatives were evaluated by the initial alternatives analysis. The analysis focused on key factors and criteria including: the alignment, location, and type of busways anticipated; station types and locations; capital costs; operations and maintenance costs; market accessibility/service to station areas; right-of-way needs; and impacts to traffic service, environmental, and community resources. In addition, preliminary ridership estimates were developed to assess the viability of the leading alternatives. Table 8 summarizes key findings of the analysis. Notable findings include:

- Capital costs are similar for all four alternatives and range from $62 to $66 million. Operating and maintenance costs are also similar and range from $3.2 to 3.5 million per year.
- Due to its use of Yale Boulevard between Central Avenue and Avenida de Cesar Chavez, Alternative 4 would have a higher percentage of the route operating in mixed flow traffic lanes — approximately 31% of the route as compared to about 20% of the route for Alternatives 1, 2, and 3. This portion of Yale Boulevard includes segments with severe congestion and narrow right-of-way. Thus, bus performance could be adversely impacted.
- Access to key markets differs between alternatives. Alternatives 2 and 3 provide good access to all of the major markets within the study area. Alternative 1 provides good access to the southern half of the UNM main campus, CNM, UNM south campus, and the Sunport. However, access to UNM Hospital and the northern half of the UNM main campus is poor. Likewise, Alternative 4 provides very good access to UNM Hospital and the UNM main campus, but has poor access to CNM and the UNM south campus area. While Alternative 4 provides the best access to the UNM main campus, its use of South Redondo Drive would likely result in lower levels of service due to pedestrian and local traffic congestion along this route.
- The need for additional right-of-way is similar for all alternatives. All of the alternatives would require the acquisition of small amounts of property between Camino de Salud and Lomas Boulevard and in areas where curbside stations are used. Alternative 1 would acquire a small amount of property along University Boulevard between Avenida Cesar Chavez and Sunshine Terrace. Alternative 2 would acquire a small amount of property along Avenida Cesar Chavez between University Boulevard and Yale Boulevard. In all instances, right-of-way impacts would be limited to land and is not likely to acquire major structures.
- Based on an analysis of volume to capacity (V/C), impacts to traffic flow would not occur as a consequence of the proposed service. Two locations — one on University Boulevard north of Lomas Boulevard and a second location on Yale Boulevard between Avenida Cesar Chavez and Coal Avenue — were identified that operate under congested conditions. However, this condition will occur with or without the proposed BRT service. Because buses would operate in a median guideway on University Boulevard, the congestion at this location would not affect bus performance. On Yale Boulevard north of Avenida Cesar Chavez, buses would operate in mixed flow traffic. Thus, bus performance would be affected by the congestion on this street.
- Based on the initial analyses, significant impacts to the human, cultural, or natural environment are not expected to occur as a result of project implementation. A categorical exclusion (CE) is the anticipated class of action needed for compliance with NEPA. Technical investigations needed in support of the CE include air quality and greenhouse gas emissions, noise, hazardous materials, historic properties, and environmental justice.

Table 8: Summary of Performance and Impacts

Alternative/Evaluation Metric	Alternative 1: University / Gibson / Yale		Alternative 2: University / Lomas / Gibson / Yale		Alternative 3: University/Lomas / Cesar Chavez / Yale		Alternative 4: University /Lomas / Yale	
Route Length	6.10 miles		6.4 miles		6.5 miles		6.6 miles	
Miles of Dedicated Busway and percent of overall route (includes guideway and BAT lanes)	4.9 miles	80%	5.2 miles	81%	5.2 miles	81%	4.6 miles	69%
Total Population Walk Access	5 minutes	7.5 minutes	5 minutes	7.5 minutes	5 minutes	7.5 minutes	5 minutes	7.5 minutes
within 5 minutes and 7.5 minutes	17,188	28,310	22,715	43,395	22,495	43,289	19,408	40,283
UNMH Workers	308	308	308	2,545	308	2,545	308	2,545
UNM Students, Faculty, and Staff	1,667	7,596	7,596	17,039	7,561	16,994	11,314	20,257
CNM Students, Faculty, and Staff	3,404	7,961	3,404	7,961	3,404	7,961	144	2,855
Near Campus Student Housing	0	981	0	981	0	981	0	117
Other Non-Campus Employment	4,010	5,278	4,079	5,280	3,894	5,219	4,070	4,920
Transit Riders	2,835	2,990	2,835	3,560	2,835	3,560	2,773	3,560
Remote Parkers	4,964	6,029	4,493	6,029	4,493	6,029	800	6,029
Special Event Venue Seats	67,334	67,334	67,334	67,334	67,334	67,334	1,985	1,985
Economic Development Opportunities	Significant opportunities at: • UNM North Campus area • University Blvd./Lomas Intersection • University Blvd./Central Intersection • CNM • South Campus area • South University • Gibson area • Sunport area		Significant opportunities at: • UNM North Campus area • University Blvd./Lomas Intersection • University Blvd./Central Intersection • CNM • South Campus area • South University • Gibson area • Sunport area		Significant opportunities at: • UNM North Campus area • University Blvd./Lomas Intersection • University Blvd./Central Intersection • CNM • South Campus area (partial) • Sunport area Opportunities for redevelopment of smaller parcels along South Yale		Significant opportunities at: • UNM North Campus area • University Blvd./Lomas Intersection • University Blvd./Central Intersection (partial) • Sunport area Opportunities for redevelopment of smaller parcels along South Yale Misses opportunities at: • CNM, South Campus area, South University	
Right-of-Way Needs	• Approximately 0.75 acres w/o bike lanes • Approximately 2.7 acres and 10 buildings if bike lanes are added to University Blvd.		• Approximately 0.60 acres w/o bike lanes • Approximately 2.38 acres and 8 buildings if bike lanes are added to University		• Approximately 0.48 acres w/o bike lanes • Approximately 2.0 acres and 8 buildings if bike lanes are added to University		• Approximately 0.44 acres w/o bike lanes • Approximately 2.0 acres and 2 buildings if bike lanes are added to University	
Traffic Conflicts	• Existing problems on University Blvd. between Lomas and Indian School Rd. (V/C 1.1 during AM and PM peaks) • No significant congestion problems identified on segments of University with lane takes.		• Existing problems on University Blvd. between Lomas and Indian School Rd. (V/C 1.1 during AM and PM peaks) • Moderate congestion potential on Lomas if BAT lanes are used • No significant congestion problems identified on segments of University with lane takes.		• Existing problems on University Blvd. between Lomas and Indian School Rd. (V/C 1.1 during AM and PM peaks) • Moderate congestion potential on Lomas if BAT lanes are used • No significant congestion problems identified on segments of University with lane takes. • No congestion on BAT lane section of Yale		• Existing problems on University Blvd. between Lomas and Indian School Rd. (V/C 1.1 during AM and PM peaks) • Moderate congestion potential on Lomas if BAT lanes are used • Existing severe congestion on Yale between Cesar Chavez and Coal Ave. (V/C > 1.6) • No congestion on BAT lane section of Yale	
Capital Costs	$62M – includes 40% contingency, $4M for expansion of maintenance facility, $5M for new park and ride lot.		$65M – includes 40% contingency, $4M for expansion of maintenance facility, $5M for new park and ride lot.		$65M – includes 40% contingency, $4M for expansion of maintenance facility, $5M for new park and ride lot.		$62M - includes 40% contingency, $4M for expansion of maintenance facility, $5M for new park and ride lot.	
Operations & Maintenance Cost	$3.2M		$3.4M		$3.4M		$3.5M	

4.1 Recommendation – Locally Preferred Alternative

Based on the investigations and analyses conducted for the alternatives analysis and input received from agency, institution, and public stakeholders, Alternative 3 is recommended as the preferred alternative for advancement into project development. This alternative provides the best overall performance and serves all of the key market areas within the study area. Major adverse impacts have not been identified nor have other factors been identified that would significantly impair its feasibility or performance. The major design and operating features of this alternative are as follows:

1. Overall Route Length – 6.5 miles
2. Portion of Route in Dedicated BRT Lanes – 5.2 miles
3. Portion of Route in Mixed Flow Lanes – 1.3 miles
4. Number of Stations – 14
5. Park and Ride Lots – 3 existing park and ride lots and 1 new lot
6. Operating Hours per Day – 16 hours per day
7. Operating Headways within Core Area (Avenida Cesar Chavez to Indian School Road)
    - 5 minute during 8 peak hours
    - 10 minute during 8 off-peak hours
8. Operating Headways Outside of Core Area (South of Avenida Cesar Chavez and North of Indian School Road)
    - 15 minute during 8 peak hours
    - 30 minute during 8 off-peak hours
9. Preliminary Estimate of Daily Ridership – approximately 17,300 trips
10. Preliminary Estimate of Implementation Cost – Approximately $65 M
11. Preliminary Estimate of Annual Operating and Maintenance Costs – Approximately $3.4 M

Figure 20 on the following page illustrates the alignment of the preferred alternative and the general location of stations and park and ride lots. The park and ride lot at the northern terminus of the proposed BRT route does not currently exist and would be constructed as part of the project. This lot is currently undeveloped land and is of adequate size to accommodate approximately 750 vehicles.

The recommended alternative uses two streets and three parking lots under the jurisdiction of UNM. The streets include the portions of Yale Boulevard, Las Lomas Road, and West Redondo Drive between Lomas Boulevard and University Boulevard for a total distance of 0.5 miles. To maintain efficient bus travel speeds, these streets will be restricted to buses and local traffic only. The three parking lots owned by UNM include the G and Q lots north of Lomas Boulevard and the South lot on Avenida Cesar Chavez. Agreements with UNM will be necessary to modify these streets and allow non-UNM personnel to use the parking lots.

The portion of Alternative 3 from Avenida Cesar Chavez south to Gibson Boulevard may change during project development depending on how a UNM-owned 47 acre lot west of University Boulevard and south of Avenida Cesar Chavez is developed. Development plans for this lot are underway. If the final development plan for this lot follows transit supportive principles, and a new park and ride lot can be integrated into the land adjacent to the development, the preferred alignment for the BRT will be shifted to University Boulevard and Gibson Boulevard. This potential change is shown in Figure 20.

Figure 20 – Locally Preferred Alternative

The following figures illustrate concepts for stations. Figure 21 illustrates the configuration for a median station. Figure 22 illustrates the configuration for curb-side stations.

Figure 21 – Example of the Design Concept for a Median Station

Figure 22 – Example of the Design Concept for a Curb-Side Station

Figure 23 and Figure 24 below illustrate station areas at two locations along the alignment. These images are conceptual only and show the general configuration of the station at University Boulevard and Basehart Street and the station at University Boulevard and Avenida Cesar Chavez.

Figure 23 – Example of Median Station Concept at CNM

Figure 24 – Example of Median Station Concept at Isotopes Stadium

Appendix A

Initial Screening Analysis Matrices

Segment 1 – Menaul Boulevard to Indian School Road (North University Campus Area)

Evaluation Metric/Route	1: University	2: AMAFCA Channel	4:Girard
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	**0**	**0**	**0**
2. Number of off-campus jobs within 5 minute walk of route	**85**	**21**	**2**
3. Number of remote parkers using shuttle service within 5 minute walk	**0**	**0**	**0**
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	**0**	**0**	**0**
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	**20**	**27**	**114**
6. Residential population (not associated with institutions) within 5 minute walk of route	**7**	**0**	**635**
7. Number of students in University dorms/housing within 5 minute walk	**0**	**0**	**0**
8. Number of seats at sports/entertainment venues within 5 minute walk	**0**	**0**	**0**
9. Overall Route Length (Relative Cost)	**0.82miles**	**1.09 miles**	**0.55 miles**
10. Total population/mile (Route productivity)	**136/mile**	**44/mile**	**1,286/mile**
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• R/W generally available to add busway without reducing the number of travel lanes • 4 signalized intersections will reduce travel time • Relatively high number of access points could conflict with busway • Street currently operates at high LOS Busway would not result in major traffic diversion • Little conflict with residential neighborhoods	• R/W generally available on channel to accommodate busway • Crossing under I-40 may be difficult and costly • Few access conflicts; travel time would not be affected by driveway and side street access • Would not divert traffic • Is adjacent to residential neighborhood; some potential for intrusion • Potential conflict with pedestrian and bicycle traffic using channel trail	• Crossing under I-40 may be difficult and costly • Limited street width would require mixed flow operation on residential collector streets • Conflicts with residential driveways; potential safety concern • Low traffic flows; no traffic diversion • Passes directly through residential neighborhood • Potential safety conflicts with residential pedestrian traffic

Segment 2 – Indian School Road to Lomas Boulevard

Evaluation Metric/Route	1: University	2: AMAFCA Channel	3: University/Tucker	4: University/Lomas	5: University/Lomas/Yale	6: Girard
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	632	721	3,469	5,029	764	257
2. Number of off-campus jobs within 5 minute walk of route	508	431	508	1,013	508	496
3. Number of remote parkers using shuttle service within 5 minute walk	969	2,128	969	969	969	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	0	0	854	854	0	284
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	21	21	21	36	21	170
6. Residential population (not associated with institutions) within 5 minute walk of route	0	0	0	69	0	1,492
7. Number of students in University dorms/housing within 5 minute walk	0	0	0	0	0	0
8. Number of seats at sports/entertainment venues within 5 minute walk	0	0	0	0	0	0
9. Overall Route Length (Relative Cost)	0.61 miles	1.2 miles	0.84 miles	1.35 miles	0.83 miles	1.0 miles
10. Total population/mile	3,462/mile	2,819/mile	6,889/mile	5,905/mile	2,740/mile	2,870/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• R/W generally available to add busway without reducing the number of travel lanes • Few signalized intersections; little impact to travel time • Moderate number of access points; potential conflicts with busway • Busway would not result in major traffic diversion • No conflicts with residential neighborhoods	• R/W generally available on channel to accommodate busway • Mixed flow on Tucker • Few access conflicts; travel time would not be affected by driveway and side street access • Would not divert traffic • No conflicts with residential neighborhoods	• R/W generally available to add busway without reducing the number of travel lanes • Mixed flow on Tucker • Few signalized intersections; little impact to travel time • Moderate number of access points; potential conflicts with busway • Busway would not result in major traffic diversion • No conflicts with neighborhoods	• R/W available on University • Lane takes or mixed flow on Lomas • Moderate number of access conflicts • Intersections would slow travel times • Lane takes on Lomas would divert some traffic or slow bus travel if mixed flow • No conflicts with residential neighborhoods	• R/W available on University • Lane takes or mixed flow on Lomas • Moderate number of access conflicts • Intersections would slow travel times • Lane takes on Lomas would divert some traffic or slow bus travel if mixed flow • No conflicts with residential neighborhoods	• Limited r/w would require mixed flow travel • Very high number of access conflicts; potential safety conflicts and slower travel time • Little impact to traffic operations • Passes through residential neighborhood • Potential safety conflicts with pedestrian traffic

Segment 3 – Lomas Boulevard to Central Avenue (Main Campus)

Evaluation Metric/Route	1: University	2: Yale/Redondo	3: Lomas/Girard/Central	4: Lomas/Yale	5: University/W. Redondo	6: Girard
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	4,716	28,472	15,414	29,669	16,470	102
2. Number of off-campus jobs within 5 minute walk of route	182	88	244	77	139	189
3. Number of remote parkers using shuttle service within 5 minute walk	532	1,283	1,066	1,281	532	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	1,960	1,943	1,943	2,618	1,960	200
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	169	243	293	47	88	102
6. Residential population (not associated with institutions) within 5 minute walk of route	2,033	1,562	460	1,492	1,799	311
7. Number of students in University dorms/housing within 5 minute walk	0	3,288	993	0	0	993
8. Number of seats at sports/entertainment venues within 5 minute walk	0	0	2,000	2,000	2,000	0
9. Overall Route Length (Relative Cost)	0.62 miles	1.26 miles	1.68 miles	0.56 miles	0.76 miles	0.45 miles
10. Total population/mile	15,421/mile	29,143/mile	12,123/mile	62,383/mile	27,689/mile	4,253/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• Limited R/W; may require conversion of 2 lanes to add guideway • 4 signalized intersections; moderate impact to travel time • Moderate number of access points; potential conflicts with busway • V/C indicates 4 lanes are adequate for traffic volume • Neighborhood conflicts not expected • Ped conflicts with traffic at stops on University	• Limited R/W will require mixed flow on Yale and Redondo • Few intersections and driveways; little access conflict that would affect travel time • No neighborhood impacts	• Lane takes on Lomas; mixed flow on Girard • High number of signals, intersecting streets and driveways; slow travel time and high potential for safety conflicts • Traffic diversion on Lomas due to lane takes • Edge of neighborhood on Girard; some residential conflict	• Lane takes on Lomas; mixed flow on Girard • Traffic diversion on Lomas due to lane takes • Mixed flow on Yale across campus • Potential for conflicts with pedestrians on campus • Would require the relocation of several campus places of interest	• Limited R/W; may require conversion of 2 lanes to add guideway or mixed flow operation • Some traffic diversion from lane conversion on Lomas • Mixed flow on Redondo or conversion to bus only facility • Neighborhood conflicts not expected • Ped conflicts with traffic at stops on University	• Limited r/w would require mixed flow operation • High number of intersecting streets and driveways; slow travel time and high potential for safety conflicts • Little to no traffic diversion • Some conflict with neighborhood to the east

Segment 4 – Central Avenue to Coal Avenue

Evaluation Metric/Route	1: University	2: W Central/Yale/Coal	3: Buena Vista	4: Yale	5: E Central/Yale	6: Girard
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	825	3,503	3,419	792	2,112	0
2. Number of off-campus jobs within 5 minute walk of route	208	766	420	574	1,127	484
3. Number of remote parkers using shuttle service within 5 minute walk	0	0	0	0	0	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	0	155	155	155	1,030	0
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	280	387	273	286	463	159
6. Residential population (not associated with institutions) within 5 minute walk of route	996	1,251	924	857	1,348	737
7. Number of students in University dorms/housing within 5 minute walk	0	0	0	0	0	0
8. Number of seats at sports/entertainment venues within 5 minute walk	0	0	0	0	0	0
9. Overall Route Length (Relative Cost)	0.40	1.02	0.43	0.41	0.91	0.38
10. Total population/mile	5,774/mile	5,966/mile	11,961/mile	6,545/mile	6,745/mile	3,597/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• Limited R/W; may require conversion of 2 lanes to add guideway • V/C indicates 4 lanes are adequate for traffic volume • Low number of signals and intersecting streets; little travel time or access conflicts • Passes through neighborhood, but is already an arterial street • Stations on street generates high ped conflicts on an arterial street	• Limited R/W on Central; may require conversion of 2 lanes for guideway; likely traffic diversion • Limited r/w on Yale may require mixed flow use • R/W limits may hinder ability to integrate bike lanes • High number of access conflicts on Yale; potential travel time detriment • Minor neighborhood effects	• Limited r/w would require conversion to bus only route or mixed flow • Low traffic volumes; little diversion • Few conflicts with access drives • Ability to add ped and bike facilities • Passes through mixed residential-commercial neighborhood • Low speed route, but few impedances	• Limited r/w on Yale may require mixed flow use • R/W limits may hinder ability to integrate bike lanes • High number of access conflicts on Yale; potential travel time detriment • Good pedestrian corridor, provided adequate sidewalks can be implemented • Minor neighborhood effects	• Limited R/W on Central; may require conversion of 2 lanes for guideway; likely traffic diversion • Limited r/w on Yale may require mixed flow use • R/W limits may hinder ability to integrate bike lanes • High number of access conflicts on Yale; potential travel time detriment • Good ped corridor, provided adequate sidewalks provided • Minor neighborhood effects	• Limited r/w would require mixed flow • High number of intersecting streets and driveways; slow travel time and high potential for safety conflicts • Little to no traffic diversion • Neighborhood intrusion on both sides. Strong public opposition. • Limited ability to develop as multimodal route.

Segment 5 – Coal Avenue to César Chavez

Evaluation Metric/Route	1: University	2: University/Coal	3: Yale	4: Buena Vista/Yale	5: Buena Vista/C. Chavez	6: Girard/Cesar Chavez
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	18,743	18,721	0	9,387	9,387	0
2. Number of off-campus jobs within 5 minute walk of route	0	89	342	143	143	84
3. Number of remote parkers using shuttle service within 5 minute walk	148	148	0	0	0	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	0	0	0	0	0	0
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	17	84	103	21	21	215
6. Residential population (not associated with institutions) within 5 minute walk of route	78	268	395	208	215	1,122
7. Number of students in University dorms/housing within 5 minute walk	0	0	0	0	0	0
8. Number of seats at sports/entertainment venues within 5 minute walk	10,000	10,000	0	0	10,000	0
9. Overall Route Length (Relative Cost)	0.55	0.89	0.38	0.50	0.77	0.96
10. Total population/mile	34,461/mile	21,796/mile	2,228/mile	19,530/mile	12,774/mile	1,486/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• R/W available for busway and existing lanes • No traffic diversion • Low number of signals and intersecting streets; little travel time or access conflicts • No neighborhood impacts • Stations on street generates high ped conflicts on an arterial street	• Limited R/W on Coal will require mixed flow on this segment • No r/w constraints on University • No major access conflicts that would slow travel or create potential safety conflicts • No neighborhood impacts • Same issues as Route 1 regarding University	• Limited r/w on Yale may require mixed flow use • R/W limits may hinder ability to integrate bike lanes • Moderate number of access conflicts on Yale; minor travel time detriment • Good pedestrian corridor, provided adequate sidewalks can be implemented • Minor neighborhood effects	• Limited r/w would require conversion to bus only route or mixed flow • Low traffic volumes; little diversion • Few conflicts with access drives except for portion south of St Cyr Ave. where houses face street • Can add bike and ped facilities except for area south of St. Cyr • Low speed route, but few impedances	• Limited r/w would require conversion to bus only route or mixed flow • Low traffic volumes; little diversion • Few conflicts with access drives except for portion south of St Cyr Ave. where houses face street • Can add bike and ped facilities except for area south of St. Cyr • Low speed route, but few impedances	• Limited r/w would require mixed flow • High number of intersecting streets and driveways; slow travel time and high potential for safety conflicts • Little to no traffic diversion • Neighborhood intrusion on both sides of Girard and Santa Clara. Strong public opposition. • Limited r/w diminished ability to develop as multimodal route.

Segment 6 – César Chavez to Gibson Blvd.

Evaluation Metric/Route	1: University/Gibson	2: University/Sunport	3: Yale	4:BV/University/Gibson	5: Girard	6: Girard/Santa Clara
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	24	24	0	24	0	0
2. Number of off-campus jobs within 5 minute walk of route	161	38	499	280	83	216
3. Number of remote parkers using shuttle service within 5 minute walk	0	0	0	3,888	0	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	0	0	0	0	0	0
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	31	31	84	49	192	248
6. Residential population (not associated with institutions) within 5 minute walk of route	1,002	643	707	1,101	1,032	1,222
7. Number of students in University dorms/housing within 5 minute walk	0	0	0	0	0	0
8. Number of seats at sports/entertainment venues within 5 minute walk	55,000	55,000	0	55,000	0	0
9. Overall Route Length (Relative Cost)	1.2	0.71	0.77	1.6	0.7	1.2
10. Total population/mile	1,012/mile	1,042/mile	1,684/mile	3,349/mile	1,830/mile	1,369/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• R/W available on both University and Gibson for busway and existing lanes • No traffic diversion • Few access conflicts; little travel time or safety conflicts • No neighborhood conflicts • Stations on street generates high ped conflicts on an arterial street	• R/W available on University for busway and existing lanes • No traffic diversion • Few access conflicts; little travel time or safety conflicts • No neighborhood conflicts • Stations on street generates high ped conflicts on an arterial street	• Limited r/w would take 2 traffic lanes or require mixed flow operation • Lane takes would raise potential for traffic diversion • Few conflicts with access drives • Difficult to include bike lanes • Emerging land use good fit for transit	• R/W constraint between Buena Vista and Yale would require mixed flow or lane take • R/W available for remainder of corridor • Minor traffic diversion if lane takes occur on CC • Few access conflicts; little travel time or safety conflicts • No direct neighborhood conflicts	• Limited r/w would require mixed flow • High number of intersecting streets and driveways; slow travel time and high potential for safety conflicts • Little to no traffic diversion • Neighborhood intrusion on both sides of Girard. Strong public opposition. • Limited r/w diminished ability to develop as multimodal route.	• Limited r/w would require mixed flow • High number of intersecting streets and driveways; slow travel time and high potential for safety conflicts • Little to no traffic diversion • Neighborhood intrusion on both sides of Girard and Santa Clara. Strong public opposition. • Limited r/w diminished ability to develop as multimodal route.

Segment 7 – Gibson to Sunport

Evaluation Metric/Route	1: Gibson/Yale	2: University/Sunport	3: Yale	5: Girard
1. Daytime population (UNM, UNMH, CNM students, faculty, staff, workers) within 5 minutes of route	0	0	0	0
2. Number of off-campus jobs within 5 minute walk of route	3,644	3,578	3,592	3,219
3. Number of remote parkers using shuttle service within 5 minute walk	0	0	0	0
4. Number of transit arrivals at existing stops within 5 minute walk (only major stops with >100 arrivals)	0	0	0	0
5. Home residence of faculty, staff, workers, and students (in off campus housing) within 5 minute walk of route	3	56	0	0
6. Residential population (not associated with institutions) within 5 minute walk of route	250	400	25	0
7. Number of students in University dorms/housing within 5 minute walk	0	0	0	0
8. Number of seats at sports/entertainment venues within 5 minute walk	0	0	0	0
9. Overall Route Length (Relative Cost)	2.13	2.9	1.6	0.8
10. Total population/mile	1,830/mile	1,373/mile	2,211/mile	3,219/mile
11. General Feasibility (issues pertaining to right-of-way, traffic, travel times, neighborhood intrusion, pedestrian safety) No major challenges Challenges, but not a fatal flaw Potential fatal flaw	• R/W available on Gibson for busway and existing lanes; R/W limited on Yale, likely lane take in 6-lane section • Minor traffic diversion • Moderate access conflicts; minor travel time or safety conflicts • No neighborhood conflicts	• Mixed flow on overall route • Low traffic flows; therefore no diversion • Slower travel times through residential area • Passes through neighborhood and requires new route to connect to Sunport; opposed by neighborhood • Potential conflicts with neighborhood pedestrians	• R/W limited on Yale, likely lane take in 6-lane section • Minor traffic diversion • Moderate access conflicts; minor travel time or safety conflicts • No neighborhood conflicts	• R/W available for bus lanes, although low use of Girard may make mixed flow adequate • Few access conflicts; low potential for safety conflicts • No neighborhood conflicts • Would require new connection at Sunport terminal area