Gannett Fleming West, Inc.

Working Paper #1
Existing Conditions/Opportunities and Constraints

CITY OF ALBUQUERQUE 1706 NEW MEXICO

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Introduction

Existing and Planned Bikeway and Trail Facilities

This section describes the current bikeway and trail network in Albuquerque. The first part is a brief overview of existing facilities including bike routes, bike lanes, bicycle boulevards, multi-use trails and wide lanes/paved shoulders as well as support facilities. The second section explains the facility selection process used to identify existing bicycling routes. Finally, the identified opportunities and constraints are presented.

Bicycle Facilities

Several types of bikeways exist, as defined by federal, state and local bicycle planning and design guides and manuals. Bikeways generally are distinguished as preferential roadways accommodating bicycle travel, with accommodation taking the form of bicycle route designation, bike lane striping, or shared use multi-use trails to physically separate cyclists from motorists.

Albuquerque's formalized bikeway system consists of on-street facilities; bike routes, bicycle boulevards, bike lanes, wide lanes/paved shoulders and off-street facilities; multi-use trails. A significant portion of the City's bicycle facilities are multi-use paved trails making up nearly 1/3,161 mile, of the existing bicycle facilities in the metropolitan area. The City of Albuquerque has prepared a map of the bikeways in the immediate metropolitan area, including an insert of the City of Rio Rancho. The 2011 City of Albuquerque Bicycle Map, figure 1, shows the existing bikeway network in Albuquerque.

Bike Lanes

Designated exclusively for bicycle travel, bicycle lanes are separated from vehicle travel lanes with striping and include pavement stencils and signage. Bicycle lanes are most appropriate on arterial and collector streets in urban and rural areas where higher traffic volumes and speeds warrant greater separation. Some of the earliest bike lanes are in the northeast part of the City on Constitution Avenue, Chelwood Boulevard and Kirtland Air Force Base. As the City expands to the west bike lanes are being included as part of new roadway construction for example 98th Street and Unser Boulevard. The City has invested in roadway improvements adding bike lanes to existing streets recently along Jefferson Street, Comanche Boulevard and Academy Road. Bike lanes are added during construction of new facilities to increase the connectivity of the bikeways system. There are approximately 170 miles of existing bike lanes within the city, most of which are on located collector and minor arterial streets.

Figure 2: Typical bike lane with adjacent parking

Figure 3: Typical bike lane on roadway bridge

Many bicyclists that use their bicycle for trips other than recreation would argue that on-street facilities are the most functional facilities for bicycle transportation. Bicyclists have stated their preference for marked on-street bicycle lanes in numerous national surveys. The fact is that many bicyclists – particularly less experienced riders – are far more comfort-

able riding on a busy street if it has a striped and signed bike lane. Part of the goal of this Plan is to encourage new riders, and providing future marked facilities such as bike lanes may be one way of accomplishing that.

This Plan takes the approach that, if properly designed, bike lanes can increase safety and promote proper riding habits. For this reason, bike lanes are highly desirable for bicycle commutes and other utilitarian routes along major roadways. Bike lanes help to define the road space for bicyclists and motorists, reduce the chance that motorists will stray into the cyclists' path, discourage bicyclists from riding on the sidewalk, and remind motorists that cyclists have a right to the road. One key consideration in designing bike lanes in an urban setting is to ensure that bike lanes and adjacent parking lanes have sufficient width (Figure 2), so that cyclists have enough room to avoid a suddenly opened vehicle door. A design guide for bicycle facilities will be developed as part of this Master Plan and information about shared parking and bike lanes will be provided.

Bike Routes

The most common bikeways in Albuquerque are shared roadways, typically designated as "Bike Routes", which are designed to accommodate vehicles and bicycles in the same travel lane. The most suitable roadways for shared vehicle/bicycle use are those with low posted speeds of 25 MPH or less or low traffic volumes of 3,000 average daily traffic (ADT) or less, many of which are in residential areas. These facilities may include traffic-calming devices such as speed humps to reduce vehicle speeds. A common practice is to designate a system of shared roadways which are signed with bicycle route signs and directional arrows. Approximately 134 miles of Bike Routes currently exist throughout the metropolitan area, providing convenient links to other parts of the bikeways network and to destinations throughout the City, including residential areas, transit stops and schools.

Bike routes may also be desirable on certain commuting routes where installing bike lanes is not possible, provided that traffic volumes are acceptable and appropriate signage is installed to alert motorists to the presence of bicycles on the roadway. Bike route signing may also include "Share the Road" signs at regular intervals along the route.

Wide Lanes/Paved Shoulders

A wide outside lane, as shown in figure 4 and 5, provides accommodation for bicyclists on streets with insufficient width for bike lanes but which do have space available to provide a wider (14'-16') outside travel lane. Typically found in rural areas, shoulder bikeways are paved roadways with striped shoulders (4'+) wide enough for bicycle travel. Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway. Bike routes with paved shoulders are typically along State Highways within the City for example Tramway Boulevard and Rio Bravo Boulevard.

Figure 4: Wide shared outside lane

Figure 5: Wide shared lane on Comanche Boulevard along 2nd Street

Bicycle Boulevards

Bicycle Boulevards are low-volume streets where motorists and bicyclists share the same lane. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist unless the shared lane is wide enough for passing in the same lane.

Traffic calming and other treatments along the corridor may reduce vehicle speeds so that motorists and bicyclists generally travel at the same speed. This creates a safer and more comfortable environment for all users. The first phase for the recently implemented Silver Avenue Bicycle Boulevard did not incorporate traffic calming devices other than reducing the speed limit to 18 miles per hour (Figure 7). Traffic calming treatments such as traffic diverters may be installed were the traffic flow on the Bicycle Boulevards is predominantly using the street as a through street. Bicycle Boulevards also incorporate median refuges to facilitate safe and convenient crossings where bicyclists must traverse major streets such as the University Boulevard and Lomas Boulevard. Bicycle Boulevards work best in well-connected street grids where riders can follow reasonably direct and logical routes with few "twists and turns." Boulevards also work best when higher-order parallel streets exist to serve thru vehicle traffic. Albuquerque has recently designated 6 miles of Bicycle Boulevards along Silver Avenue, 14th Street and Mountain Road. Figure 6 and 7 show examples of signing used by the City on the Bicycle Boulevards.

Figure 6: Bicycle Boulevard Guide Sign at the Intersection of Silver Avenue and Carlisle Boulevard

Figure 7: Speed Limit Sign along the Silver Avenue Bicycle Boulevard

Why Bicycle Boulevards are Important

Bicycle Boulevards serve a variety of purposes:

- **Parallel major streets lacking dedicated bicycle facilities**: Higher-order streets such as arterials and major collectors typically include major bicyclist destinations (e.g., commercial and employment areas, and other activity centers). However, these corridors often lack bike lanes or other dedicated facilities thereby creating an uncomfortable, unattractive and potentially unsafe riding environment. Bicycle Boulevards on parallel facilities allowi cyclists to avoid major streets for longer trip segments.
- **Parallel major streets with bicycle facilities that are uncomfortable for some users**: Some cyclists do not feel comfortable riding in bike lanes on major streets for various reasons,. This is especially true on streets with high traffic volumes and vehicle speeds, conflicts with motorists entering and leaving driveways, and/or conflicts with buses occupying the bike lane while loading and unloading passengers. Children and less-experienced riders find these environments especially challenging. Utilizing lower-order streets, Bicycle Boulevards provide alternate route choices for bicyclists unwilling to use the major street network. It should be noted however that bike lanes on major streets provide important access to key land uses, and the major street network often provides the most direct routes between major destinations. For these reasons, Bicycle Boulevards should complement a bike lane network and not serve as a substitute.
- **Ease of implementation on most local streets**: Bicycle Boulevards incorporate cost-effective and less physically-intrusive treatments than bike lanes. Many low traffic volume streets could incorporate relatively inexpensive treatments like new signage, pavement markings, striping and signal improvements to facilitate bicyclists' mobility and safety. Other

potential treatments include curb extensions, medians, and other features that can be implemented at reasonable cost and are compatible with emergency vehicle accessibility.

- **Benefits beyond an improved bicycling environment**: Residents living on Bicycle Boulevards benefit from reduced vehicle speeds and thru traffic, creating a safer and more-attractive environment. Pedestrians and other users can also benefit from boulevard treatments by improving the crossing environment where boulevards meet major streets.

Multi-Use Trails

Approximately 161 miles of multi-use trails provide bicycle access throughout the City. The Paseo del Bosque Recreational Trail, the Unser Boulevard Trail, the North Diversion Channel Trail and the Tramway Trail are examples of some of the major north/south multi-use trails. These major north/south trails provide connections to the Paseo del Norte, I-40 Trail, Paseo del Nordeste Recreational Trail, and Paseo de las Montanas Trail that run predominantly in the east/west direction. Developers are including mulit-use trails as part of the transportation system within the new developments. The I-40 Trail connects the east and west sides of the City crossing the Rio Grande River on a multi-use bicycle/pedestrian bridge.. Albuquerque's west side has fewer multi-use trails and is less well connected than the more mature multi-use trail system of Albuquerque's east side. The existing multi-use trail network is shown on figure 1.

Figure 8: Typical Multi-use Trail Paralleling an Arterial with Bike Lanes Lanes along Unser Blvd.

Figure 9: Multi-use Trail along Waterline Utility Easement Easement near Campbel Road

Figure 10: Multi-use Trails Intersecting

Multi-Use Trail Crossings

The City's extensive multi-use trail system intersects streets, highways, arroyos, drainages channels and The Rio Grande . Where these intersections occur, various crossing treatments are used to provide safe and convenient crossing opportunities for the trail user. These crossings can be divided into two basic groups, at-grade and grade separated.

Grade Separated Crossings

Grade separated crossing are further divided into two distinct categories; overpasses and underpasses.

Overpass

Overpasses provide locations where the multi-use trails pass above the obstruction. The multi-use trail may require a dedicated structure to provide this separated crossing. The multi-use trail may be aligned with an existing roadway bridge where the multi-use trail is provided a space on the bridge. Shared roadway/multi-use trail bridges can be found at some of the freeway, drainage channel and river crossings. In locations not having a bridge one would have to be constructed. They can range from a simple pre-fabricated truss bridge (Figure 14), typically used to cross the shorter spans of arroyos and drainage channels like those along North Diversion Channel and Paseo del las Montanas to the more complex bridge structure spanning multi-lane arterials and the Interstates similar to the structures crossing Tramway and I-40 (Figure 11-3).

Figure 11: I-40 Overpass Near Uptown

Figure 12: Paseo del Norte Multi-use Trail Overpass crossing 2nd Street

Figure 13: I-40 Overpass Connecting Residential Neighborhoods

Figure 14: Single Span Pre-fabricated Truss Bridge Crossing Drainage Channel

Underpass

An underpass serves a similar purpose as an overpass but differs in that the multi-use trail passes below the barrier. In locations where the multi-use trail is aligned with an existing roadway underpass the multi-use trail can be provided space adjacent to the roadway for the crossing. At locations of independent trail alignment a modified culvert large enough to provide safe access for the cyclist and maintenance equipment (Figure 15) can be effective. The City has successfully used a technique termed “notches” where roadway bridges intersect multi-use trails following major drainage channel alignments (Figure 16). A notch in the channel’s sloping side provides space for multi-use trail to pass below the bridge.

Figure 15: Concrete Box Underpass Structure beneath an Urban Principal Arterial

Figure 16: A Notch along the Drainage Channel Providing Multi-use Trail Access Under I-40

Figure 17: Multi-use Trial with Corrugated Multi-plate Type Underpass crossing 4th St.

At-Grade Crossings

At-grade multi-use trail crossings of roadways may occur at controlled or uncontrolled intersections and mid-block locations. Where the multi-use trail is in close proximity to a signalized intersection the trail alignment may be diverted to the intersection, as shown in the photo of the crossing at Matthew Ave.(Figure 18), where the multi-use user crosses at the crosswalk. Mid-block crossings are the most frequent at-grade multi-use trail crossings. Two-lane to six-lane streets with multi-use and trails mid-block crossings are located throughout the City's bikeways network.

Figure 18: Multi-use Trail Diverted to Signalized Intersection Crossing.

Figure 19: Multi-use Trail Mid-block Crossing of a Two-lane Residential Street.

Figure 20: Multi-use Trail Mid-block Crossing of Comanche Rd. a Four-lane Minor Arterial with Bike Lanes.

Figure 21: Multi-use Trail Mid-block Crossing of Wyoming Blvd. a Six-lane Principal Arterial.

Bikeway Supporting Facilities

Bikeway Signage

Bikeway signage includes signs to identify a bike route, lane or multi-use trail to cyclists and drivers (e.g. "Bike Lane" signs posted along a roadway with a bike lane), signs that provide regulations or warnings to cyclists or drivers (e.g. "Bike Xing" warning signs or bicycle-sized "Stop" signs) and signs that provide wayfinding to cyclists (e.g. trailhead signage or bike route numbering). Examples of some signs being used in Albuquerque are shown in Figure 22.

In Albuquerque, most on-street facilities have standard bikeway signage and some multi-use trail facilities have entrance monuments. There is currently little directional signage provided along bikeways in Albuquerque, either on on-street facilities or off-street multi-use trails. Most local street connections, continuous bikeway routes and destinations are not identified. Wayfinding is difficult on trails that do not parallel roads, since cross streets and familiar landmarks are sometimes difficult to use as reference points. An important area of concern is the inability to readily identify a location on the multi-use trails for emergency response purpose.

Figure 22: Examples of Bike Route, Share The Road, Bike Lane and Multi-use Trail Signs in Albuquerque

Bicycle Detector; Loops, Video Camera and Pushbuttons

Loop detectors are in-pavement wire sensors or video camera detection systems that activate traffic signals when a vehicle is positioned within or over the loop. The in-pavement wire sensor loops work by sensing the metal in the vehicle and the video cameras detect changes in the background image. The in-pavement loop detectors and video camera detector can be adjusted to be sensitive enough to detect when a bicycle has stopped over the loop, allowing a cyclist to activate a traffic

signal. At some intersections that do not have dedicated right turn lanes the City has installed pushbuttons, located at the stop bar next to the curb, allowing the cyclist to activate the pedestrian call.

Bicycle Parking and other End-of-Trip Facilities

Bicycle parking can be divided into two types: short-term and long-term, as described below.

Short-Term Parking

Short-term bicycle parking facilities consist of bicycle racks. These facilities are intended to accommodate bicycles of visitors, customers, messengers, and others for short periods of time. Racks are relatively low-cost devices that typically hold between two and eight bicycles, allow bicyclists to securely lock their frames and wheels, are secured to the ground, and are located in highly visible areas.

Albuquerque zoning code provides the following requirements for bicycle parking:

Parking for bicycles shall be provided on-site or on a site within 300 feet of the use, measured along the shortest public right-of-way, as follows:

(1) Residential use, five or more dwelling units or mobile homes per lot: one bicycle space per two dwelling units.

(2) Dormitory, fraternity or sorority house: one bicycle space for each six persons in residence.

(3) Nonresidential uses: one bicycle space per each 20 parking spaces required for automobiles and light trucks, but not less than two spaces per premises, unless otherwise specified below:

  (a) Drive-in theater, mortuary, or motel or hotel rental unit: None.

  (b) School elementary and middle: one bicycle space for each 20 students.

  (b) School high, commercial, and trade: one bicycle space for each 50 students.

Figure 23: Example of Short-Term Bicycle Parking Facilities

Valet Parking

Recently the City has experimented with Valet Bicycle Parking during special events that attract people traveling to the event by bicycle. For example, at the 2009 Albuquerque International Balloon Fiesta approximately 200 secure bicycle parking spaces were available. The valet parking area was conveniently located next to a multi-use trail that connects the North Diversion Trail to the nearby balloon launching fields. At peak use times the parking area was at full capacity. The City should be encouraged to continue this type of service at public events.

Long-Term Parking

The City has installed, through the Transportation Demand Program (TDM) Program, over 300 bicycle lockers at over 23 locations in the Metro area. Transportation Demand Management (TDM) program encourages the use of alternative modes of transportation to improve air quality and decrease traffic congestion in the Albuquerque area. The Transportation Demand Management (TDM) programs implemented by the public and private sectors help reduce traffic and sustain Albuquerque's economic vitality and air quality, thereby preserving and strengthening the quality of life in the city.

The City installs an average of 50 lockers per year. The locations for theses lockers come from request by individuals and employers. The purpose of this program is to provide secure bicycle parking to encourage bicycle commuting. Major employers that have taken advantage of the bike locker program include Intel, Honeywell, and the University of New Mexico .

Figure 24: Example of Bike Lockers that are Available through the TDM Program
Source: http://www.cabq.gov/albuquerquegreen/green-goals/transportation-options/bicycles

End-of-Trip Facilities

The City has no zoning requirement for end-of-trip facilities other than the bicycle parking requirements. Some businesses provide end-of-trip facilities such as bike lockers, showers and changing rooms for employees who commute to work.

Facility Analysis Process

As a citywide plan, the Albuquerque Bicycle Master Plan reflects previous planning efforts while focusing on providing a connected on-road bike network and multi-use trail network within Albuquerque. The existing bicycle facilities discussed in this report were developed from the Albuquerque Bikeways GIS layer, while proposed facilities were found in the MRCOG Bikeways GIS layer, Map 1 in Appendix A. One purpose of this planning process is to refine, augment and prioritize the proposed facility recommendations contained in the Mid-Region Council of Governments MRCOG Bikeways GIS layer. The final recommendations will be developed based on facilities recommended in previous planning efforts, needs analysis and level of service provided by existing facilities, input from stakeholders, fieldwork, community comment, and input from other relevant municipal staff and decision makers. The Level of Service will be determined by Bicycle Quality Index methodlogy (BQI) analysis will be submitted as a separate working paper.

System Gap Analysis

This section discusses the identification of gaps within the existing City of Albuquerque walkway and bikeway networks. The text first defines common bikeway and multi-use trail gap types with respect to Arterial streets and multi-use trails. Various gap closure measures used throughout the United States and other countries are listed, including both on- and off-street treatments that could be applied in Albuquerque. The text concludes with a procedure for identifying Albuquerque's bikeway and multi-use trail network gaps.

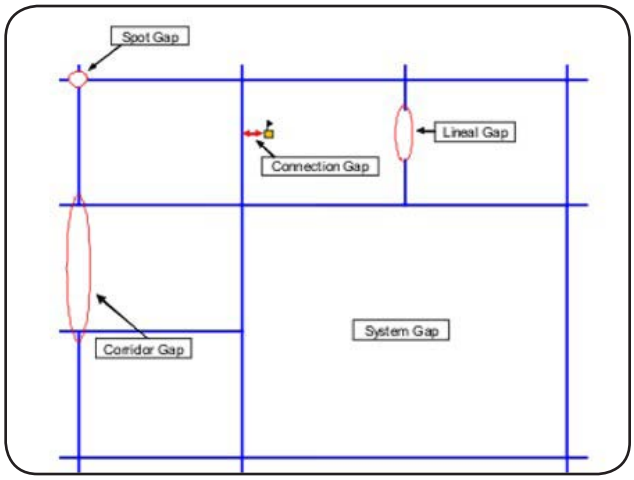

Figure 25: Diagram of Gap Types

Defining Bikeway and Multi-use Trail Gaps

Bikeway and multi-use trail gaps exist in various forms, ranging from short "missing links" on a specific street or multi-use trail corridor, to larger geographic areas with few or no facilities at all. Determining specifically what constitutes a "gap" requires setting parameters for the bikeway and trail networks and determining which activity centers require direct links to the networks. Gaps can then be organized based on length and other characteristics. Gaps can be classified into five main categories:

- **Spot gaps**: Spot gaps refer to point-specific locations lacking dedicated facilities or other treatments to accommodate safe and comfortable pedestrian or bicycle travel. Spot gaps primarily include intersections and other areas with potential conflicts with motor vehicles. Examples include bike lanes on a major street "dropping" to make way for right turn lanes at intersection, or a lack of intersection crossing treatments for pedestrians on a route or sidewalk as they approach a major street.
- **Connection gaps**: Connection gaps are missing segments (¼ mile long or less) on a clearly defined and otherwise well-connected walkway or bikeway. Major barriers standing between destinations and clearly defined routes also represent connection gaps. Examples include bike lanes on a major street "dropping" for several blocks to make way for on-street parking; a discontinuous sidewalk along a street; or a freeway standing between a major pedestrian or bicycle route and a school.
- **Lineal gaps**: Similar to connection gaps, lineal gaps are ½- to one-mile long missing link segments on a clearly defined and otherwise well-connected walkway or bikeway.
- **Corridor gaps**: On clearly defined and otherwise well-connected bikeways, corridor gaps are missing links longer than one mile. These gaps will sometimes encompass an entire street corridor where bicycle facilities are desired but do not currently exist (does not apply for walkway gaps).
- **System gaps**: Larger geographic areas (e.g., a neighborhood or business district) where few or no bikeways exist would be identified as system gaps. System gaps exist in areas where a minimum of two intersecting bikeways would be required to achieve the target network density (does not apply for walkway gaps).

Gaps typically exist where physical or other constraints impede walkway or bikeway network development. Typical constraints include narrow bridges on existing roadways, severe cross-slopes, and potential environmental damage associated with wider pavement widths. Traffic mobility standards, economic development strategies, and other policy decisions may also lead to gaps in a network. For instance, the City's desire for on-street parking or increased vehicle capacity may hinder efforts to install continuous bike lanes along a major street. Figure 25 presents a theoretical diagram illustrating the five gap types described above.

Gap Closure Measures

Numerous approaches exist for addressing bikeway system gaps. The following sections discuss various gap closure measures, ranging from minor treatments (e.g., signage) to larger-scale applications (e.g., new multi-use trail corridors). The measures generally fall into two categories:

- On-street bicycle gap closure measures
- Off-street gap closure measures

The two categories merely reflect the typical location of gap closure measures (e.g., off-street measures utilize non-roadway corridors to complete system gaps) and the users of the facility (pedestrians or bicyclists). In some scenarios, the on- and off-street measures can be used interchangeably to complete system gaps where necessary. For instance, on-street gap closure measures (e.g., intersection treatments) may be necessary to complete an multi-use trail that crosses several major streets with difficult crossings.

On-Street Bicycle Gap Closure Measures

On-street bikeway gap closure measures largely focus on completing on-street gaps, though some measures may also effectively fill off-street gaps. The on-street bicycle gap closure measures fall within four major categories:

- Intersection improvement measures facilitate safe, comfortable and convenient bicycle travel through intersections and other vehicle/bicycle conflict areas where minimal or no bicycle facilities exist
- Arterial bike lane retrofit measures add bike lanes to existing major streets
- Arterial shared roadway measures accommodate bicyclists on major streets where bike lanes are desired but not possible
- Alternative routing measures re-route bicyclists onto secondary streets as an alternative or supplement to the Arterial bikeway network

Intersection Improvement Measures

Intersection improvements concentrate on facilitating safe, convenient and comfortable bicycle travel through intersections where minimal or no bicycle facilities exist. While the measures are largely intended for bikeways on major streets, some treatments may be appropriate on bikeways using secondary street corridors, and at multi-use trail/roadway crossings. Although the intersection improvement measures are most appropriate for addressing spot gaps, they could supplement other measures as part of larger efforts to address lineal, segment, corridor and system gaps.

Figure 26: “Bike Box” on Indian School Rd.

Treatments for improving intersections for bicyclists include:

- Bicycle detection at traffic signals
- Shared bicycle/right-turn lanes
- Bike boxes
- Colored bike lanes
- Shared bicycle/double right-turn lanes

Interchange Areas

Arterial streets may include free-flowing interchanges with high-speed merge lanes at freeway entrance and exit ramps. These conditions create a challenging bicycle environment for several reasons:

- Merging (especially exiting) motorists do not expect to see cyclists
- Motorists cross the bicyclist’s direction of travel at high speeds where multi-use trails cross ramp areas
- The angle and position of the merging ramp creates visibility challenges, forcing bicyclists to monitor overtaking traffic by looking over their left and right shoulders
- Exiting vehicles may not signal their intent to cross the bicyclist’s travel multi-use trail
- The design of merge/diverge points typically includes long vehicle/bicyclist conflict zones

Albuquerque should consider solutions to these issues that have been implemented successfully in other major metropolitan areas. The City of Portland, Oregon has addressed this issue with striping or physical elements that encourage bicyclists to cross ramps at or close to a right angle. The treatment shortens the vehicle/bicycle conflict zone while also improving sight distance for bicyclists. Some bicyclists may choose to ignore this treatment however, as this creates a less-direct route through the interchange area and forces them to relinquish right-of-way to exiting motorists.

Arterial Bike Lane Retrofit Measures

Most Arterial streets in Albuquerque exhibit characteristics (e.g., high vehicle speeds and/or volumes) where dedicated bicycle lanes may better accommodate safe and comfortable riding. Indicating a preferential or exclusive space for bicycle travel, bike lanes are typically five to six feet wide with delineation taking the form of striping and pavement stencils. These facilities create a predictable environment for motorists and bicyclists by clarifying the appropriate position for each user on a roadway. Bike lanes on congested streets also enable cyclists to pass slow or stopped vehicles on the right.

The measures listed below represent various approaches for adding bike lanes to existing streets. Although opportunities to add bike lanes through roadway widening may exist in some locations, most major Albuquerque streets pose physical and other constraints requiring street retrofit measures within existing curb-to-curb widths. As a result, the measures effectively reallocate existing street width through striping modifications to accommodate dedicated bike lanes.

The bike lane retrofit measures listed following are most appropriate for addressing connection gaps and lineal gaps, though they could supplement other measures to address corridor and system gaps. Although largely intended for Arterial streets, these measures may be appropriate on some Collector streets where bike lanes would best accommodate cyclists.

Treatments for retrofitting arterial streets with bike lanes include:

- Shoulder widening
- Removing travel lanes (road diet)
- Floating or off-peak bike lanes
- Left side bike lanes on one-way streets
- Cycle tracks
- Reducing travel lane or on-street parking lane widths
- Removing on-street parking
- Uphill bike lanes
- Contra-flow bike lanes on one-way streets

Arterial Shared Roadway Measures

Although most Arterial streets in Albuquerque have sufficient traffic volumes to warrant dedicated bike lanes, physical constraints or other factors may preclude these facilities. Because Arterial streets typically provide the most direct routes to major bicyclist destinations and also serve as destinations in and of themselves, bicycle facility provisions on these corridors still hold great importance.

The measures below represent various approaches for accommodating bicyclists on major streets where bike lanes are desired but not possible. Similar to the bike lane retrofit measures described earlier, the Arterial shared roadway measures work within existing curb-to-curb widths but do not impact vehicle or on-street parking capacity. The measures include various signage and pavement marking treatments to inform motorists of bicyclists on the roadway, and to inform all users of appropriate behaviors.

The Arterial shared roadway measures described below are most appropriate for addressing connection gaps and lineal gaps, though they could supplement other measures to address corridor and system gaps. Although largely intended for Arterial streets, these measures may be appropriate on some Collector streets.
Treatments appropriate for shared roadways include:

- Wide curb lanes
- Combined bicycle/bus lanes
- “Share the Road”/”Watch for Bicyclists” Signage
- “Bike Lane Merges” Signage
- Shared lane markings
- Warning signage on shared roadways
- “Bicyclists Allowed Use of Full Lane” Signage

Alternative Routing Measures

Alternative routing on secondary streets may be necessary to address bikeway connectivity needs where constraints preclude bike lanes or other treatments on Arterial roadways. Alternative routing may also be necessary where constraints preclude a continuous multi-use trail corridor. Although these measures can effectively fill on- and off-street bikeway gaps, they should be applied only after careful consideration of several factors, discussed below.
Bicyclists often gravitate to Arterial and other major streets for several reasons:

- Major streets generally offer the most direct routes between bicyclist destinations while providing better connectivity compared with lower-order streets. Consequently, commuter cyclists and those traveling longer distances often gravitate to these routes.
- Major streets usually have the right-of-way or signals favoring through traffic, whereas secondary streets often have numerous stop signs which can slow bicycle travel.
- Major streets include provisions to overcome major barriers such as railroads, freeways and drainage channels.
- The commercial character of major streets (e.g., employment, shopping, etc.) makes these corridors destinations in and of themselves.

- Illustrated in figure 27, alternative routing measures pose several challenges:
- Bicyclists on major streets may ignore alternative routes if they are used to overcome spot gaps and connection gaps. The relatively short lengths of spot and connection gaps may induce riders to remain on the thoroughfare despite the lack of bicycle accommodations, potentially creating safety issues.
- Bicyclists may perceive the alternative route as too circuitous.
- The alternative route may include uncontrolled crossings of major streets.

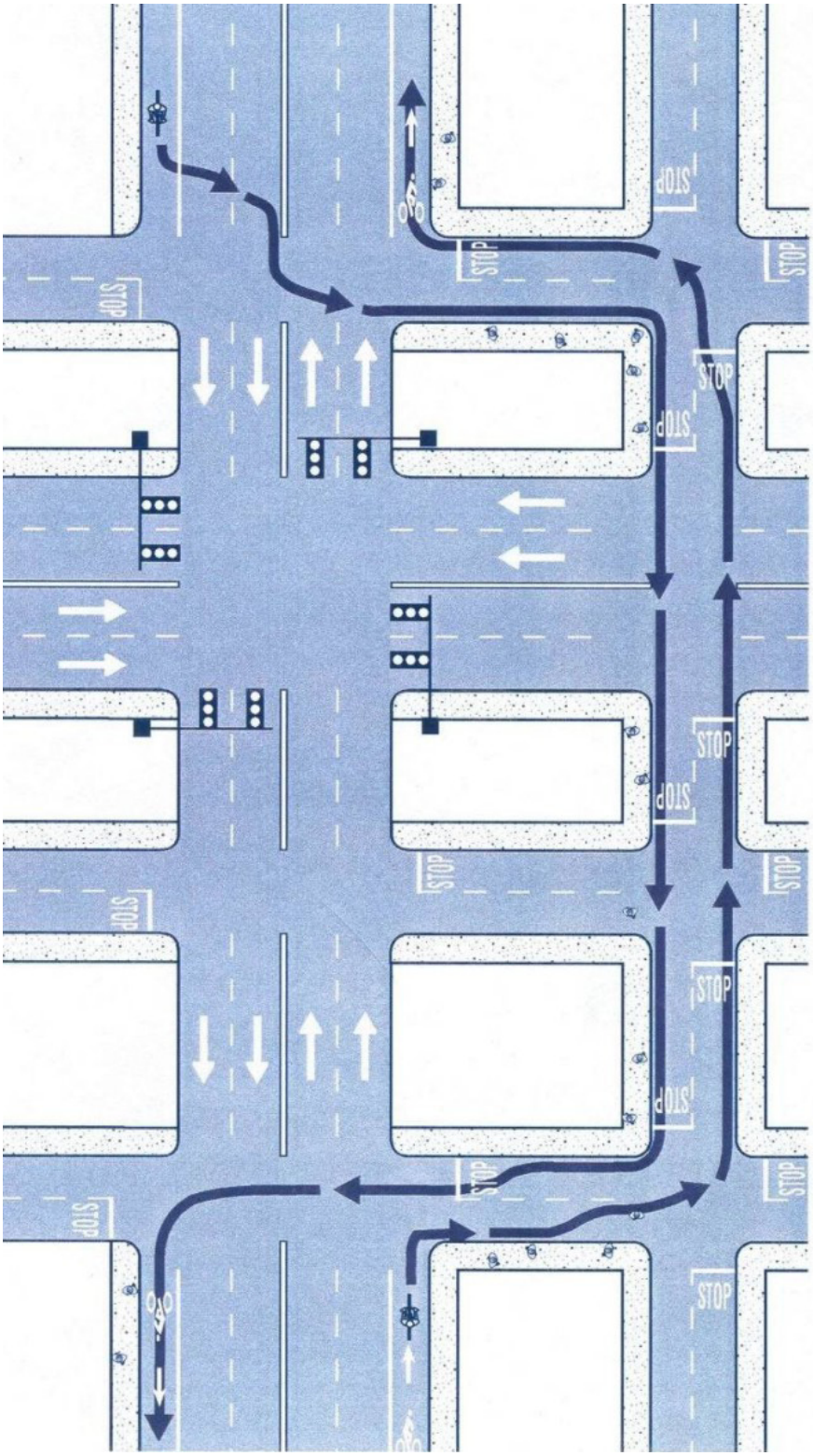

Figure 27. Alternative routing issues
(source: Oregon Bicycle & Pedestrian Plan)

It should be noted that alternative routing measures on secondary streets offer some benefits. Some users may not feel comfortable riding on major streets for various reasons (e.g., high traffic volumes and vehicle speeds, conflicts with motorists entering and leaving driveways, and/or conflicts with buses occupying bike lanes while loading and unloading passengers). Children and less-experienced riders might find these environments especially challenging. Secondary streets provide alternate route choices for bicyclists uncomfortable using the major street network.

Albuquerque benefits from a generally well-connected system of Collector and Local streets in many neighborhoods that – with the addition of relatively small-scale treatments – could be used to overcome bikeway system gaps. These streets (referred to as Bike Routes or Signed Shared Roadways) accommodate bicyclists and motorists in the same travel lanes often with no specific vehicle or bike lane delineation. These corridors include warning signage to alert motorists of bicyclists on the roadway, and may include wayfinding signage to orient cyclists on the route.

Alternative routing measures are largely intended to address lineal, corridor and system gaps, and are less appropriate for addressing spot and connection gaps (spot and connection gaps should be directly addressed on the corridor in which they are located). The measures fit within the overall concept of "Bicycle Boulevards," which incorporate a variety of treatments to enhance bicycle travel on these lower-order streets.

Off-Street Gap Closure Measures

The sections below describe multi-use trail gap closure measures emphasizing off-street treatments. The measures largely focus on completing multi-use trail/bikeway gaps (e.g., discontinuous multi-use trail segments), and are most appropriate for addressing connection, lineal, corridor and system gaps on the multi-use trail network. It should be noted however that some measures could effectively address some multi-use trail or bikeway gaps, especially connection gaps near on-street bikeways (e.g., a bicycle/pedestrian bridge crossing a freeway to connect an on-street bikeway with a nearby school).

Figure 28 Potential Multi-use Trail Alignment along the Alemeda Drain an Existing MRGCD Easement.

Off-street gap closure methods can include:

- **Drainage easements** utilize maintenance easements to complete multi-use trail system gaps. Drainage corridors offer several advantages, including relatively direct routes between major destinations, and following gently sloping terrain.
- **Utility and Irrigation Corridor** Trails typically include power line and water utility easements, as well as canals, and drainage ditches. These corridors offer excellent transportation and recreation opportunities for cyclists of all ages and skills. Some safety issues due to proximity to the irrigation ditches or power poles should be understood and appropriate protective fencing/railing and warning signs installed.
- **Bicycle/pedestrian overcrossings and undercrossings** provide critical multi-use trail system links by joining areas separated by any number of barriers. Overcrossings and undercrossings address real or perceived safety issues by providing users a formalized means for traversing "problem areas" drainage channels, waterways or major transportation corridors.

Figure 29 Multi-use Trail Sharing a Utility Easement Along the Alemeda Drain an in the Near North Valley.

Addressing Albuquerque Bikeway Network Gaps

This section describes the recommended procedure for addressing gaps on the Albuquerque bikeway and trail networks. The procedure involves a series of sequential steps incorporating information described throughout this working paper.

Given the diversity of bikeways and other conditions, the City should consider the procedure a "living document" and remain open to flexibility to address unique circumstances. Figure 30 graphically depicts the procedure discussed below.

Steps in Addressing Bikeway Network Gaps

Step 1: Identify Gap Type

Identify the gap type (e.g., spot gap, connection gap, lineal gap, corridor gap, system gap).

Step 2: Identify Appropriate Range of Gap Closure Measure Types

The type of gap determines the initial range of closure measure options. For instance, longer system gaps can be filled using nearly all gap closure measure types described in this memo, while a limited range of measures are appropriate for shorter gaps such as spot and connection gaps. Using Figure 30, determine the initial range of options.

Step 3: Determine Appropriate Location for Gap Closure Measures

The type of gap also determines the appropriate gap closure location. Due to their relatively short lengths, spot and connection gaps should be addressed specifically where they exist. Mentioned earlier, alternative routing measures are not an appropriate measure for addressing these gaps. Although addressing spot and connection gaps may prove challenging, they represent the most critical walkway and bikeway links.

In general, the majority of bikeway gaps should also be addressed specifically where they exist. Cyclists should not be re-routed further than across a street, and then only temporarily during construction. However, bikeway gap closure measures should be prioritized in areas of the City where more cyclists are expected to be, i.e. along routes to schools or near mixed-use centers.

Lineal, corridor and system bikeway gaps, typically covering longer distances, offer greater implementation flexibility. Bicyclists generally prefer direct travel routes, though they may tolerate route diversions to avoid long bikeway gap segments. Identifying the appropriate gap closure location for lineal, corridor and system gaps involves evaluating the feasibility of adding bicycle facilities to the major street or multi-use trail corridor under focus versus the appropriateness of using alternative routes. The feasibility analysis should consider the following:

- Whether compelling safety, operational, environmental, economic, or other reasons preclude bicycle facilities on the major street or multi-use trail corridor under focus
- Proximity of alternate route to the major street of multi-use trail corridor under focus
- Connectivity and continuity provided by the alternate route

The feasibility analysis will determine whether bicycle facilities should be added directly on the major street or multi-use trail corridor under focus, whether alternative routing is necessary, or both.

Step 4: Determine Appropriate Gap Closure Measure Type

The appropriate gap closure measure type depends both on the walkway or bikeway gap type and location. Intersection improvement measures or mid-block crossings represent the most appropriate strategy for addressing spot gaps, while sidewalk infill, Arterial bike lane retrofit, Arterial shared roadway, and off-street gap closure measures represent the most appropriate strategies for closing connection gaps. Appropriate measures for lineal, corridor and system gaps depend on the feasibility analysis referenced in Step 3.

Step 5: Determine Specific Gap Closure Measure

Identification of the appropriate gap closure measure type and specific characteristics of the corridor/location under focus will help determine the appropriate specific gap closure measure.

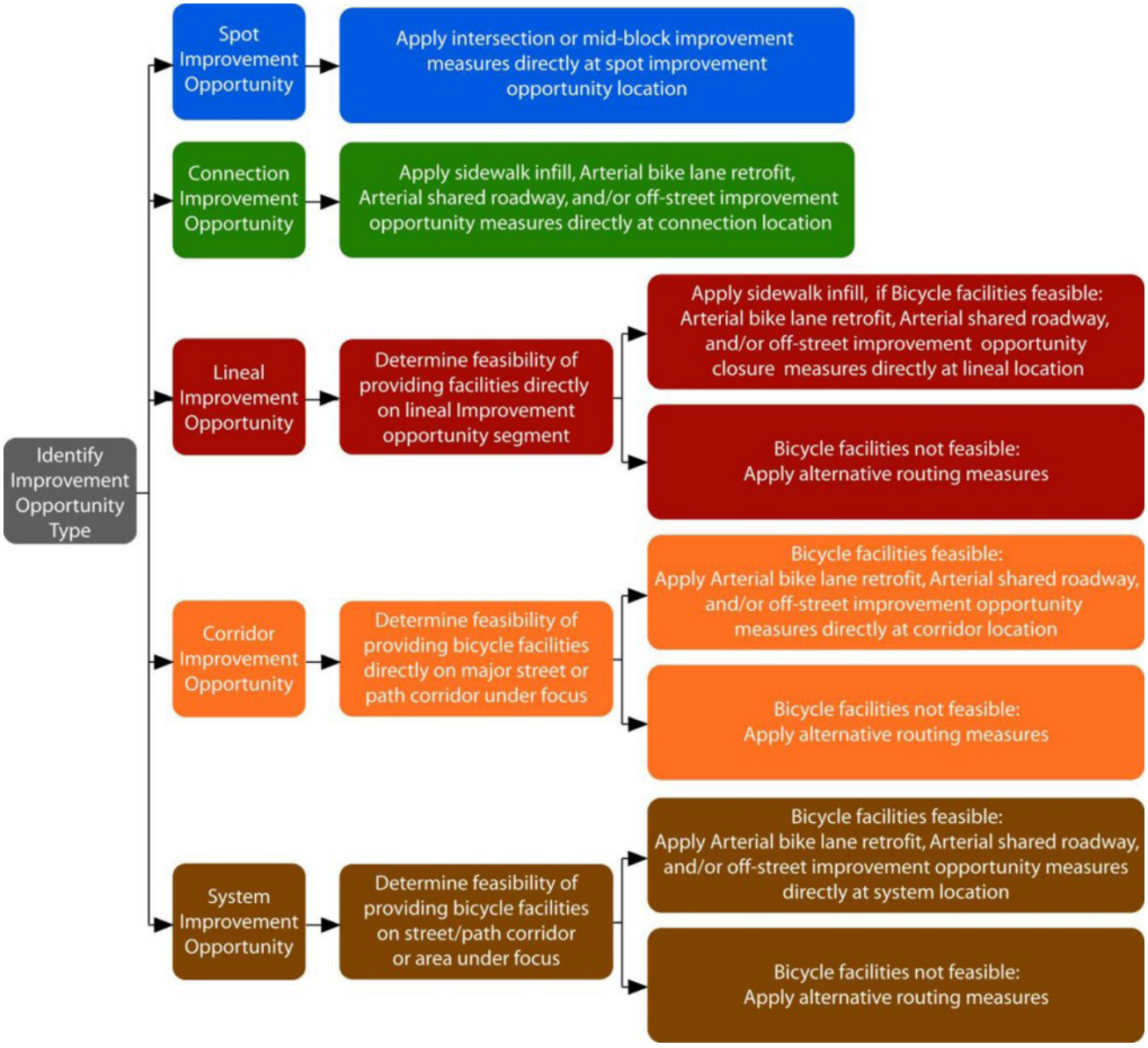

Figure 30: Recommended Albuquerque Bikeway and Multi-use Trail Gap Closure Procedure

Opportunities and Constraints

This section provides an analysis of the existing conditions for bikeways and multi-use trails in Albuquerque and outlines improvement opportunities. The section also identifies some potential barriers to accommodating and encouraging bicycle trips, which this Plan seeks to overcome.

Opportunities

Various characteristics foster an environment where bicycling is safe and enjoyable in Albuquerque. Our preliminary field investigations have uncovered needs and opportunities for expansion of the existing bikeways and multi-use trail system in the metropolitan area. In the northeast and southeast quadrants, shown on Maps 3 and 5 in Appendix B, are opportunities that warrant consideration:

- Connection to the Rail Runner Station(s)
- Provide better bicycle access into the Journal Center and Balloon Fiesta Business Park
- Multi-use trail along Tramway Boulevard between I-25 and the County line

- Connections to trail heads in the Cibola National Forest for mountain bike riding
- Potential Bicycle Boulevards on Claremont Avenue and Cutler Avenue
- Improved access to the Expo New Mexico, Sandia National Labs. and UNM/CNM
- Crossings of I-25
- Arroyo and drain alignments

In the northwest and southwest quadrants, shown on Maps 2 and 4 in Appendix B, are opportunities that warrant consideration:

- Connections to the Petroglyph National Monument
- Potential Bicycle Boulevard along the frontage road north side of Central Avenue between Unser Boulevard and 98th Street
- Bike lanes along West Central Avenue (Historic Rote 66)
- Better connectivity into Rio Rancho
- Denser bikeways network south of Bridge Boulevard
- Crossing of I-40
- Arroyo and drain alignments

As our field investigations progress, along with; public involvement, stakeholder groups, interviews and surveys, additional opportunities will be better understood and included in the master plan. An overview map of identified opportunities for the metropolitan area can be found in Appendix C.

Population Growth in Albuquerque

As the population of Albuquerque continues to grow, the City needs to plan for a truly multi-modal transportation system that serves the needs of all residents. The City's' rapid growth is occurring west of the Rio Grande both in the northwest and southwest quadrant. Roughly half the people in New Mexico live in the Albuquerque area.

Population of Albuquerque	
Year	Population
2000	448,607
2006	507,789
2010	535,239

Population of Metro Area (includes Bernalillo, Sandoval and Valencia counties)	
Year	Population
2000	712,738
2005	766,016
2009	857,903
2020, projected	1,000,000

Land Use & Demand

The concept of "demand" for bicycle facilities can be difficult to comprehend. Unlike automobile use, where historical trip generation studies and traffic counts for different types of land uses permits an estimate of future "demand" for travel, bicycle trip generation methods are less advanced and standardized in the United States. Land use patterns can help predict demand and are important to bikeway planning because changes in land use (and particularly employment areas) will affect average commute distance, which in turn affects the attractiveness of bicycling as a commute mode. The Bikeways network will connect the neighborhoods where people live to the places they work, shop, recreate, or go to school. An

emphasis will be placed on regional bikeway connections centered on the major activity centers in Albuquerque, including:

- Major employment centers
- Civic buildings such as libraries
- Transit Stations
- Major retail and commercial centers
- Schools
- Parks and regional recreational areas

Existing Network Coverage

The existing bicycle facility network coverage provides an understanding of how accessible the existing bicycle facilities are to the residents of Albuquerque. The goal is to provide a bikeway every half mile, putting a bicyclist a maximum of a quarter-mile from a bicycle facility. Albuquerque is well-served in northeast quadrant; however the further west one travels, additional gaps in both the connectivity and accessibility of the bikeway system appear.

Encouragement and Education Programs

The City of Albuquerque sponsors bike to work day in May. In addition, The City of Albuquerque has a website http://www.cabq.gov/bike that includes links to information about:

- Parks and Recreation Bike Safety Education Program
- Bike Paths in Open Space
- Tingley Bike Rentals
- Albuquerque Bike Maps
- Bicycling Planning
- Bike Clubs, Groups & Events
- Paseo del Bosque Bike Trail
- Open Space Trail Etiquette
- Bicycling & Mass Transit
- Documents & Government
- City Committees

Bicycle/Pedestrian Safety Education

The City's Bicycle/Pedestrian Safety Education Program began in 1995 with a mission to design and provide for the citizens of the Albuquerque metropolitan area educational activities and information which promote bicycle and pedestrian safety, bicycling and walking as alternative transportation modes, and the health benefits of cycling and walking.

A primary objective of the program is to increase the bicycle safety knowledge of Albuquerque Public School elementary Students (4th & 5th grade) through bicycle safety presentations and "bike rodeos".

Youth Bicycle Safety Program

The City offers a free, year round bike safety clinic for youth ages 7-10 teaching children how to "drive" their bike safely through a safety talk and a hands-on experience.

Bicycling 101

The City of Albuquerque Park and Recreation Dept Bicycling 101 is a comprehensive class for adults (children 12 or older considered with parents or guardians) certified by the League of American Bicyclists. An Advanced Mechanics Class is also available.

Source http://www.cabq.gov/recreation/bicycle.html

Multi-Modal Connections

Multi-modal refers to the use of two or more modes of transportation in a single trip, (i.e., bicycling and riding the bus or train). This section describes bicycle-transit connections. Linking bicycles with Albuquerque's mass transit effectively increases the distance cyclists can travel, provides options in the event of a bicycle breakdown or collision, and gives cyclists alternatives to riding at night or in hot or inclement weather.

Making an effective multi-modal connection consists of several key elements:

- Providing bicycle parking facilities at transit stops and bike racks or storage on trains and buses
- Improving bikeways that link with transit facilities and stops
- Encouraging the use of bicycles on transit through education and encouragement programs

Bike & Ride the Bus

Bicycle racks are mounted on the front bumpers of all AbqRide buses that can carry most types of non-motorized bicycles. The City's 300 and 400 series buses have a rack that can hold two bikes at a time, while the 700, 900 and Rapid Ride buses can accommodate three bikes. If the bike rack is full the bike policy is as follows:

- Only when the bicycle rack is full, and the bus is not to full capacity with passengers (i.e. there is sufficient space to hold a bike without impeding other passengers), the passenger will be allowed to take the bike on the bus.
- The bicycle will only be allowed in the front portion of the bus in the wheelchair area and only if the space is free.
- The passenger will be required to stand with their bicycle to secure it.

Source http://www.cabq.gov/transit/getting-around/bicycling

New Mexico Rail Runner Express

Santa Fe is now connected to Belen by the Rail Runner Express, commuter train. The Rail Runner currently has eleven stations; three of these are in Albuquerque. The Alvarado Transportation Center is its busiest station and is a multi modal hub for rail/transit and cycling. Current bicycle use of the Rail Runner far exceeds the anticipated demand creating some challenges in bicycle storage on the train and long term storage at the stations. The bicycle-on-train counts provided by MRCOG for the year 2009 indicate a higher demand during the warmer months and may also be attributed to an increase in weekend train service.

January 1, 2009 - March 31, 2009		
	Bikes On	Average/Day
Weekday Totals	7,094	112
Saturday Totals	789	60
Sunday Totals	7	7
Grand Totals	7,890	102

April 1, 2009 - June 30, 2009		
	Bikes On	Average/Day
Weekday Totals	10,068	154
Saturday Totals	786	60
Sunday Totals	107	107
Grand Totals	10,961	138

July 1, 2009 - September 30, 2009		
	Bikes On	Average/Day
Weekday Totals	12,389	190
Saturday Totals	1,138	87
Sunday Totals	120	24
Grand Totals	13,647	164

October 1, 2009 - December 31, 2009		
	Bikes On	Average/Day
Weekday Totals	8,920	139
Saturday Totals	667	51
Sunday Totals	172	13
Grand Totals	9,759	108

Bicyclist Destinations

It is particularly important for bikeway and the multi-use trail networks to provide access to destinations popular among pedestrians and bicyclists. Within Albuquerque, popular destinations include:

- Educational facilities including UNM, CNM, elementary, junior high and high schools
- Employment centers including: Kirtland Air Force Base/Sandia Labs, Intel, Journal Center and Mesa del Sol
- Commercial areas including those along Route 66/Nob Hill, Coronado and Cottonwood Mall, ABQ Uptown and neighborhood shopping centers and grocery stores
- Public facilities such as the Bio Park, Albuquerque Public Libraries, and museums
- Old Town, Downtown and Uptown Albuquerque
- Rural roadways on the community's outskirts for recreational cyclists
- Nearby communities in the East Mountains and South Valley, Valencia County and Sandoval County
- Natural areas within and outside Albuquerque including Albuquerque Open Space, Sandia Mountain foothills, National Monuments, Rio Grande Valley State Park

Connections to Schools

Students, whether in elementary school, high school, or at the university level, traditionally are more likely to walk or bike than other demographic groups. It is therefore critical for the bikeway and multi-use trail networks to provide safe and convenient access to schools.

Constraints

Identified below are major constraints that most bicyclists in and around Albuquerque encounter on their bicycle trips. Maps 2 through 5 in appendix B provide a graphical display of these constraints. To provide a direct, safe and connected bikeways and multi-use trail system the following constraints should be considered and resolved when possible.

- Rio Grande River
- Expo New Mexico
- Private neighborhoods
- Drainage and irrigation alignments
- Open Space
- I-40 and I-25
- Airports
- Military base
- West Mesa Escarpment
- Railroad tracks
- Golf Courses
- Indian Pueblos
- Major arterials

Topography

Albuquerque is located within the Rio Grande Rift valley. The valley's alignment is north/south with gently sloping side to the east meeting the Sandia Mountains with slightly steeper sloping topography on the west side where it encounters the west mesa escarpment. The elevations within the City range from approximately 4950 feet along the Rio Grande to 6100 feet in the Sandia foothills and 5750 feet of the west mesa. Few rolling hills exist except for the when crossing the North Diversion Channel, along the west mesa escarpment and in the Sandia foot hills. The broad central portion of the Rio Grande valley especially east of the river has very little change in elevation and could be considered being nearly level. The topography of Albuquerque is well suited for cycling with gentile terrain and the occasional hill.

Geography

According to the United States Census Bureau, Albuquerque has a total area of 181.3 square miles. 180.6 square miles of it is land and 0.6 square miles of it (0.35%) is water. The developed metro area is over 1,000 square miles. The city is bordered to the north by Sandia Pueblo and Rio Rancho, to the east by the Sandia Mountains and to the south by Kirtland Air Force Base and Isleta Pueblo restricting the majority growth to the westerly direction. The Rio Grande River flows in a southerly direction through the central portion of the metropolitan area dividing the west and east sides of the city.

Wayfinding Tools

Albuquerque's bikeways and multi-use trail system could benefit from signage and other wayfinding tools to orient users and direct them to and through major destinations like. Wayfinding is difficult on trails that do not parallel roads, since cross streets and familiar landmarks are sometimes difficult to use as reference points. An important area of concern is the inability to readily identify a location on the multi-use trails for emergency response purpose.

Figure 31: Examples of Wayfinding Sign being used in Albuquerque

Discontinuous Multi-use Trail System

Although the City of Albuquerque has made significant progress toward completing a comprehensive bikeways and multi-use trail system, several major gaps remain. One notably discontinuous area includes access to the trails in the northwest region of the city. Some examples are, the Paseo del Norte multi-use trail connection at Coors Boulevard and through or around Paseo del Norte interchange should be improved by connecting to multi-use trails west of Coors Boulevard. Multi-use trails along Unser Boulevard and 98th Street, south of I-40, should be linked together by additional multi-use trails in the east/west direction. The multi-use trails in Paradise Hills and Taylor Ranch lack sufficient north/south connections.

Appendix A not included

Appendix A

Map 1 Bikeway Facilities Proposed by Mid Region Council of Governments

Appendix B not included

Appendix B

Opportunities and Constraints Maps by Quadrant: Maps 2, 3, 4 and 5

Appendix C not included

Appendix C

Overview - Opportunities and Constraints Map