Northwest Corridor
Bicycle and Pedestrian Accessibility Study

Summary Report

Denver Regional Council of Governments
Sustainable Communities Initiative
December 2014

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Acknowledgements

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Stakeholders

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- Adams County Housing Authority: Don May
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- City of Boulder: Kathleen Bracke and Lesli Ellis
- City and County of Broomfield: Debra Baskett and Katherine Horne
- City of Louisville: Heather Balser and Troy Russ
- City of Westminster: Grant Penland and Aric Otzelberger
- RTD: Genevieve Hutchison
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Introduction: The Need for Connections

The goal of this project is to enhance bicycle and pedestrian access and mobility within the first and last mile of new transit stations.

The state of Colorado and the Regional Transportation District (RTD), along with its local jurisdiction partners, have made significant transportation investments in the Northwest Corridor (the Corridor) in recent years. Along with the Colorado Department of Transportation (CDOT) US 36 Express Lanes Project, which includes the US 36 Bikeway, RTD is currently constructing two FasTracks projects in the corridor: the US 36 bus rapid transit (BRT) Line and a segment of the Northwest Rail Line (from Denver Union Station to Westminster Rail Station), both scheduled to open in 2016. Together, these transportation projects will improve multimodal mobility and access between Denver and Boulder and points in between.

In order to maximize investments that have been made in the Corridor, the Denver Regional Council of Governments (DRCOG), through its Sustainable Communities Initiative (SCI), hosts a partnership of Corridor public and private sector organizations whose goals include enhancing bicycle and pedestrian access and mobility within the first and last mile of new transit stations. The Northwest Corridor Bicycle and Pedestrian Accessibility Study (NW Corridor Study) is charged with the same goal. The project builds upon the 2013 US 36 First and Final Mile (FFM) Study by 36 Commuting Solutions and advances the top priorities identified in that study.

First and final mile transit connectivity for bicyclists and pedestrians has several benefits:

- Provides easier access to transit, which can increase ridership and/or relieve the need for costly automobile parking;
- Encourages active transportation, which is linked to improved personal health and other benefits; and
- Has the potential to result in increased economic activity along bicycle and/or pedestrian routes.

This summary report presents the findings from the NW Corridor Study, which includes the following discrete subject areas: Branding and Wayfinding, Connectivity Improvements, Secure Bicycle Parking, and Bicycle Share. Together, these actions form a holistic approach to enhancing first and final mile connections to NW Corridor transit. This report is supported by five appendices which include reports and drawings related to each of those subject areas, and detailed information about analysis and findings.

Study Area

The study area for this project, shown in **Figure 1**, consists of the following seven transit stations, which comprise the Northwest Corridor:

- Table Mesa BRT Station
- McCaslin BRT Station
- Flatiron BRT Station
- Broomfield BRT Station
- Church Ranch BRT Station
- Westminster Center BRT Station
- Westminster Rail Station

Northwest Corridor Bicycle/Pedestrian Accessibility Study

- Station Study Area
- US 36 BRT Line
- Northwest Rail Line (funded)
- Local Service

DRCOG
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Toole Design Group

Figure 1: Study Area Map

Scope of Work

The project consultant team was led by Toole Design Group and supported by Cloud Gehshan Associates, Fehr & Peers, and CDR Associates. Each of the four technical tasks of the project followed a similar process including stakeholder coordination, existing conditions analysis, concept development, design, and the development of implementation considerations. Specific information about the scope of each task is discussed below.

The project included detailed study in four subject areas: Branding and Wayfinding, Connectivity Improvements, Secure Bicycle Parking, and Bicycle Share. Together, these actions would form a holistic approach to enhancing first and final mile connections to NW Corridor transit.

Branding and Wayfinding

This task included the design of a uniquely-branded wayfinding signage system to be used in three different contexts:

1. At the Corridor transit stations;
2. Within the station study areas, which are the communities within an approximately one-mile radius around each transit station; and
3. Along the US 36 Bikeway, to supplement and complement the signage already being installed.

The project team conducted three stakeholder workshops throughout the project to understand the system needs for signage, develop sample journeys,[1] and gain feedback on sign design options. At the outset of the project, each station and its surrounding area were visited, and existing wayfinding and signage conditions were analyzed. Based on the goals for the system, the functional and aesthetic requirements for both pedestrian and bicyclists were determined. Schematic design was then completed in three iterations: initial design concepts, refined design concepts, and a preferred design concept. Finally, planning-level costs were developed for the preferred design concept.

Connectivity Improvements

This task included the conceptual design of one priority bicycle or pedestrian connectivity improvement at each station. The project team started with the previously-developed FFM Study list of infrastructure recommendations and met with each study area local jurisdiction to identify the priority connection for each station. Conceptual design plans were then developed for each priority connection, using high-resolution aerial photography provided by DRCOG. Based on these designs, construction cost estimates were developed.

Secure Bicycle Parking

This part of the study included conceptual design of secure bicycle parking at all Corridor stations. To complete this task, data was collected and analyzed from site visits and a stakeholder workshop. Additional data was provided by RTD,

1 Sample journeys are representative routes that a pedestrian or bicyclist could travel along within the study area.

36 Commuting Solutions, and Boulder County. During the data collection phase, Boulder County was interviewed about their Bus-Bike shelter experience, design, and site locations. Conceptual designs were then completed for a total of 11 shelters using aerial photography, and cost estimates were developed.

Bicycle Share

This task included the development of a feasibility study for bicycle share in the Corridor. To complete this task, data was collected and analyzed from site visits and a stakeholder workshop conducted by the project team in October 2014. Additional data was provided by RTD, 36 Commuting Solutions, and from the U.S. Census. The project team worked closely with local jurisdictions along the corridor to identify the key activity centers, develop goals for bicycle share, and recommend technologies for each station study area. The feasibility study introduces the concept of bicycle share and provides bicycle share recommendations for each transit station in the Corridor.

The Northwest Corridor Working Group has a long-standing history of collaborative decision-making, and this project was no exception.

Stakeholder Collaboration

The Northwest Corridor Working Group (CWG) was the primary stakeholder group engaged in this project. Members include specific individuals from the following organizations: DRCOG, RTD, 36 Commuting Solutions, City of Boulder, Boulder County, Town of Superior, City of Louisville, City and County of Broomfield, City of Westminster, Adams County Housing Authority, and CDOT.

The CWG has a long-standing history of collaborative decision-making, and this project was no exception. Some CWG members were involved as early as the project scoping process, and all were engaged throughout the project. **Table 1** summarizes the project meetings held with stakeholders. Effective involvement of the CWG was particularly critical due to the consolidated project schedule. For that reason, the stakeholder process was designed to:

- Build upon previous work;
- Gain buy-in early throughout the process;
- Discuss coordination and implementation considerations amongst the group; and
- End with useful products that can be advanced to the next design phase.

Because this project was already entering a design phase and due to schedule constraints, it did not formally include engagement with the general public. Project staff did present information at two public meetings, however: the US 36 BRT Station Area and Connectivity Open House on November 1, 2014 in Broomfield, and the City of Boulder Transit Projects Open House on December 3, 2014.

Table 1: Summary of Stakeholder Meetings

Date	Study Task	Goals for the Meeting
August 21, 2014	Connectivity Improvements	Information gathering from City and County of Boulder about Table Mesa BRT Station priority connection
September 5, 2014	Secure Bicycle Parking	Presentation of state of the practice, goal setting, feedback on desired designs, features, and locations
September 9, 2014	Branding and Wayfinding	Information gathering, scope definition, goal setting
September 18, 2014	Connectivity Improvements	Information gathering from City of Louisville, Town of Superior and County of Boulder about McCaslin BRT Station priority connection
September 22, 2014	Connectivity Improvements	Information gathering from City of Westminster about Westminster Center and Church Ranch BRT Stations priority connections
October 1, 2014	Connectivity Improvements	Information gathering from City of Broomfield about Broomfield and Flatiron BRT Stations priority connections
October 16, 2014	Bicycle Share	Presentation of state of the practice, goal setting, discussion of technology for each station study area
October 20, 2014	Branding and Wayfinding	Presentation of and feedback on initial design options
October 27, 2014	Connectivity Improvements	Information gathering from City of Westminster and Adams County Housing Authority about Westminster Rail Station priority connection
November 20, 2014	Branding and Wayfinding	Presentation of and feedback on refined design options
December 3, 2014	All	Presentations of and feedback on final findings.

Recommendations: Improving the First and Final Mile

Recommendations are intended to create connected, comfortable, and easy to navigate communities around each station.

Recommendations were developed for each of the study tasks. Particularly when considered as a whole, these recommendations are intended to create connected, comfortable, and easy to navigate communities around each station. The recommendations vary in type and geographic scale and for those reasons, are summarized separately within this section of the report. The maps that follow show each station study area including its relevant existing conditions, future transit service and US 36 Bikeway, proposed connectivity improvement, and proposed secure bicycle parking location(s). More detailed drawings of these proposed features are included in the Appendices and referenced in the Connectivity Improvements and Secure Bicycle Parking sections that follow.

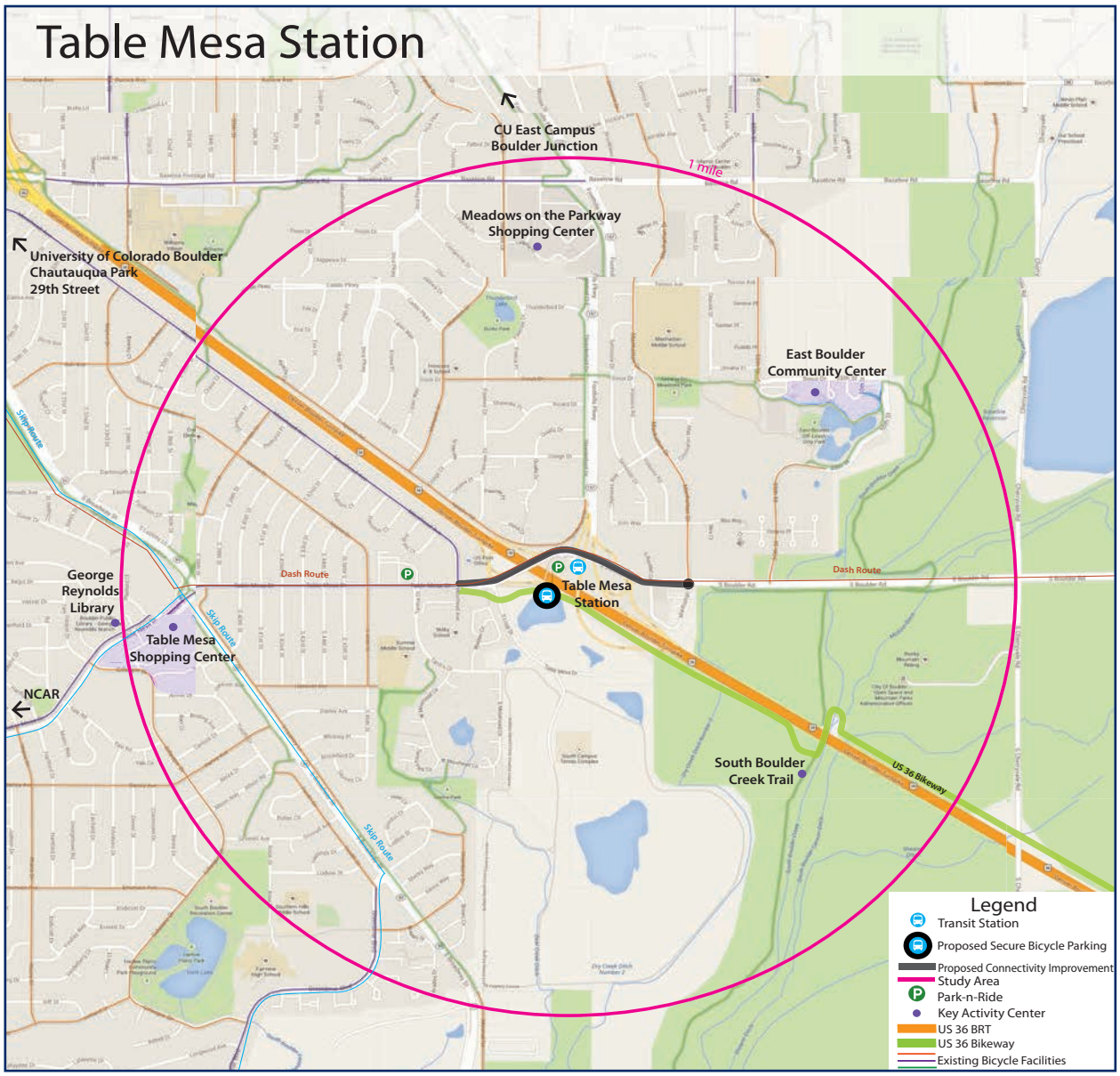


Figure 2: Table Mesa Station Area

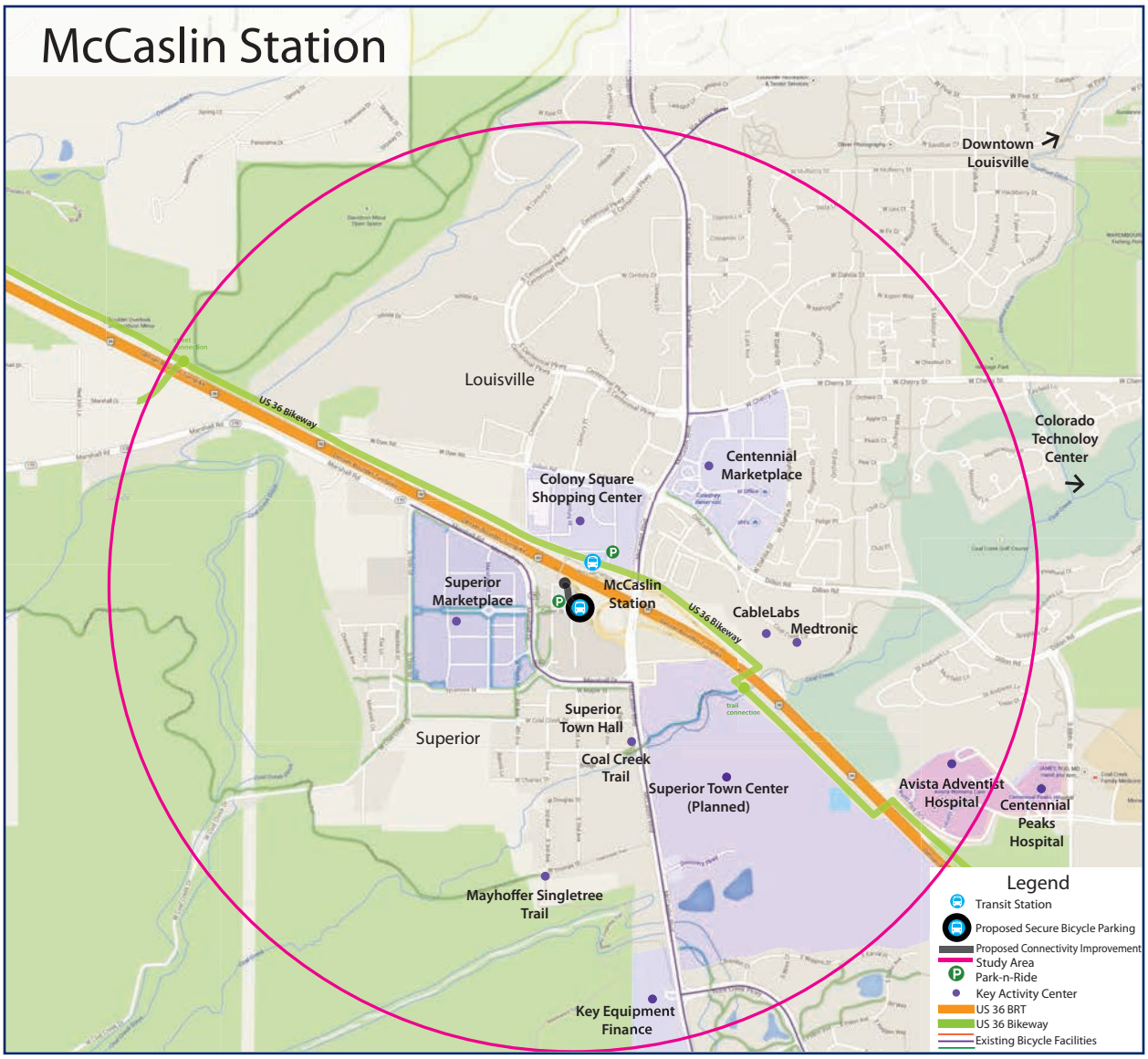


Figure 3: McCaslin Station Area

Note: A secure bicycle parking shelter is planned for the westbound McCaslin WB shelter.

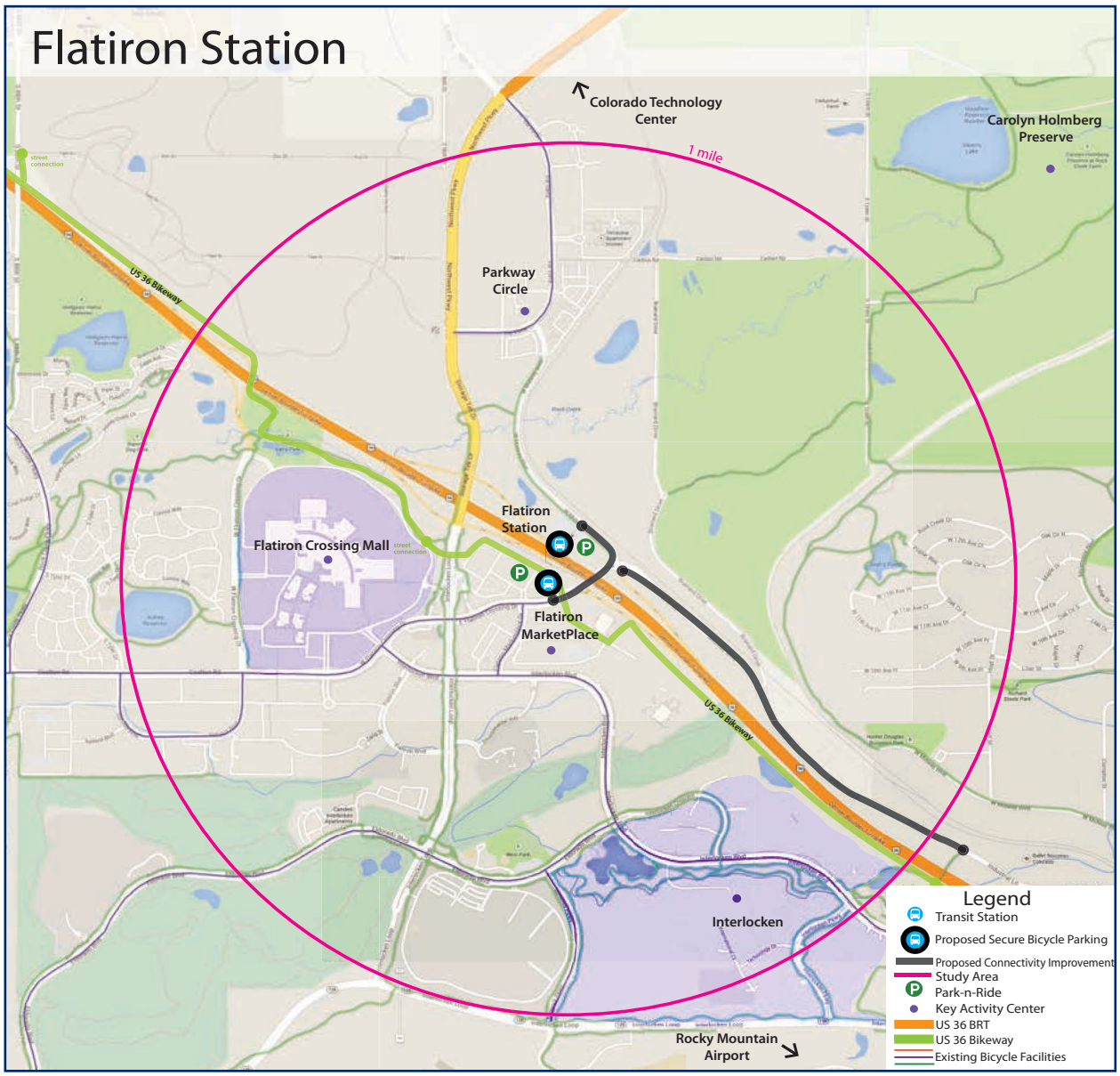


Figure 4: Flatiron Station Area

Notes: Storage Tek Drive is now "Northwest Parkway;" The bicycle trail from Midway to Northwest Parkway is a proposed trail.

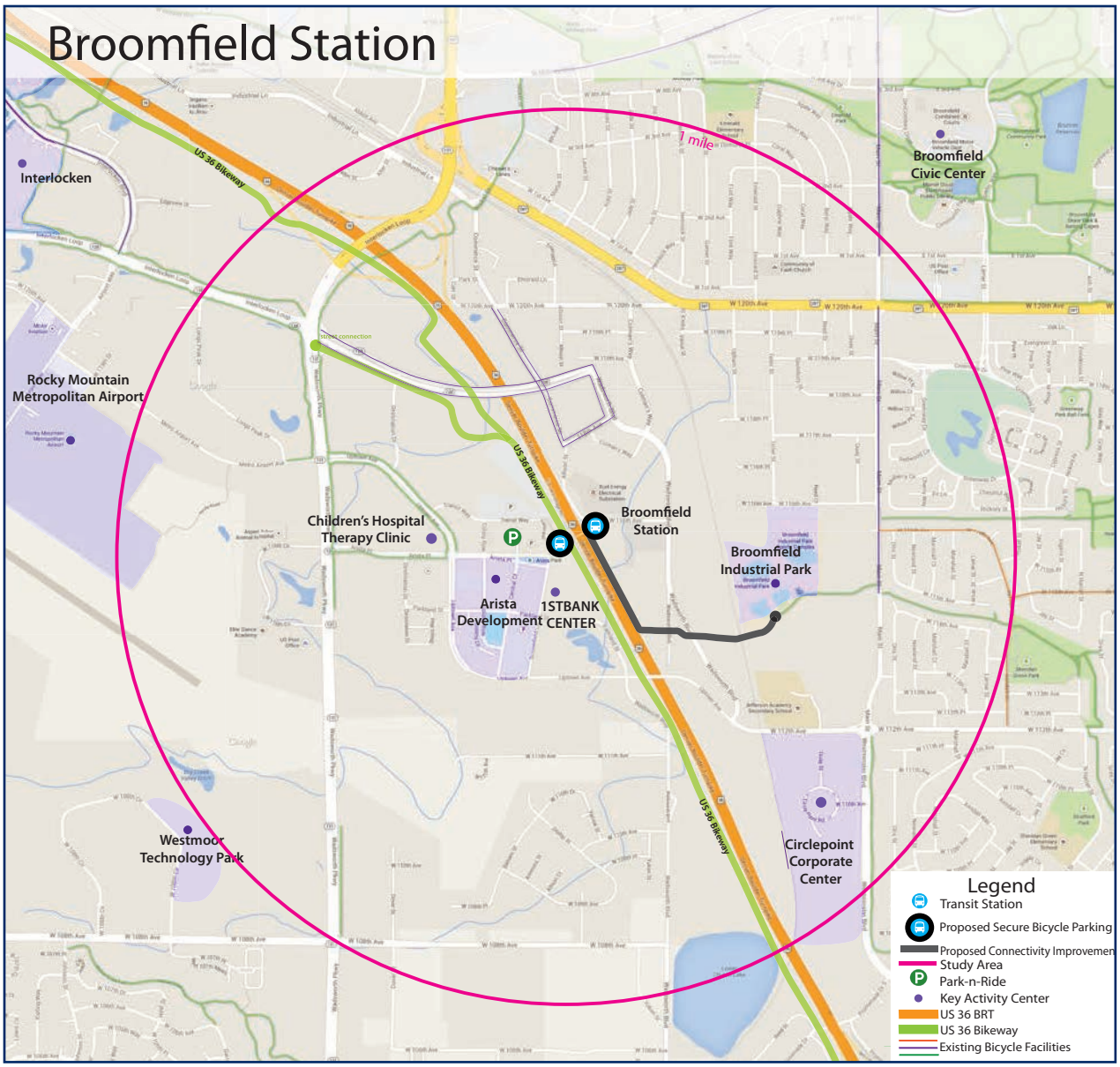


Figure 5: Broomfield Station Area

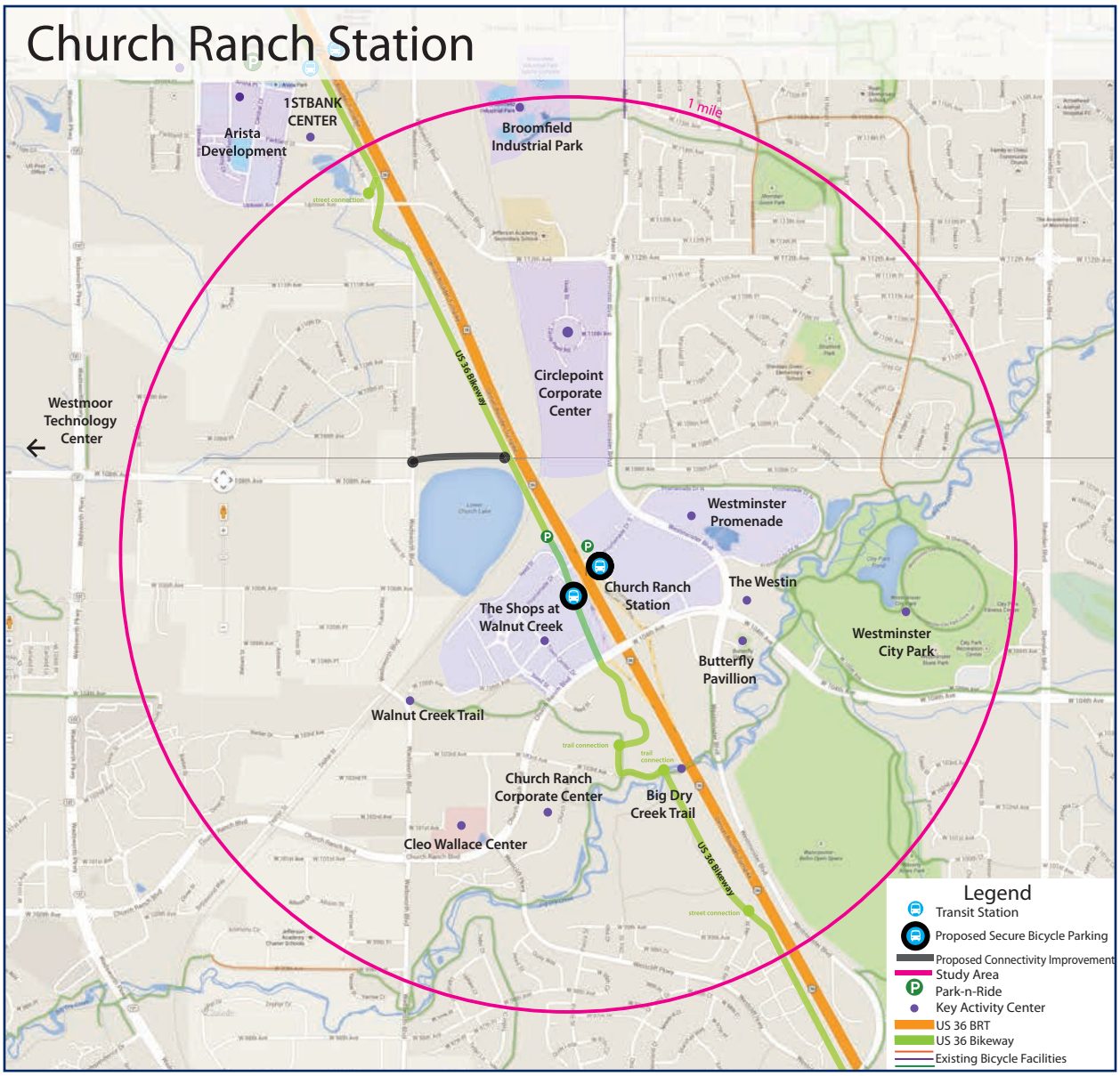


Figure 6: Church Ranch Station Area

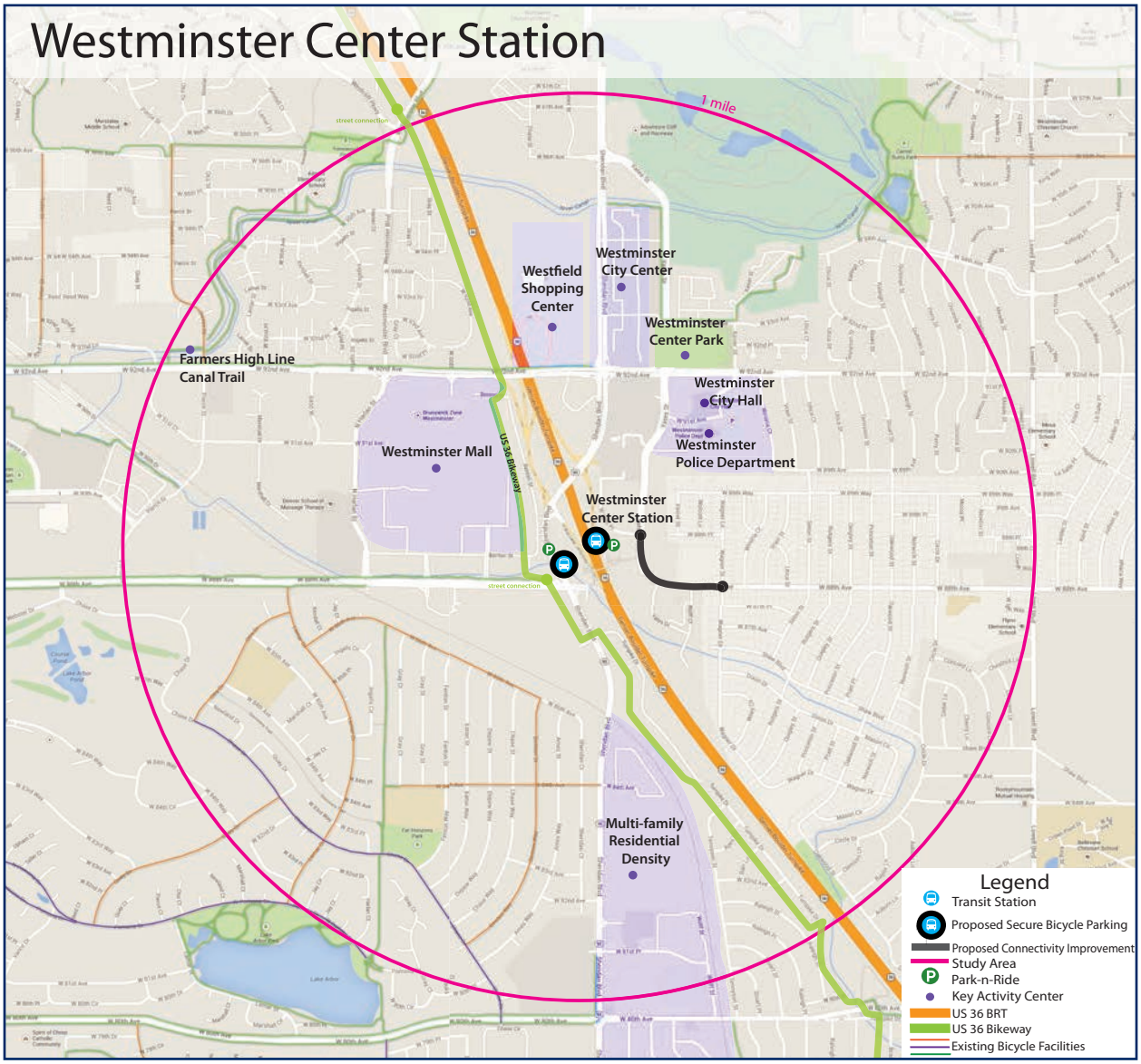


Figure 6: Westminster Center Station Area

Figure 8: Westminster Rail Station Area

Branding and Wayfinding

The development of a unified, unique brand for the Corridor for use on wayfinding signage was one of the top priorities identified in the FFM Study. Due to the large size of the Corridor, the numerous communities spanned, and the diversity of existing and proposed visual elements, this task was complex and the intent visionary.

The Northwest CWG previously developed a vision, goals, and objectives for the Corridor. Based on this work, the following principles were developed to guide the work of the Branding and Wayfinding planning:

- Creates a sense of welcome and access.
- Helps people navigate to and from their destinations as easily as possible.
- Unifies and elevates the brand message and identity of the region, its towns, and its partners.
- Helps people understand the resources available and how to get to them.

Based on those principles, sample journeys—representative routes that a pedestrian or bicyclist could travel along within the study area—were developed for each station to understand the needs of a sign system that would serve the stations, the station study areas, and the US 36 Bikeway. Graphic standards were developed, including recommended typefaces and logos.

The proposed sign system would be deployed in the manner shown in **Figures 10** and **11**.

The proposed wayfinding sign system would unify and elevate the identity of the Corridor, its communities, and its partners. The system would be a unique amenity for pedestrians and bicyclists within this multimodal corridor.

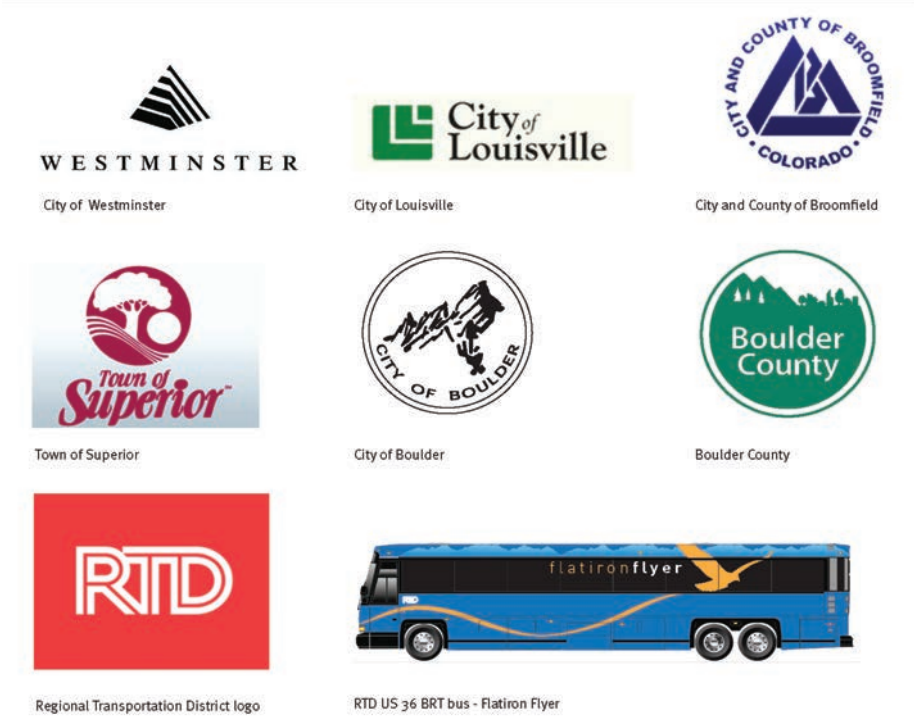
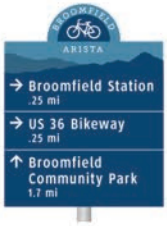


Figure 9: Sample of the Logos in the Corridor

Sign Type	Sign Purpose/Messaging	Recommended locations
Pedestrian		
Orientation Kiosk	Directional messaging Local and regional map Information about bus network, bike network and secure bicycle parking	Near station platforms and at major community hubs/public facilities

Directional signage- low pole and overhead option	Directional messaging to destinations within FFM	Pedestrian-friendly areas near stations



Sign Type	Sign Purpose/Messaging	Recommended locations
FFM Bicycle signage		**In communities**
Bike route Identification - pole-mounted	Identifies bike routes	On and off-road bike routes
Bike Directional sign	Up to three directional messages With mileage	On designated bike routes 15'-50' before intersection
Bike Route Identification - Pavement marking	Identifies and guides cyclists on off-road bike routes with directional arrow	On sidewalks/multi-use paths May also be used on US 36 Bikeway at intersections to show the continuation of the bikeway *these do not replace standard MUTCD on-street pavement markings; these are to clarify where a bike route begins, ends or turns when it is not on a roadway

Client/Project
Northwest Corridor

Figure 10: Recommended Sign Types and Placement - Pedestrian and Bicycle

Note: Larger versions of the sign designs can be found in Appendix A.

Sign Type	Sign Purpose/Messaging	Recommended locations
US 36 Bicycle signage		**On US 36 Bikeway**
Distance-to-destination sign	Upcoming bikeway intersections with mileage	Between directional signs
Directional sign	Way to Denver/Boulder Stations Corridor communities Station areas, when bikeway intersects directly with station pathways (such as Church Ranch and Broomfield) Mileage	15'-50' before intersection
US 36 Bikeway diagrammatic map	All bikeway intersections and amenities (such as restrooms)	At major bikeway intersections (such as BRT Stations)

Figure 11: Recommended Sign Types and Placement - US 36 Bikeway

Note: Larger versions of the sign designs can be found in Appendix A.

Recommended Design

After developing numerous options for the sign design, CWG members unanimously recommended a single option as the preferred design. The reasons the CWG preferred this option included:

- It is simple and legible
- The single color tones help minimize varying design elements throughout the Corridor
- The mountain silhouette and blue color link to the Flatiron Flyer branding
- The landscape element provides a sense of place

The preferred design is shown in **Figure 12**. More details about the design, including more images of example signs and the development process for the design, can be found in Appendix A.

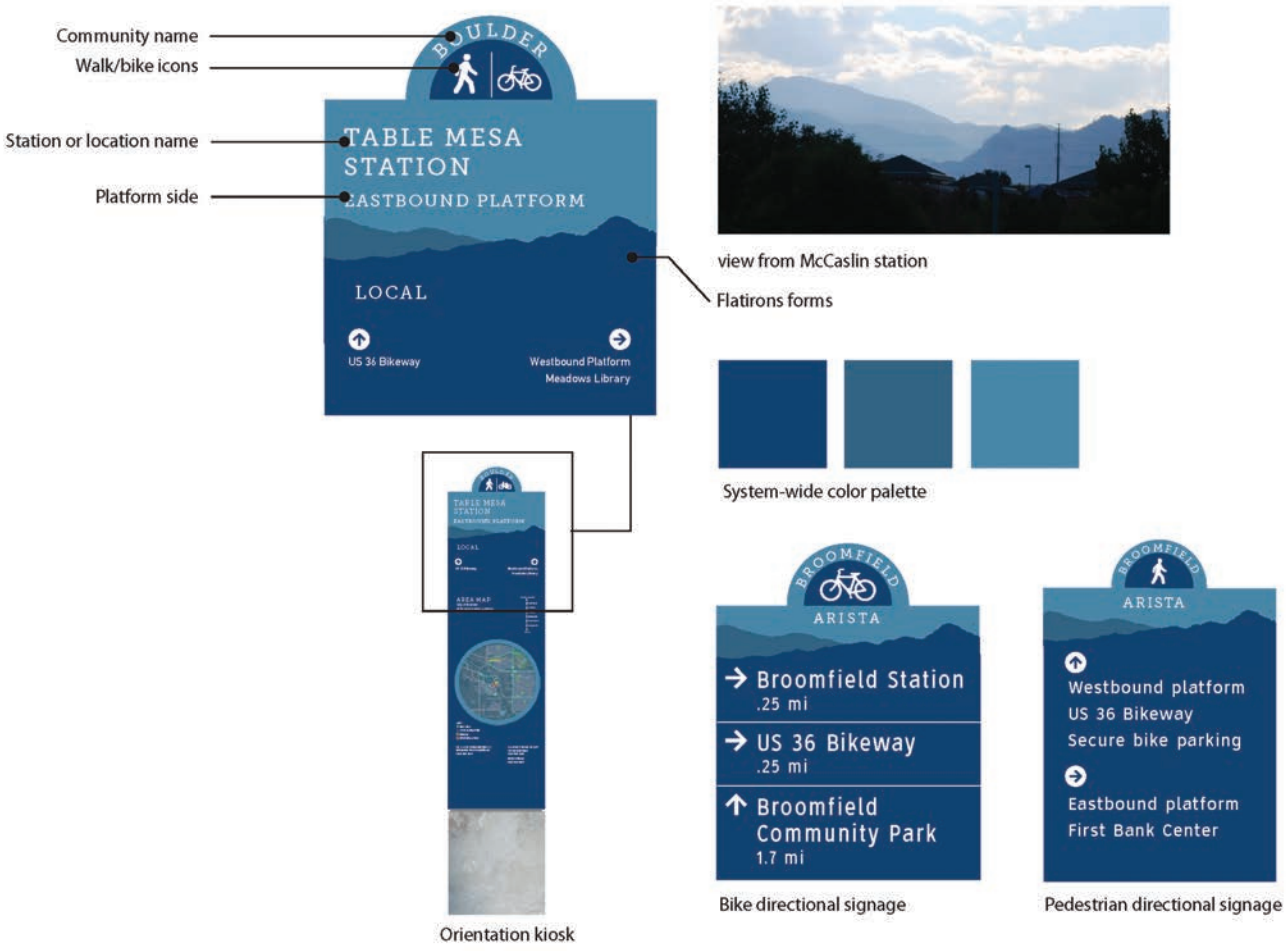


Figure 12: Branding Elements of the Recommended Sign Design

Note: Larger versions of the sign designs can be found in Appendix A.

Connectivity Improvements

The identified connectivity improvements build off of the connections identified in the FFM Study and were a joint effort by the project team and local jurisdictions. For some communities, the connections can be "easy wins" meaning projects that could be implemented quickly due to relative cost and a low level of controversy or complexity. In other communities, connections are more complex are will require further evaluation before they can move forward. The improvements listed in **Table 2** were based on recommended from each local jurisdiction, and are shown in the Design Plans in Appendix B. The improvements are also shown diagrammatically in **Figures 2 through 8**.

Table 2: Summary of Priority Connectivity Improvements

Transit Station	Local Jurisdiction	Priority Connectivity Improvement
Table Mesa Station	City of Boulder	Add bicycle facility upgrades to Table Mesa Drive from Morehead Avenue to Manhattan Drive to mitigate conflict zones.
McCaslin Station	City of Louisville, Town of Superior and Boulder County	Add a clear bicycle route at the station to reduce bus/bike/pedestrian/vehicle conflicts and increase access to transit and bicycle parking.
Broomfield Station	City and County of Broomfield	Add a shared-use path from Broomfield Industrial Park to the Park-n-Ride bridge on the east of US 36.
Flatiron Station	City and County of Broomfield	Widen the existing sidewalk along Midway Boulevard/Industrial Lane to create a shared-use path and extend the path to the Hoyt Street bridge.
Church Ranch Station	City of Westminster	Add a bicycle connection between Westmoor Office Park/Green Knolls Subdivision and the US 36 Bikeway. This off-street connection will begin at 108th and Wadsworth Boulevard and cross to the north of Lower Church Lake to the US 36 Bikeway.
Westminster Center Station	City of Westminster	Add bicycle lanes on 88th Avenue between Wagner Drive and the Park-n-Ride.
Westminster Rail Station	City of Westminster	Add bicycle lanes or shared lane markings on Lowell Boulevard between US 36 and 68th Avenue.

Cost estimates were developed for each improvement; these are summarized in the Implementation section of this report. Costs of the improvements range from $9,000 to $4.8M; however, most are under $200,000.

For many Corridor communities, the proposed connectivity improvements are "easy wins"— projects that could be implemented quickly due to relative cost and low level of controversy or complexity.

Secure Bicycle Parking

There are currently 332 bicycle parking spaces at the six Park-n-Ride facilities along US 36. The spaces are generally a mixture of bike racks, bike trees, bike lockers and, at Table Mesa, a Bus-Bike shelter. As these facilities transition to become BRT Stations, and as the Westminster Rail Station is constructed, it is important to provide high-quality and secure bicycle parking to complement and potentially replace some share of existing bicycle parking. The desire for secure bicycle parking in the Corridor was identified as the top priority during the US 36 FFM Study, and was identified during a 2014 RTD customer survey as the number one preference for improving bicycling to stations.

Bike-n-Ride shelters would store between 38 and 62 bikes, and could easily increase in size based on demand.

Bike-n-Ride Name

During the project process, the CWG recommended that the name used for the secure bicycle parking shelters should be Bike-n-Ride. For example, the McCaslin Bike-n-Ride would be located at the McCaslin BRT Station. This naming convention was desired due to its alignment with other RTD transit terminology (Park-n-Ride, Call-n-Ride, etc.), its clarity, and its applicability to various types of transit (as opposed to the existing Boulder Bus-Bike naming).

Designs

The Boulder County Bus-Bike shelters were the basis for the designs produced as part of this project. Key features of these shelters include: galvanized steel mesh, roof protection, and secure key-card entry. Based on consultation with bicycle parking manufacturers, anticipated 2020 AM peak boardings for each transit station, and existing bicycle parking quantities, three shelters sizes were developed: high, with space for 62 bikes; standard, with space for 50 bikes; and low, with space for 38 bikes. Space would be provided by a mixture of inverted-U racks and double tier style racks. All shelters would be 19'x26'.

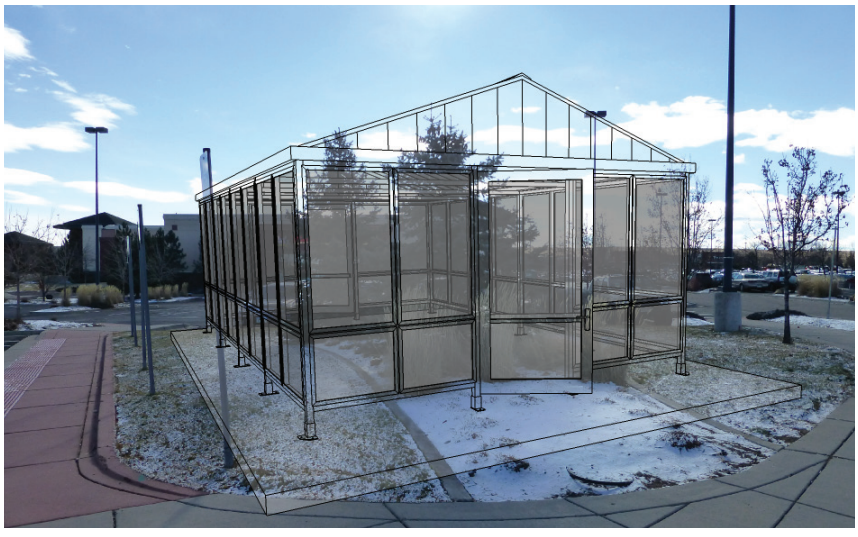


Figure 13: Image of McCaslin Eastbound Proposed Bike-n-Ride

Locations

Appendix C includes conceptual design plans depicting the proposed locations for the Bike-n-Ride facilities. Designs were prepared for a total of 11 shelters at the seven stations in the Corridor. The locations were based on:

- Preliminary locations provided by RTD and 36 Commuting Solutions
- Guidance obtained from the Secure Bicycle Parking Stakeholder Workshop, and subsequent CWG coordination
- Adherence to various goals related to site selection, including:
  - Locating the shelter on public property: RTD, CDOT, or local jurisdiction
  - Locating the shelter to provide a high level of access and visibility to the US 36 Bikeway and other bicycle routes
- Minimizing conflicts with or impacts to existing stormwater facilities
  - Limiting drainage and wetland impacts
  - Utilizing existing infrastructure such as concrete pads
  - Protecting existing above and below ground utilities

The final secure bicycle parking shelter site locations should be coordinated and approved by RTD or the identified property owner.

The Broomfield and Flatiron Stations have the most potential for bicycle share.

Bicycle Share

Bicycle share systems are becoming more popular in the U.S., with over 40 systems now operating, 13 of which were added in 2013 alone. Bicycle share is a high profile, fast, and relatively inexpensive way to change a city's transportation infrastructure and to offer an effective first and final mile solution to support large-scale transit investments. For the Corridor, bicycle share would be primarily intended to complement and extend the reach of transit, support commuting trips, grow bicycling in the Corridor, and support economic development.

Based on stakeholder feedback gathered in October 2014, it was determined that one bicycle share system would not necessarily fit the Corridor due to each station study area's unique characteristics and the Corridor's large geographic area. However, bicycle share integration is desired along the corridor. Therefore, bicycle share recommendations were developed on a station-by-station basis, with considerations given to the long-term implementation a fully-integrated, automated bicycle share system. Ideally, this system would integrate with the existing employer- and privately-provided systems to provide a holistic, public/private system oriented for the first and final mile of commuting trips in the corridor.

The stations with the most potential for short- and long-term implementation of bicycle share are the Broomfield and Flatiron BRT Stations which have a significant number of large employers located at least one mile from the station. The McCaslin BRT Station may also have potential with two key employment

campuses between one and four miles from the station. The Table Mesa BRT Station is already part of a planned Boulder B-cycle expansion. The Westminster Rail, Westminster Center BRT, and Church Ranch BRT Stations have less potential for near-term employer-provided bicycle fleets but may be good candidates for a future automated bicycle share system.

Automated smart bike systems include a fleet of bicycles with independent locks and other technology fitted to the bicycle so that it can be picked up and dropped off anywhere within the service area. Although smart bikes have not been implemented on a large scale to date, these systems offer the flexibility needed to serve the area's low density land uses in the most affordable manner. The CWG should monitor the upcoming launches of citywide smart bike systems, such as in Phoenix, to understand how this type of program could be implemented in each station study area and along the Corridor.

Table 3: Preliminary Bicycle Share Recommendations

Transit Station	Station Area Characteristics	Recommended Bicycle Share Technology	
		Near-Term	Long-Term
Table Mesa Station	Low-density, residential, and close to parks and open spaces.	Smart Dock System (Boulder B-cycle expansion)	
McCaslin Station	Commercial land uses with some single-family and multi-family residential densities. Proximity to bicycle network and open spaces.	Employer-Provided Bicycle Fleets	Smart Bike System
Broomfield Station	Transit-oriented development, including residential and commercial and a significant portion of vacant and undeveloped land. Major employment centers.	Employer-Provided Bicycle Fleets	Smart Bike System
Flatiron Station	Mostly commercial uses, major employment centers, and some single-family residential. Proximity to trails and open spaces.	Employer-Provided Bicycle Fleets	Smart Bike System
Church Ranch Station	Commercial land uses and visitor attractions. Low-density residential.	Hotel-Provided Bicycle Fleets	Smart Bike System
Westminster Center Station	Commercial land uses, low-density residential with a small concentration of multi-family residential density.	N/A	Smart Bike System
Westminster Rail Station	Low-density residential with open spaces and recreational opportunities.	N/A	Smart Bike System

Implementation Considerations: Moving Forward

The recommendations range in cost and complexity, but many could be implemented relatively easily given the appropriate resources.

The implementation of the study recommendations would substantially improve bicycle and pedestrian connectivity and access around the Corridor transit stations. The recommendations range in cost and complexity, but many could be implemented relatively easily given the appropriate resources. The primary resources needed include funding and collaboration, both summarized in this final section of the report.

Phasing and Cost Considerations

Branding and Wayfinding

Planning-level cost estimates, for budgetary purposes only, were developed for the recommended sign types. Appendix A includes costs for the sample journeys identified. These costs should be taken as an example of what could be included in an overall station or station study area cost estimate. The cost estimate for a station, station study area, or US 36 Bikeway segment will depend on a variety of factors including sign types chosen, number of signs, and number of routes signed.

Table 4: Summary of Estimated Sign Unit Costs*

Sign User	Sign Type Description	Total Unit Cost*
Pedestrian	Orientation kiosk - stone base illuminated	$11,940
	Orientation kiosk - post & panel non-illuminated	$4,125
	Pedestrian directional - low mount version	$1,515
	Pedestrian directional - overhead version	$1,690
Bicycle - with new posts	Bike route identification	$1,060
	Directional signage (large)	$1,840
	Bikeway signage - distance to destination	$1,765
	Directional signage (small)	$1,720
	Bike route identification - pavement marking	$275
	Bikeway diagrammatic map	$1,665
Bicycle - bandit-strap mounted to existing poles	Bike route identification - round sign	$855
	Directional signage (large)	$1,630
	Bikeway signage - distance to destination	$1,515
	Directional signage (small)	$1,465
	Bikeway diagrammatic map	$1,465
Bicycle - Bike-n-Ride Shelter	Thermoform illuminated "lollipop" ID sign	$4,855
	Orientation/map panel	$2,680
	Large ID panel	$3,510
	Mountain Graphic Panels (6)	$3,466

**Note: Costs do not include a contingency. At this level of planning and schematic design, a 20 percent contingency should be applied to signage cost estimates. Costs shown in Table 4 include both material and installation cost, but do not include costs such as design, engineering, or maintenance costs.*

Connectivity Improvements

The estimated construction cost for each recommended connectivity improvements is show in **Table 5**. Details about the costs, including assumptions and methodology, are included in Appendix B.

Table 5: Connectivity Improvement Cost Estimates

Transit Station	Priority Connectivity Improvement	Estimated Construction Cost
Table Mesa Station	Add bicycle facility upgrades to Table Mesa Drive from Morehead Avenue to Manhattan Drive to mitigate conflict zones.	$193,000
McCaslin Station	Add a clear bicycle route at the station to reduce bus/bike/pedestrian/vehicle conflicts and increase access to transit and bicycle parking.	$9,000
Broomfield Station	Widen the existing sidewalk along Midway Boulevard/ Industrial Lane to create a shared-use path and extend the path to the Hoyt Street bridge.	$4,793,000
Flatiron Station	Connect the existing sidewalk on Midway Boulevard/ Industrial Lane to the Hoyt Street bridge with an on-street bicycle facility and a continuation of the eight-foot sidewalk.	$948,000
Church Ranch Station	Add a bicycle connection between Westmoor Office Park/Green Knolls Subdivision and the US 36 Bikeway. This off-street connection will begin at 108th and Wadsworth Boulevard and cross to the north of Lower Church Lake to the US 36 Bikeway.	$174,000
Westminster Center Station	Add bicycle lanes on 88th Avenue between Wagner Drive and the Park-n-Ride.	$59,000
Westminster Rail Station	Add bicycle lanes or shared lane markings on Lowell Boulevard between US 36 and 68th Avenue.	$27,000

Secure Bicycle Parking

Based on costs received from parking manufactures and cost information received from Boulder County, cost estimates for the various Corridor Bike-n-Ride facilities are shown in **Table 6**. The probable costs represent a preliminary estimate that can serve as a guideline and refined based on the final site locations, desired bicycle parking spaces, and structural and geotechnical engineering for each shelter. The cost estimates include facility warranty, engineered stamped drawings with geotechnical/technical survey, a steel enclosed structure with wire mesh and secure doors, bicycle rack components, signage materials, shelter lighting, and the construction fee to install the shelter. The estimates do not include administrative, internal, or lifecycle costs, which may include: key card access-controlled software; end user support; server hardware; and annual utility, cleaning, or miscellaneous maintenance and repair costs.

Appendix C contains information about potential phasing of the Bike-n-

Appendix C contains details about potential Bike-n-Ride shelter phasing and future implementation decisions to be made.

Ride facilities. Table Mesa (EB side), Westminster Center (both sides), and Westminster Rail were determined to be the highest priority locations, based on a variety of factors. The CWG should consider this prioritization as funding becomes available.

Table 6: Proposed Bike-n-Ride Cost

Station	Shelter Capacity	Probable Cost
Table Mesa	High	$81,000
McCaslin	Standard	$78,000
Flatiron	Low	$75,000
Broomfield	Standard	$78,000
Church Ranch	Low	$75,000
Westminster Center	High	$81,000
Westminster Rail	Standard	$78,000

Bicycle Share

Phasing considerations for a Corridor or station-specific bicycle share system were presented in **Table 3** in the previous section of this report. Most station study areas could move forward with an employer-provided bicycle fleet in the near-term. As most station study areas develop and densify the bicycle share technology can transition to a smart bike system.

Continued Collaboration

The CWG should continue to collaborate with DRCOG, 36 Commuting Solutions, and other agencies.

The Northwest CWG is a well-established coalition of agencies with a stake in the Corridor's future transportation and built environment. The CWG has been making collaborative decisions for years, and with the leadership of DRCOG, 36 Commuting Solutions, and others, that is expected to continue. As such, the Corridor is in a strong place to continue to implement improvements. The following sections describe suggested next steps and collaboration for each type of recommendation.

Branding and Wayfinding

Stakeholders have brought up a number of items that should be discussed as part of the next steps for Corridor implementation.

- Decision-making around wayfinding sign details. While a preferred sign design was selected during this project process, the details of the design—such as exact colors, messaging and placement—will need to be decided during the next, more detailed, design phase.
- Roles and responsibilities. A number of questions remain about who would fund and maintain the sign system.
- Integration between these recommendations and RTD/ individual community actions. The proposed signs would be primarily placed on RTD,

CDOT, and local jurisdiction property. Many of these properties—the transit stations, the US 36 Bikeway, and some of the individual communities—have existing or proposed signage of their own. More coordination is needed to ensure integration between sign systems and to obtain necessary permits for sign installations.

Connectivity Improvements

The collaboration needed to implement proposed connectivity improvements is relatively straightforward, as most of the improvements are located on local jurisdiction property. Each community should coordinate internally and with others, as needed, to ensure final design and construction of the improvements. For improvements limited to pavement markings and signage, local jurisdictions should explore the implementation of these during routine street maintenance projects.

Secure Bicycle Parking

A number of next steps related to roles and responsibilities of constructing and operating Bike-n-Ride shelters were brought up during this project.

- Roles and responsibilities. Questions about who would pay for, maintain, and operate the shelters need to be addressed in the short term.
  - A central agency, such as 36 Commuting Solutions, should be the clearinghouse for the customer service operations of the shelters. For example, they might operate and maintain the website where customers could sign up for a key card and obtain information about Bike-n-Rides.
  - The entity responsible for maintaining the shelters, or each shelter, needs to be determined. Based on Boulder County's experience, maintenance needs are minimal. Minimum maintenance needs include power washing, trash removal, and periodic inspection.
- Operations structure. The maintenance and operations of the shelters could be partially funded by a fee-for-service key card, advertising on the shelters themselves, local governments, and/or RTD. How the shelters are operated, including how information technology is managed and who pays for electricity, is important to determining funding needs as well as roles and responsibilities.

Bicycle Share

Stakeholders stated a desire for coordinated management of bicycle share systems, especially due to the overlapping jurisdictions between station study areas. A central agency (such as 36 Commuting Solutions) should take on responsibility for advancing bicycle share along the corridor. This organization would be responsible for coordinating stakeholders and making decisions around the development of the system, monitoring progress in the industry, and taking on near-term efforts. In the near term, the central agency should develop central resources for employers, apartment building managers, and other private entities to provide bicycle fleets at their locations.

Over the long term, the agency should work with RTD and local agencies to implement a high-technology, publically-available bicycle share system at the seven stations and key destinations as outlined Appendix D. Ideally, this bicycle

A central agency should assume responsibility for aspects of Bike-n-Ride shelter operations and for advancing bicycle share along the corridor.

share system would integrate with systems implemented in the near-term to create a holistic, public/private system oriented for the first and final mile of commuting trips in the corridor. The central agency may assume responsibility for fundraising, planning, and implementing the bicycle share system, including the purchase of equipment. They may also take on operations or transition this responsibility to a third party.

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Appendix A
Branding and Wayfinding Report

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Northwest Corridor

Bicycle/Pedestrian Accessibility Study

Branding and Wayfinding Report

Programming, Audit and Schematic Design

December 29, 2014

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Northwest Corridor Branding and Wayfinding Report	**14NW251001**
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Project background

The state of Colorado and the Regional Transportation District (RTD), along with its local jurisdiction partners, have made significant transportation investments in the Northwest Corridor (the Corridor) in recent years. Along with the Colorado Department of Transportation (CDOT) US 36 Express Lanes Project, which includes the US 36 Bikeway, RTD is currently constructing two FasTracks projects in the corridor: the US 36 bus rapid transit (BRT) Line and the Northwest Rail Line, both scheduled to open in 2016. Together, these transportation projects will improve multimodal mobility and access between Denver and Boulder and points in between.

In order to maximize investments that have been made in the Corridor, the Denver Regional Council of Governments (DRCOG), through its Sustainable Communities Initiative (SCI), hosts a partnership of Corridor public and private sector organizations whose goals include enhancing bicycle and pedestrian access and mobility within the first and last mile of new transit Stations. The Northwest Corridor Bicycle/Pedestrian Accessibility Study (NW Corridor Study) is charged with the same goal. The project builds upon the 2013 US 36 First and Final Mile Study by 36 Commuting Solutions and advances the top priorities that were identified in that study.

This report is a presentation of two of the six NW Corridor Study tasks: Branding and Wayfinding. The report includes an audit of existing conditions, sample journeys in study areas, a diagrammatic overview of the system components and functional requirements, and schematic design options.

Study Area
The study area for this project, shown in Figure 1, consists of the following seven transit Stations:

- Table Mesa BRT Station
- McCaslin BRT Station
- Flatiron BRT Station
- Broomfield BRT Station
- Church Ranch BRT Station
- Westminster Center BRT Station
- Westminster Rail Station

These seven Stations comprise the Northwest Corridor.

Stakeholder Process

Cloud Gehshan Associates (CGA), as part of the Toole Design Group (TDG) led consultant team, worked closely with local jurisdictions along the Corridor to identify the general design aesthetic for the branded wayfinding signage. The key stakeholders and local jurisdictions included members of the Corridor Working Group: DRCOG, RTD, 36 Commuting Solutions, Adams County Housing Authority, City of Boulder, Boulder County, Town of Superior, City of Louisville, City and County of Broomfield, City of Westminster, and CDOT.

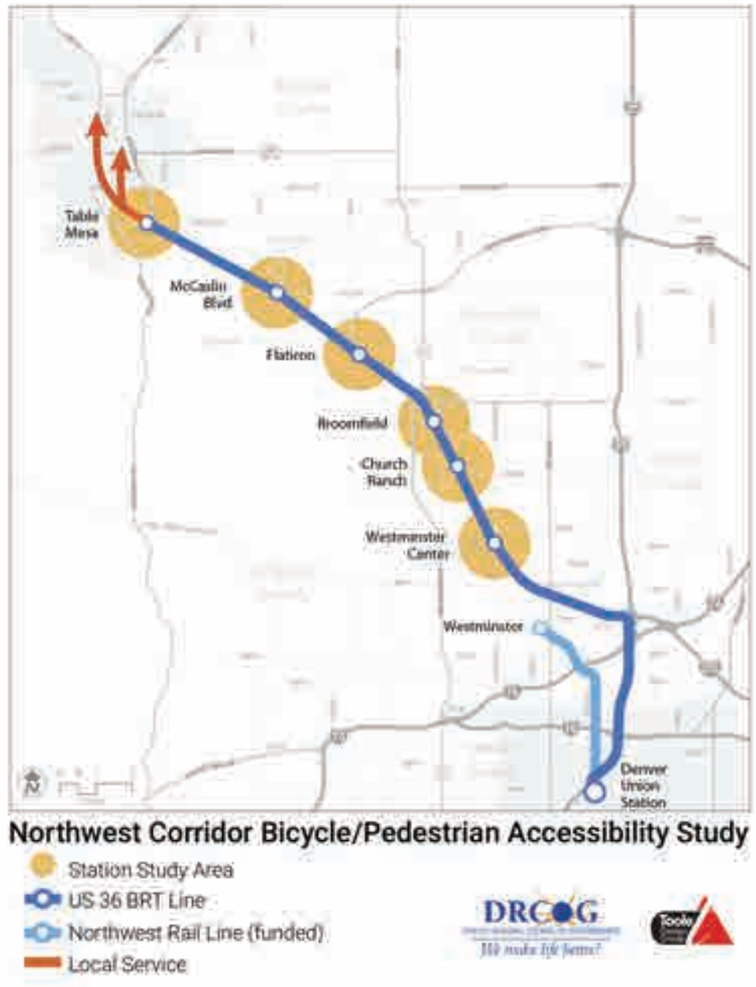

Figure 1

Reports that have informed this document

In the spring of 2013, 36 Commuting Solutions released the findings of the US 36 First and Final Mile Study. This document identified Station-specific and Corridor-wide opportunities and recommendations to encourage multimodal transportation within one mile of US 36 Stations. The #2 Recommendation from this report is the development of a corridor-wide branded signage and wayfinding program.

Several documents were provided to CGA to provide project background, corridor data, and corridor goals and visions:

The US 36 First and Final Mile Study (36 Commuting Solutions):
- Station ridership data, Station conditions and connectivity to the community and local trails
- Future development and recommendations for each community
- Transportation goals for the corridor

Northwest Corridor Profile and Recommendations Report (Reconnecting America):
- Provides demographic and economic characteristics of residents
- Identifies corridor-wide and Station-specific opportunities, challenges and current activities
- Identifies visions and goals for each Station
- Defines the development, transportation and connectivity goals of the corridor

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Northwest Corridor Vision and Goals

Introduction

Cities and towns located within the corridor understand their goals and aspirations for their communities are connected and interdependent with those of the larger region. The Northwest Corridor is a national example of how a carefully planned and implemented, multimodal system of transportation can connect a region, ignite economic growth, and foster a more sustainable environment. The completion of the US36 BRT in 2016 is one of a series of important initiatives that will provide improved Station areas and increased multimodal access to RTD service and the new US 36 Bikeway between Denver and Boulder.

The goal of this study is to understand the brand identity, signage, and wayfinding needs of the region and to develop a unified system that will strengthen and enhance these connections and foster access to an expanded range of transportation options within these communities.

Guiding Principles:

The Northwest Corridor Working Group previously developed a vision, goals, and objectives for the corridor. Based on this work, the following principles were developed to guide the work of the Branding and Wayfinding Master Plan.

1. Builds on planning principles in place for the Corridor and seeks to elevate the experience of visiting, working, and living in the community.
   Creates a sense of welcome and access.

2. Improve mobility and strengthen first and final mile connections to and from the Stations; with an additional focus on connectivity between systems and transportation facilities.
   Helps people navigate to and from their destinations as easily as possible.

3. Develop a system that unifies and communicates the unique identity of the Corridor and demonstrates long term investment and commitment while featuring US 36 BRT. Foster a strong sense of place, and increase collaboration and equity among the communities.
   Unifies and elevates the brand message and identity of the region, its towns, and its partners.

4. Create an effective signage and wayfinding program that enhances access and orientation to employment, educational, retail, and recreational centers and resources throughout the region.
   Helps people understand the resources available and how to get to them.

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Executive Summary

Project Overview
The Northwest Corridor Branding and Wayfinding task is focused on designing a “universal brand” for First and Final Mile (FFM) bicycle and pedestrian signage. The brand can be woven into wayfinding signage to help users locate multimodal access points and routes to the Stations. Branded signage should be designed with a standard pallet of colors, logos, and fonts to direct travelers to and from destinations within the first and final mile of Station areas and to the US 36 Bikeway.

Project Process
I. KICK-OFF MEETING
CGA and the project team conducted a stakeholder workshop to understand the system needs for FFM signage and US 36 Bikeway signage.

Take-aways from Workshop #1:
1. There is no single umbrella name identified for use and application to the Northwest Corridor FFM bicycle and pedestrian wayfinding system.

2. Absent a name or wordmark, the word “branded” should therefore be taken to mean a unified and integrated system of component signage and graphic elements, designed to be recognizable wherever deployed within the FFM.

3. This system will co-oexist with other partner systems and will be deployed within the RTD Station facilities, FFM communities, and along the new US 36 Bikeway.

4. Some communities have bicycle signage and some do not.

5. There is a desire to have communities represented on the signs.

6. US 36 Bikeway CDOT signage is in motion—the design cannot be changed—but the bikeway needs additional signage.

7. We learned priority pathways, destinations, and future plans from the map breakout activity.

II. AUDIT AND ANALYSIS
CGA visited each RTD Station and its surrounding area, analyzing wayfinding and signage conditions in and close to the Station: Followed pathways out of Station areas to study a typical pedestrian experience, rode on bicycle to experience the biking conditions and follow routes outlined in workshop #1, and formulated recommendations based on observations. Because this report is intended to create a cohesive wayfinding system that does not exist today, the audit focused on gaps and needs in the Corridor communities.

Audit Observations and recommendations:
Report Recommendations guide the function and design of the sign system shown and explained later in this report.
Community Recommendations are suggestions for Corridor communities that are out of this study’s scope but would enhance wayfinding in these areas.
RTD Recommendations are suggestions for RTD that are out of this study’s scope but would enhance wayfinding on their property.

1
Observation: At most Stations, bicycle racks and lockers are visible and easy to access.
RTD Recommendation: At locations where the bicycle racks and lockers are more difficult to find, add wayfinding signage directing users to these facilities.

2
Observation: Stations and bus platforms are difficult to find.
Report Recommendation: Create highly visible pedestrian signage on or near platforms. Create pedestrian and bicycle directional signage to Stations and platforms.
Community Recommendation: Add vehicular trailblazers to RTD Stations.

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RTD Recommendation: Add more legible identification signage to Stations at entrances.

3
Observation: There is a lack of identification and bicycle or pedestrian orientation signage on the platform.
Report Recommendation: Create orientation kiosks with maps of the surrounding area.
RTD recommendation: Add more legible identification signage on platforms.

4
Observation: At some Stations, it is difficult to determine where pedestrian pathways lead.
Report Recommendation: Provide directional signage to nearby facilities and destinations.

5
Observation: Bike route markings are inconsistent or lacking.
Report Recommendation: Create a unified system of route markings, accommodating for both free-standing and on-sidewalk applications.

6
Observation: There is missing or insufficient directional bicycle signage in nearly all of the Corridor communities.
Report Recommendation: Create a unified system of directional bicycle signage that is similar in scale, message structure, information layout, and aesthetic.

7
Observation: US 36 Bikeway signage does not indicate upcoming intersections or mileage to destinations.
Report Recommendation: Create US 36 Bikeway signage with messaging about intersections, mileage, and amenities.

III. DEVELOP DIAGRAMMATIC SYSTEM

CGA catalogued the system requirements based on what the system needs to deliver from a functional and aesthetic standpoint. The proposed systems and sign types include:

Pedestrian System
Orientation kiosks with maps showing the local area and regional bus/bicycle network
Pedestrian directional signage

FFM bicycle system
Directional signs with mileage
Single-destination blazes
Bike Route identification—both freestanding and pavement markings

US 36 bikeway signs
Directional signs with mileage
Upcoming trail intersections with mileage
Diagrammatic bikeway map with mileage

IV. SCHEMATIC DESIGN

CGA designed a schematic signage system to address the goals outlined in the SCI Northwest Corridor Working Group plan, the needs identified by stakeholders at workshop #1, and the recommendations made during the audit phase.

CGA presented six design concepts to a second stakeholder workshop, where the design options were narrowed down to two. After the workshop, the design process resulted in one additional concept, for a total of three schematic designs. All schematic design concepts are included in the appendix.

CGA presented three refined design concepts at a third and final stakeholder workshop. At the workshop and in the comments received after, unanimous support was received for Option 2. This option is shown in the Schematic Design section of this report.

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section 1

Audit

As part of the data collection phase of the project, an audit was performed at each of the US 36 BRT Station locations. The audit included walking and bicycling trips to and from each Station.

In order to provide each Corridor Working Group organization with a clear understanding of how to improve wayfinding around the future BRT Stations, the audit focuses on existing gaps and needs. While there are successful elements at work today, this report is intended to highlight Station-area and community-wide opportunities, and establish a baseline for the recommendations that follow.

Corridor-wide Audit of Existing Signage and Wayfinding

OVERVIEW

CGA spent several days conducting an audit of existing signage, wayfinding, and orientation systems throughout the Corridor. Traveling by car, bicycle and foot we documented signage and information systems that are in place and already providing some support for multimodal travel and guidance. We also spent considerable time at each of the six future BRT Stations and within the communities. The RTD Stations' proposed new bicycle shelter locations and general existing conditions were reviewed, discussed, and photographed. Sample bicycle and pedestrian journeys were conducted into the surrounding communities to better understand their character, density, and development pattern and to try and define the potential wayfinding and orientation needs of their residents and visitors.

From a corridor-wide view, the needs and observations for better wayfinding signage are clear. With the exception of existing CDOT signs, there are gaps in all local signage making it difficult to access important public destinations and services within the communities without prior knowledge. This is not surprising, as one of the main reasons for the NW Corridor Study is that there is a lack of wayfinding in the Corridor. This report documents the gaps in and opportunities for better signage and wayfinding so that the Corridor communities and RTD can understand the specific actions needed to build a cohesive, effective wayfinding system.

VEHICULAR SIGNAGE

Observation

While vehicular signage was not included in the scope of work, it is difficult to ignore this piece of the journey. Many users of the BRT service will be driving for at least one leg of their trip, and it is important to address the wayfinding challenges they encounter before getting to the Station.

There is no single, integrated, vehicular signage and wayfinding system throughout the corridor that provides uniform and consistent directional information to motorists. While there is vehicular signage within select communities, they are not part of a comprehensive directional system. The Louisville vehicular signs, for instance, only trailblaze the route to the Historic Downtown (Fig 1). Other communities have custom street signs and gateway signs, but these do not form a cohesive wayfinding system throughout the city or corridor (Fig. 2 & 3). Additionally, the location, content, readability, and subsequent effect of these systems is mostly cosmetic and not MUTCD compliant.

In addition, gateways or points of entry into these communities are inconsistently identified, vary in size and scale, and in a few areas the retail developments or technology campuses are perceived to be the dominant and most visible presence.

Recommendation

While most of the communities has or will be developing branding and signage programs for their towns, it would be desirable if some uniform design standard that was MUTCD compliant (modified for conditions) could be adopted throughout the corridor. Consistency of scale, material, legibility, and placement across gateways, trailblazers, and directional signs should be established. This could be achieved while still providing opportunity for individual communities to express brand identity. It would go a long way towards unifying the corridor experience for residents and visitors alike (Fig. 4–6). Though vehicular signage is not part of this project's scope, the sign system developed as part of this project could be extended to include vehicular signs in the future.


Fig. 1

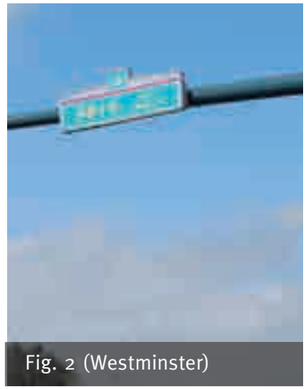
Fig. 2 (Westminster)

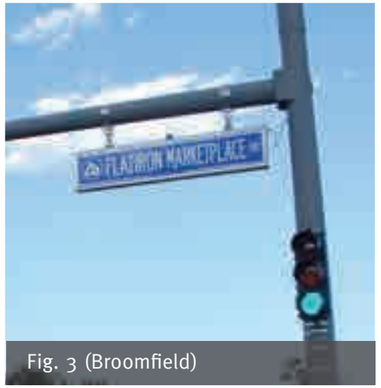

Fig. 3 (Broomfield)

Fig. 4 (Downtown Los Angeles)
Hunt Design

Fig. 5 (Cheltenham Township)

Fig. 6 (Township of Lower Merion)
Each community in the township was part of a unified vehicular branding and wayfinding system.

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Corridor-wide Audit of Existing Signage and Wayfinding (continued)

MUTCD COMPLIANCE

The new MUTCD guidelines, released in 2009, require state DOTs to conform all vehicular signage on all streets to meet the new standards within two years. The FHWA Standard Highway Signs and Markings requires a letter size of 4" for roadways 25 mph and under and 6" for roadways 26 mph and over. The vehicular signs we encountered in the corridor have legends (letter sizes) that are well under those parameters. Since many streets are over 25 mph, a change of legend/letter and panel size would be required.

ACCESS TO RTD STATIONS

Observation

The Corridor RTD Stations are challenging to find without knowledge of the Station areas. Presently multimodal travelers need pre-information (web or GPS-based mapping) to be able to locate many of the roadways and bikeways leading to these Stations. Several of them are in the rear of retail or residential complexes that are not clearly marked with directional signage (Fig. 5). There is consistent RTD signage at most of the Station parking lots, however many of the signs are not easy to read from a distance. This is due to sign complexity, height, hierarchy and scale, and vertically oriented information (Fig. 6).

Recommendation

Improved vehicular and bicycle directional signage should be introduced at important decision points enroute to all RTD Stations.

These trailblazers would be easy to deploy, provide visbility for the RTD system, and clarity at key decision points for travelers. Fig. 7 and 8 are examples of trailblazer signs.

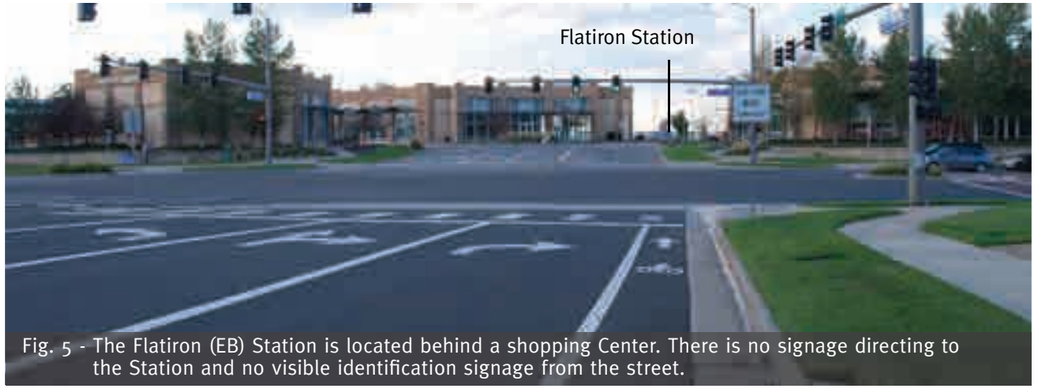

Fig. 5 - The Flatiron (EB) Station is located behind a shopping Center. There is no signage directing to the Station and no visible identification signage from the street.

Fig. 6

Fig. 7

Fig. 8 (Beaverton, Oregon)

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Corridor-wide Audit of Existing Signage and Wayfinding (continued)

PEDESTRIAN ORIENTATION

Observation
There is no pedestrian orientation information system in place in any community. The need for pedestrian orientation within the FFM and the larger community differs from one town to the next. Some areas are developing these tools and will not require assistance. Other areas are more automobile-oriented. Other environments, such as the Broomfield Station and the new Arista community, are walkable and would be helped by pedestrian orientation, which would reinforce a sense of place and welcome.

Some areas are walkable but have potentially hazardous parts of the route. The Westminster Station to City Hall route for example, would need study by a traffic planner before a pedestrian system could be deployed. City Hall is located a distance up the road, on the other side of a higher speed four-lane roadway with no defined place to cross. Without crosswalks, signaling and accessibility considerations, guiding pedestrians to this municipal campus on foot would be unwise (Fig. 9).

Recommendation
If a pedestrian wayfinding system is going to be successful, additional planning will need to be done on a community-by-community basis. The goal is to better understand which communities would benefit from these tools and how they would be used. This would include a traffic & planning study of important parking, destinations, pedestrian pathways, intersections, and nodes.

BICYCLE ORIENTATION

Observation
With the exception of Table Mesa, there is a lack of sufficient bicycle route identification and directional signage immediately around the Stations. There is a lack of information at the Stations about nearby bicycle facilities. The system is difficult to follow consistently without prior knowledge, a clear map and/or a GPS device in-hand.

Recommendation
Include bike routes on all orientation maps at Stations and secure bicycle parking shelters. Differentiate between bike lane, designated bike route, and off-road path. Because the maps will not show the entire corridor, provide “ultimate destination” indicators at the edge of the map (Fig 10) for important routes and trails that extend off the map.

Fig. 9

Fig. 10 (Bath, UK) *CityID*

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Corridor-wide Audit of Existing Signage and Wayfinding (continued)

BICYCLE WAYFINDING AND SIGNAGE

Observation
Signs identifying bike lanes and bike routes are different in each community along the corridor (Fig. 11-18). Westminster has several off-road trails, some of which are on a wide sidewalk. These are generally not marked, so it is difficult to distinguish the "bike route" from a typical sidewalk.

No directional signage, small or lacking identification signage, and the lack of physical connections made riding from the street network to the trail network very difficult in multiple communities. Once on these trails, there was limited information at the trailhead about where the trail went or the direction of travel.

Recommendation
Create a unified bicycle identification and directional sign system for both on-road and off-road bike routes. Each community should agree to a common set of guidelines for how often these signs appear and the types of messages they may carry. Recreational trails may maintain a different look and feel; these serve a different purpose and are not integrated with the street network.

Observation
Signage cannot supercede infrastructure and planning; signing routes that have not been planned and designated for cyclists is unwise and unsafe. In order to properly create a bicycle wayfinding system connecting communities to Stations, routes to and from the RTD Stations must be analyzed. Many roads around Stations are high-speed, multi-lane roads. It is imperative that cyclists are routed to avoid dangerous roads and intersections, and instead are directed to take an alternate (parallel) route.

Some Stations, as detailed in the following pages, lack bicycle facilities in the immediate area around the Station. Comfortable and safe bicycle infrastructure helps the visibility and safety of cyclists and increases ridership.[1]

Recommendation
Create routes with appropriate bicycle infrastructure to each Station. Fill in gaps that exist between current bicycle facilities. Construct a bicycle network that connects people to homes, transit, retail, workplaces, and recreation.

Fig. 11 (Westminster)

Fig. 12 (Broomfield)

Fig. 13 (Broomfield)

Fig. 14 (Broomfield)


Fig. 15 (Louisville)


Fig. 16 (Superior)

Fig. 17 (Boulder)

Fig. 18 (Boulder)

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[1] There are dozens of reports that indicate better bicycle infrastructure attracts more riders, many of which can be found on the People for Bikes website: Peopleforbikes.org/statistics. Some of these reports include:
- On D.C.'s Pennsylvania Avenue green lane, bicycle volumes increased 200% after the facilities were installed. *District Department of Transportation, 2012 - District Department of Transportation Bicycle Facility Evaluation*
- Intersections in Montreal with protected bike lanes saw 61 percent more bike traffic than comparable intersections with no bicycle infrastructure. *The Journal of Transport and Land Use, 2103 - Spatial modeling of bicycling activity at signalized intersections*
- From 1992-2005 Portland, Ore., increased its bikeway network by 215%, and during that period bicycle commuting doubled. *Birk, M., and R. Geller, 2005 - Bridging the gaps: How the quality and quantity of a connected bikeway network correlates with increasing bicycle use, Transportation Research Board Annual Meeting 2006 Paper #06-0667*

RTD signage recommendations

While an assessment of RTD signage was not formally part of the scope, it is necessary to explain the existing conditions around the Corridor Stations. RTD Stations have a limited amount of identification and orientation signage. RTD could enhance wayfinding to and within their Stations by implementing the recommendations below.

IDENTIFICATION

Observation
Most Stations do not have identification signage that is visible from the street. There is typically one identification sign per Station, but this single sign can be missed if there are multiple entrances. There is little to no directional signage that direct vehicles to the Stations.

Recommendation
Add vehicular trailblazers that direct drivers to the Station. Add identification signage at each entrance to the Station.

Observation
Currently, Stations are not clearly identified with a prominent Station name. Westminster has the name of the Station on the parking garage (Fig. 1) but it does not appear anywhere on the platform. Broomfield has multiple free-standing maps around the Station plaza bearing the name of the Station, but there is no large-scale signage that can be seen from a distance. Church Ranch (Fig.3), Flatiron (Fig. 4), McCaslin (Fig. 5) and EB Table Mesa (Fig. 6) have no identification on the platform whatsover.

Recommendation
Add large-scale identification signage that is near or visible from the Station platform or plaza. Bus shelters should also be identified with the Station name.


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6

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RTD signage recommendations

ORIENTATION

Observation
The direction of travel is not clear at the individual platforms. Table Mesa is the only Station with directional signage (Fig. 7 & 8) to the appropriate platform, but the platform had no large identification signage indicating the direction of travel. The directional signage at Table Mesa is overscaled for pedestrians and is not consistently placed at decision points.

Bus shelters have schedules that indicate the direction of travel (Fig. 9) but this information is only legible from inside the shelter.

Recommendation
Identify the platforms with the name of the Station and direction of travel with large-scaled signs that can be seen from a distance.

Fig. 7

Fig. 8

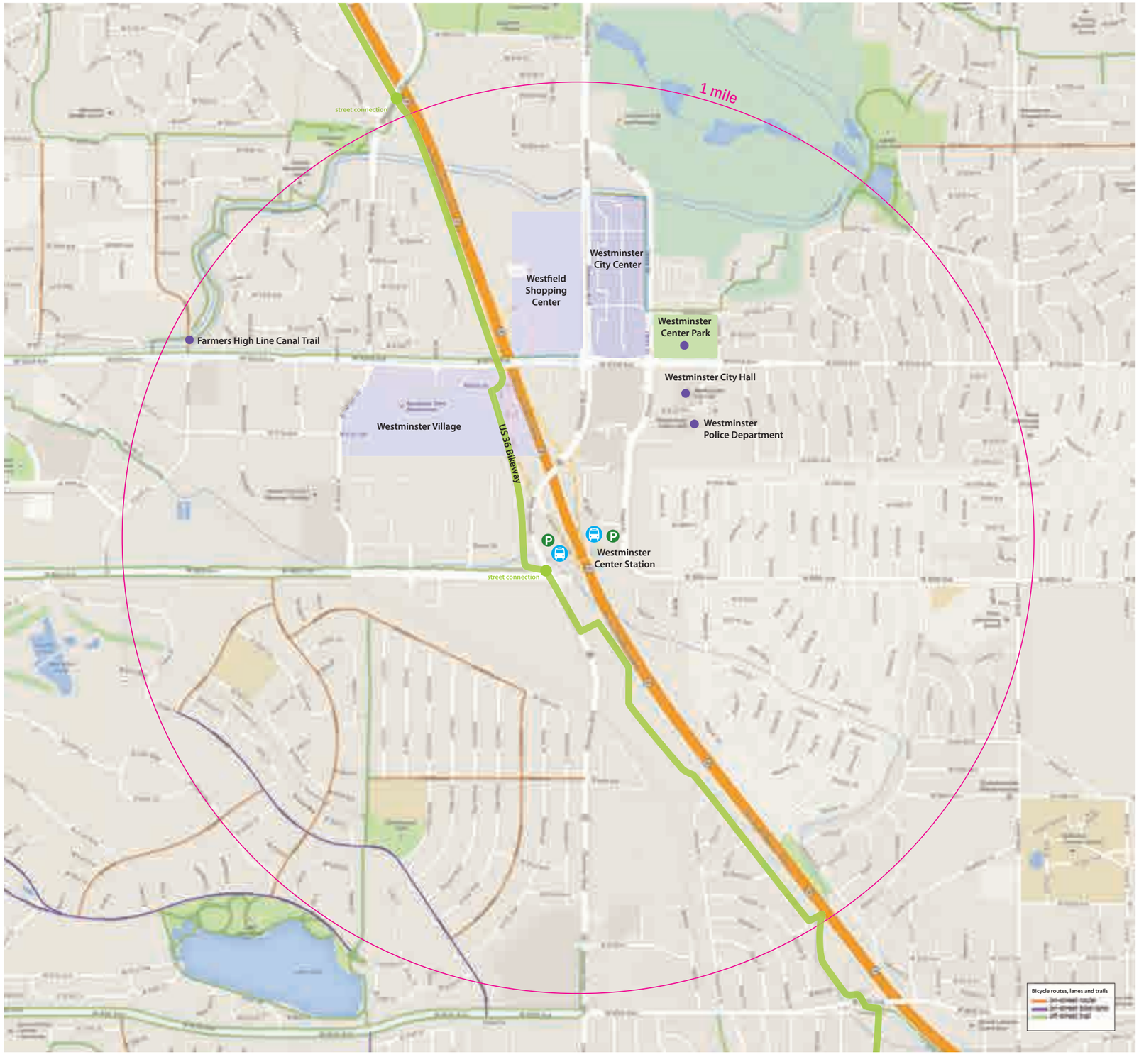
COMMUNITY OPPORTUNITIES

The lack of signage at Stations presents an opportunity for Corridor communities to create a wayfinding system that connects neighborhoods to the transit network. By highlighting routes to and from the Station, orienting bus patrons to the community, and properly identifying bus and bike facilities, signage can encourage multi-modal transportation and enhance the user experience. The individual Station audits on the following pages explain the existing conditions and opportunities appropriate for each Station.


Fig. 9 (Westminster)

2.9 AUDIT

Westminster Station 1-mile map



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14NW251001

Date
12.29.14

Revisions

Scale
N/A

Westminster Station - Eastbound

ORIENTATION

Observation
There is no signage when leaving the Station to orient the user to the surrounding area (Fig. 1). Stations lack signage indicating what is on the other side of US 36, such as important roads, destinations, or connecting transit routes. The pedestrian walkway through the Station leads to the middle of Sheridan Avenue, away from entry points to area destinations (Fig. 2).

Recommendation
Install orientation and directional signage to help users orient themselves and find the appropriate exit.

PEDESTRIAN

Observation
There are no sidewalks leading from the 88th Avenue exit of the Station (Fig. 3).

Recommendation
Add sidewalks to the 88th Avenue exit.

Observation
There is no crosswalk on the north side of the 88th Avenue/Sheridan Avenue. The Northwest corner of this intersection side provides a direct connection to the US 36 Bikeway (Fig. 4).

Recommendation
Add a crosswalk and pedestrian countdown signal at this intersection.


Fig. 1


Fig. 2

Fig. 3

Fig. 4

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Westminster Station - Westbound

ORIENTATION

Observation
There are no signs or maps to orient people to the area once they have gotten off the bus. This is problematic because the Station is not located directly on a major road and the garage blocks views of the surrounding area (Fig. 5).

Recommendation
Install orientation and directional signage to help users orient themselves and find the appropriate exit.

PEDESTRIAN

Observation
The sidewalk alongside the garage leading to Yates Avenue does not have signage indicating where it leads (Fig. 6).

Recommendation
Add directional or orientation signage to help pedestrians identify the appropriate exit.

Observation
There are no crosswalks or signals on Yates Avenue for a safe pedestrian crossing. This is of particular concern because Westminster City Hall and the Westminster Police Department are both located on the opposite side of Yates (Fig. 7 & 8). These buildings have been described as possible destinations for pedestrians from the Station, but directing them on a route without crosswalks is unsafe.

Recommendation
Add a crosswalk and possibly a traffic signal at this intersection.


Fig. 5

Fig. 6


Fig. 7


Fig. 8

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Biking near the Westminster Station

ROUTE MARKINGS

Observation
Some off-road bike paths are not signed. This causes confusion, as many of these are on sidewalks—88th Ave is an example (Fig. 9). It is difficult to discern which sidewalks are for bicyclists and which ones are not. 92nd Avenue has intermittent Bike Route signs (Fig. 10) but it is not clear whether these bike paths are multi-directional or one-way.

The bike route signs on 92nd Avenue (Fig. 10) are spaced relatively far apart, which does not help to clearly communicate that the sidewalk is a bike route. There is no sign on 92nd Avenue indicating to cyclists that they should be using the sidewalk.

The 92nd Avenue bike route does not indicate when it ends. When the sidewalk bike route ends, it is unclear whether cyclists should continue riding on the sidewalk or merge with traffic.

Recommendation
Add bicycle pavement markers to the sidewalk (Fig. 11). These should indicate the appropriate direction of travel. These should be painted with reflective paint for nighttime visibility.

Bike Route signs should be placed on the road at the start of the route explicitly state that the bike route is on the sidewalk (Fig 12 & 13). Signs at the end of the route should state that the lane ends and that bicycles must merge with traffic.


Fig. 9


Fig. 10


Fig. 11 (Seattle)

Fig. 12 (Phoenix)


Fig. 13 (Seattle)

Biking near the Westminster Station

DIRECTIONAL SIGNAGE

Observation
Because of the number of lanes and speed of traffic on Sheridan Avenue, the main Station exit on the eastbound side is not a recommended exit for cyclists (Fig. 14). The 88th Avenue exit is a more comfortable bicycling street and provides an easier transition to the street network and to the US 36 Bikeway.

Recommendation
Cyclists should be directed to use the 88th Avenue exit.

Observation
There is no directional signage for community bike routes near the Station or further out into the community. No signs indicate upcoming trail connections or necessary turns to access those trails.

The problems posed by the lack of directional signage can be seen at the 92nd Avenue and Farmer's High Line Canal Trail intersection. Trail access is difficult to see from the intersection. Even though the sign for the Farmer's High Line Canal Open Space is on the left side of the road, the trail connection is through the light and on the right (Fig. 15).

Just a few yards before the Farmer's High Line Canal Trail entrance, it is difficult to see that the path exists (Fig. 16). There is no physical connection from the road to the trail (i.e., a ramp/curb cut).

Recommendation
Provide directional signage to trail connections and local destinations. Including mileage to destinations on directional signage will help cyclists assess if they've missed a turn and gone too far.

Consider adding curb cut at the entrance to the trail to make the transition from street to trail easier.

Fig. 14

Fig. 15

Fig. 16

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Biking near Westminster Station

ROAD SAFETY

Observation
Sheridan Avenue and 92nd Avenue, major access roads to the Station, are not recommended for cyclists because of high speed, multi-lane vehicular traffic and a lack of a dedicated bicycle facility (Fig. 17). There is also no bicycle directional signage to the Station from 92nd Avenue.

Recommendation
To encourage cycling to this Station, an appropriate bicycle facility must be added to make these routes safe and lower-stress (as noted in the US 36 FFM Study). When the appropriate bicycle infrastructure is in place, install bicycle directional signage on Sheridan Avenue.

STATION IDENTIFICATION

Observation
The Station is not identified or visible from Yates Street (Fig. 18).

Recommendation
Add an RTD Station entrance sign to this corner or install directional signage to the Station at this intersection (Fig. 19).

SIGNAL LOOP DETECTORS

Observation
The signal sensor at the 88th Avenue exit does not detect a cyclist. A vehicle must be present for a green light. There is also no pedestrian signal for a cyclist to use since there is no crosswalk on the north side of 88th Avenue and Sheridan Avenue.

Recommendation
Install a bicycle signal loop detector (Fig. 20) with or a freestanding push button for signal light (Fig. 21).

Fig. 17


Fig. 18

Fig. 19

Fig. 20 (Columbus, OH) *The Columbus Dispatch*

Fig. 21 (Los Angeles) *The Source*

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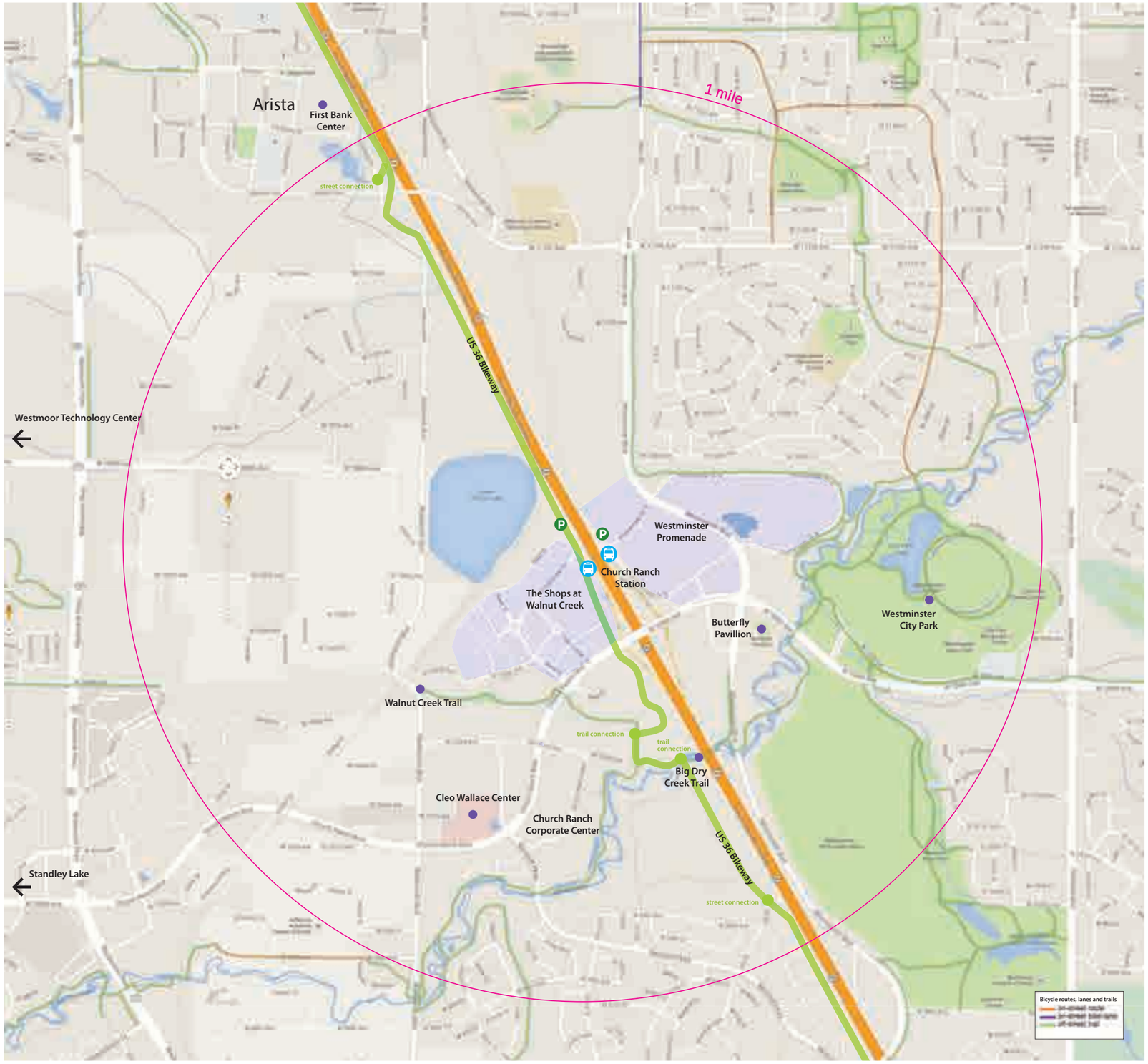
2.15 **AUDIT**

Church Ranch Station 1-mile map



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Church Ranch Station - Eastbound

PEDESTRIAN

Observation
It is difficult to tell from parking lot where the bus platforms are—there are no sightlines and no directional signage (Fig. 1). Though there is a bench, bicycle lockers and racks, and a bus sign adjacent to the parking lot, busses arrive elsewhere (Fig. 2).

There is a map of the Station (adjacent to the bench and bicycle lockers) but it is difficult to interpret (Fig. 3).

There is no signage directing to the westbound platform or the pedestrian underpass (Fig. 4). Once on the platform walkway, it is a long walk with no confirmation signage indicating that one is going the right way.

Recommendation
Provide clear directional signage from the parking lot to both platforms and bicycle shelters. Provide signage along the walkway to the platform.

BICYCLE

Observation
The intersection of the US 36 Bikeway, the ramp to the eastbound platform, and the walkway to the westbound platform is unmarked (Fig. 5).

Recommendation
Install bicycle directional signage at this intersection, directing to both platforms and the US 36 Bikeway.


Fig. 1

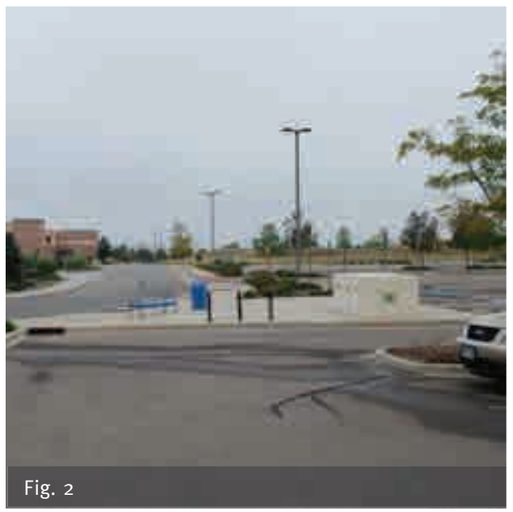
Fig. 2

Fig. 3


Fig. 4


Fig. 5

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Church Ranch Station - Westbound

ORIENTATION

Observation
There is no signage when leaving the Station to orient the user to the surrounding area, such as nearby streets and neighborhoods.

Station lacks signage indicating what is on the other side of US 36, such as important roads, destinations, or connecting transit routes (Fig. 6).

Recommendation
Install orientation and directional signage to help users orient themselves.

PEDESTRIAN

Observation
There is no signage at the end of the long platform walkway to the pedestrian underpass, parking lot or eastbound platform (Fig. 7), with the exception of the entrance sign to the Shops at Walnut Creek on the overpass (Fig. 8).

There is also no signage upon emerging from the pedestrian underpass (heading towards the westbound platform) indicating that the westbound platform is accessible via the walkway (Fig. 9).

Recommendation
Install directional signage at these locations.


Fig. 6


Fig. 7


Fig. 8


Fig. 9

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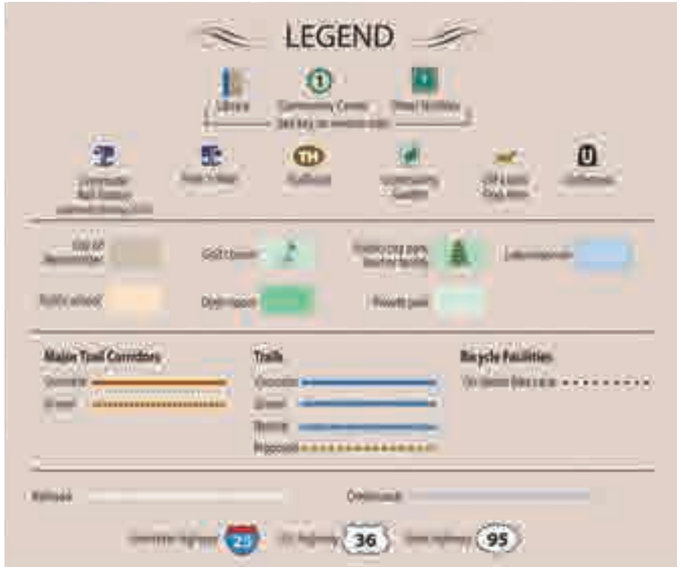
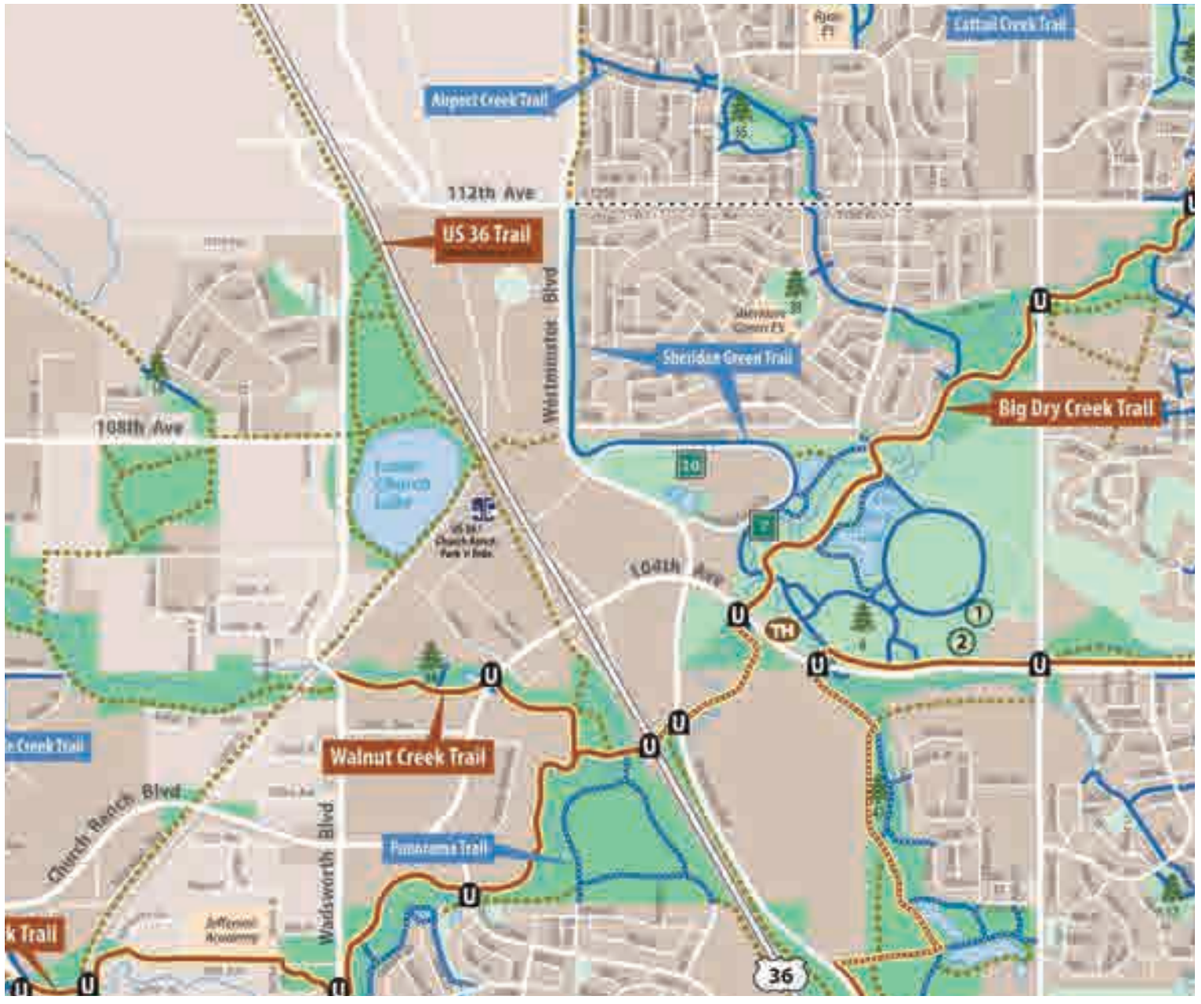
Biking near the Church Ranch Station

CONNECTING TO THE STATION

Observation
The Church Ranch Station has many bike paths within a 1 mile radius of the Station; however, there are none that connect directly with the Station. There is a plan to add a route along Zephr Street and beyond. The US 36 Bikeway will connect with the Station, but many people using this Station would likely use other routes.

Recommendation
Add bike lanes, bike routes and/or off-road bikeways connecting neighborhoods and commercial areas to the Station before adding signage.





City of Westminster trail map

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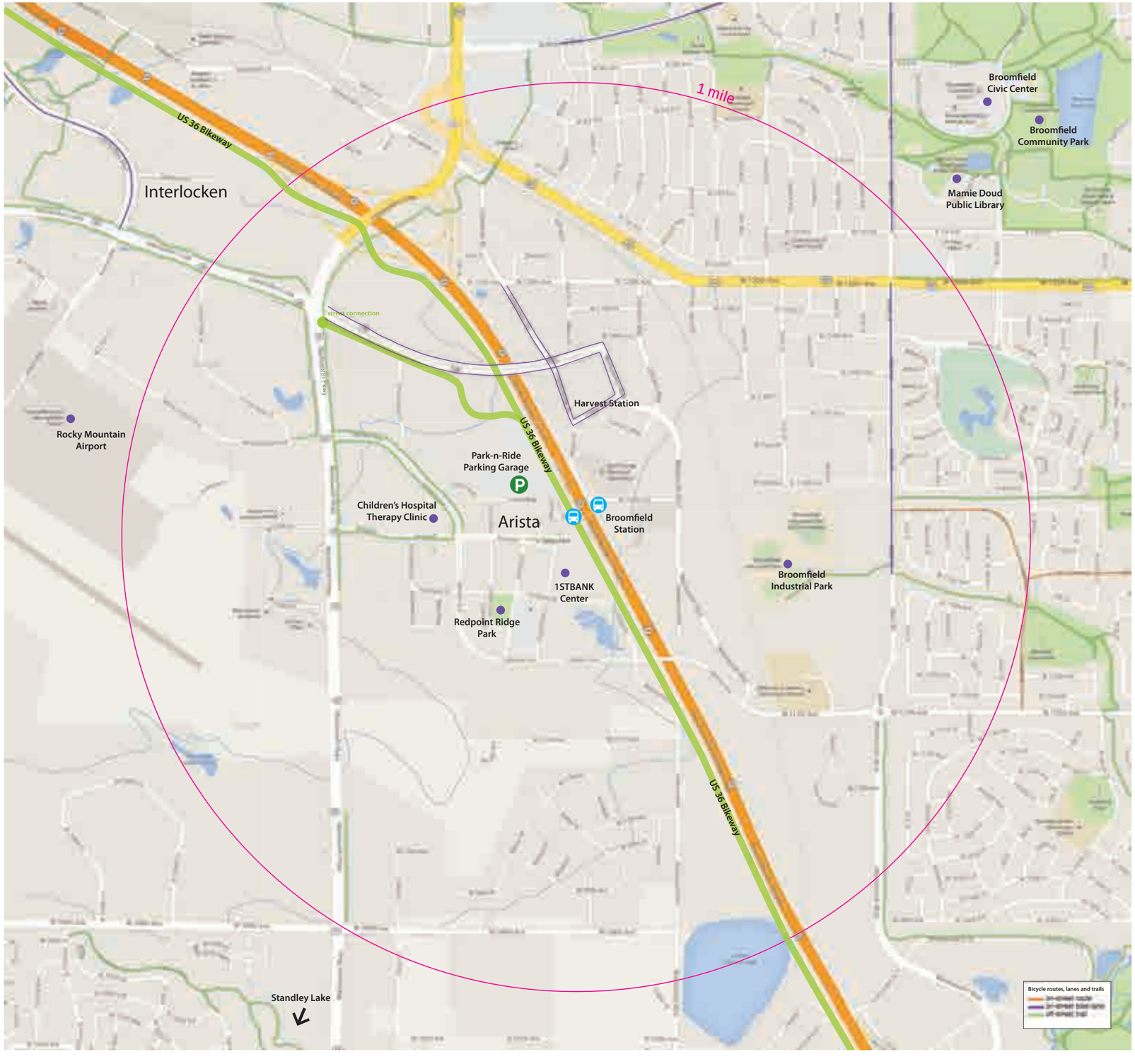
2.19 AUDIT

Broomfield Station 1-mile map



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Broomfield Station - Eastbound

ORIENTATION

Observation
The Station is situated near a fairly dense, transit-oriented development and the 1STBANK Center (Fig. 1 & 2). The path to the "core" of Arista leads directly into the Station. Shops, offices, and restaurants along this core are not immediately visible from the Station, blocked by buildings and foliage (Fig. 3).

Recommendation
Install orientation and directional signage to channel pedestrians into the core of Arista. Make it clear that the opposite direction leads only to the parking garage.

PEDESTRIAN

Observation
Of all of the Station areas in the corridor, Arista is the best suited for a pedestrian wayfinding system. The proximity to the Station, density of development, and the diversity of retail, commercial, recreational, and residential uses make this neighborhood robust enough to support a pedestrian sign system.

Many destinations, including the Station, are obscured by tall buildings even from only a couple blocks away (Fig. 4). Thus, destinations cannot be navigated to via sightlines from a distance.

Recommendation
Implement a pedestrian sign system throughout Arista, directing users to walkable destinations such as the Station, 1STBANK Center, Children's Hospital Therapy Clinic, and Redpoint Ridge Park.

Fig. 1

Fig. 2 *from the Westin Denver/Boulder website*

Fig. 3

Fig. 4

Broomfield Station - Eastbound

BICYCLE

Observation
Because the US 36 Bikeway intersects with the walkway to the Station (Fig. 5), most cyclists coming off of the bikeway will try to find the quickest and easiest way out of the Station area without dismounting. There are RTD Station signs indicating that cyclists should dismount (Fig. 6), but these are not legible from the bikeway and up the walkway (Fig. 7).

Recommendation
Assess the site and conditions to determine if there is a possible route from Arista Place to the bikeway without cyclists dismounting (Fig. 8). Pavement markings on either side of the light posts might be an appropriate physical barrier, accompanied by pavement markings to designate appropriate lanes of travel (Fig. 9). Pedestrian safety should be the priority when determining a possible bike lane through the Station plaza.

If dismounts are necessary, dismount signs should be placed immediately at the intersections of the walkway and bikeway (on both sides of the pedestrian bridge). Orientation kiosks should be placed within eyesight of the dismount zone so that cyclists can find the best route out of the Station. All directional signage should be at pedestrian scale to encourage cyclists to dismount in order to read them.

Observation
There is no bicycle directional signage to indicate how cyclists should exit the Station area. Because many destinations are accessible via Arista Place, it is advised that cyclists are routed to exit by Arista Place. Transit Way, the alternative, is not recommended because it is an access road to the garage, which is not a destination for cyclists (Fig. 10). This road is also heavily used by busses, so it may be safer and less stressful for cyclists to avoid this road.

Recommendation
Designate Arista Place as a bike route and sign accordingly. Directional signage to local desinations should be located along this street.


Fig. 5

Fig. 6


Fig. 7


Fig. 8


Fig. 9 *Goldengate.org*

Fig. 10

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Broomfield Station - Westbound

ORIENTATION

Observation
The Station is situated on a back road, with no street sign or RTD Station identification sign. There are no visible businesses, intersecting roads, or distance signs to indicate an appropriate direction of travel. Directly across from the Station is an electrical subStation (Fig. 11) and 116th Avenue (Fig. 12).

Recommendation
Install orientation signage near the platform to indicate that most destinations in this area are on the other side of US 36.

PEDESTRIAN

Observation
The environment around the Station indicates that there are no walkable destinations on this side of US 36. Because of the lack of pedestrian-focused development and lack of pedestrian infrastructure, this area is not suitable for pedestrian sign system.

Recommendation
Pedestrian directionals should feature destinations on other side of US 36.

Observation
There is a large housing development, Harvest Station, behind the electrical subStation (Fig. 13), which is within walking distance of the Station. There is a sidewalk leading from the develoment to the Station.

Recommendation
Enhance the route from Harvest Station to the Station with lighting, landscaping and street furniture to encourage residents to walk to the Station.


Fig. 10


Fig. 12


Fig. 13


Fig. 14

Broomfield Station - Westbound

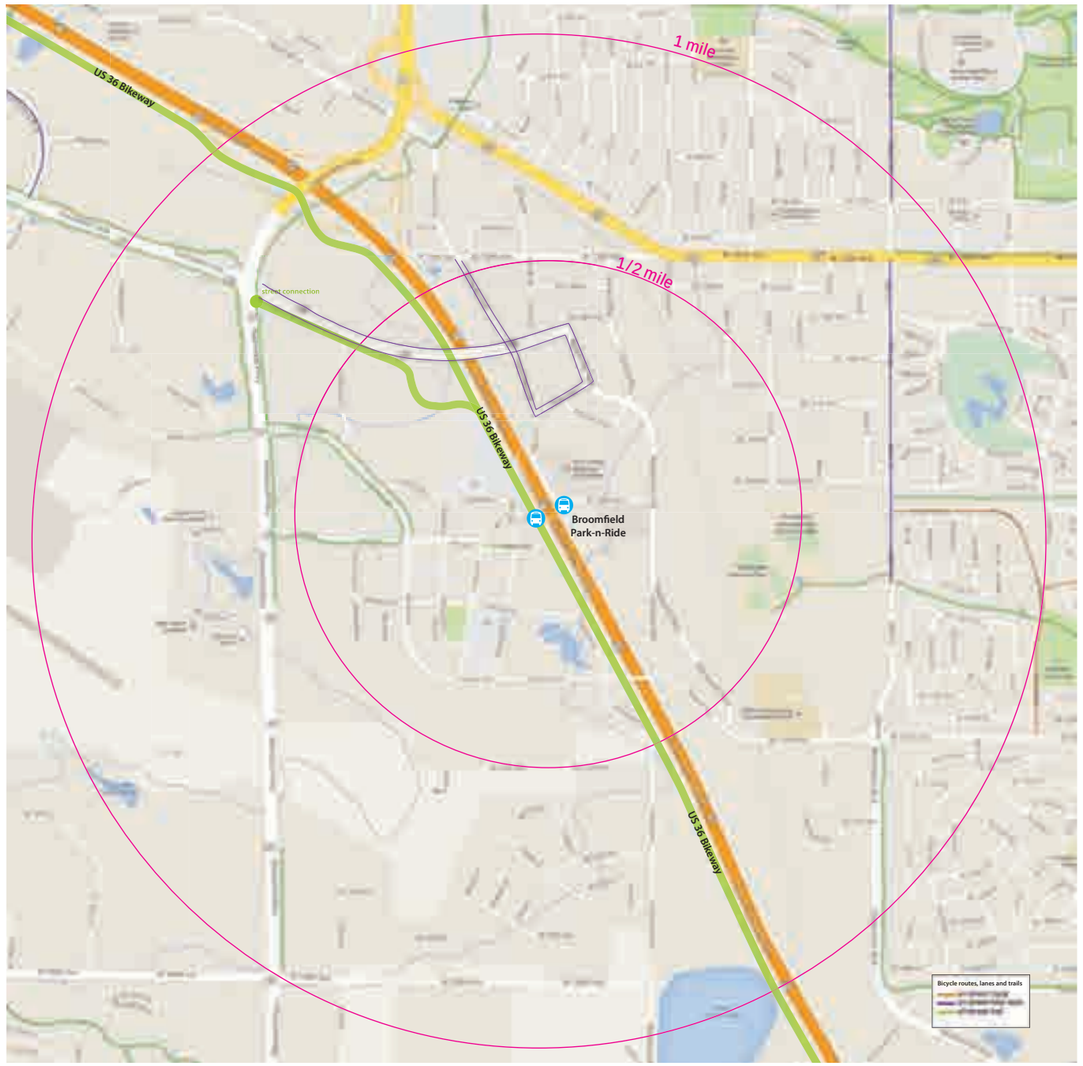
BICYCLE

Observation
The westbound side of US 36 lacks a bicycle network connecting the Station to adjacent neighborhoods. Land development and high-speed roadways between the Station and the east side of Main Street makes bicycle travel difficult.

The Broomfield Station needs significant investment in bicycle infrastructure to improve connections to the community.

Recommendation
It is advised that the improvements proposed in the US 36 FFM Study be implemented before adding bicycle signage.

This area should be studied closely to identify “best” routes for cyclists—based on road stress levels and bicycle facilities. The best route [ie, the safest and most condusive to bicycle traffic] may not be the most direct.



DRCOG Denver Regional Bike Map, as of 8/27/2014

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Revisions

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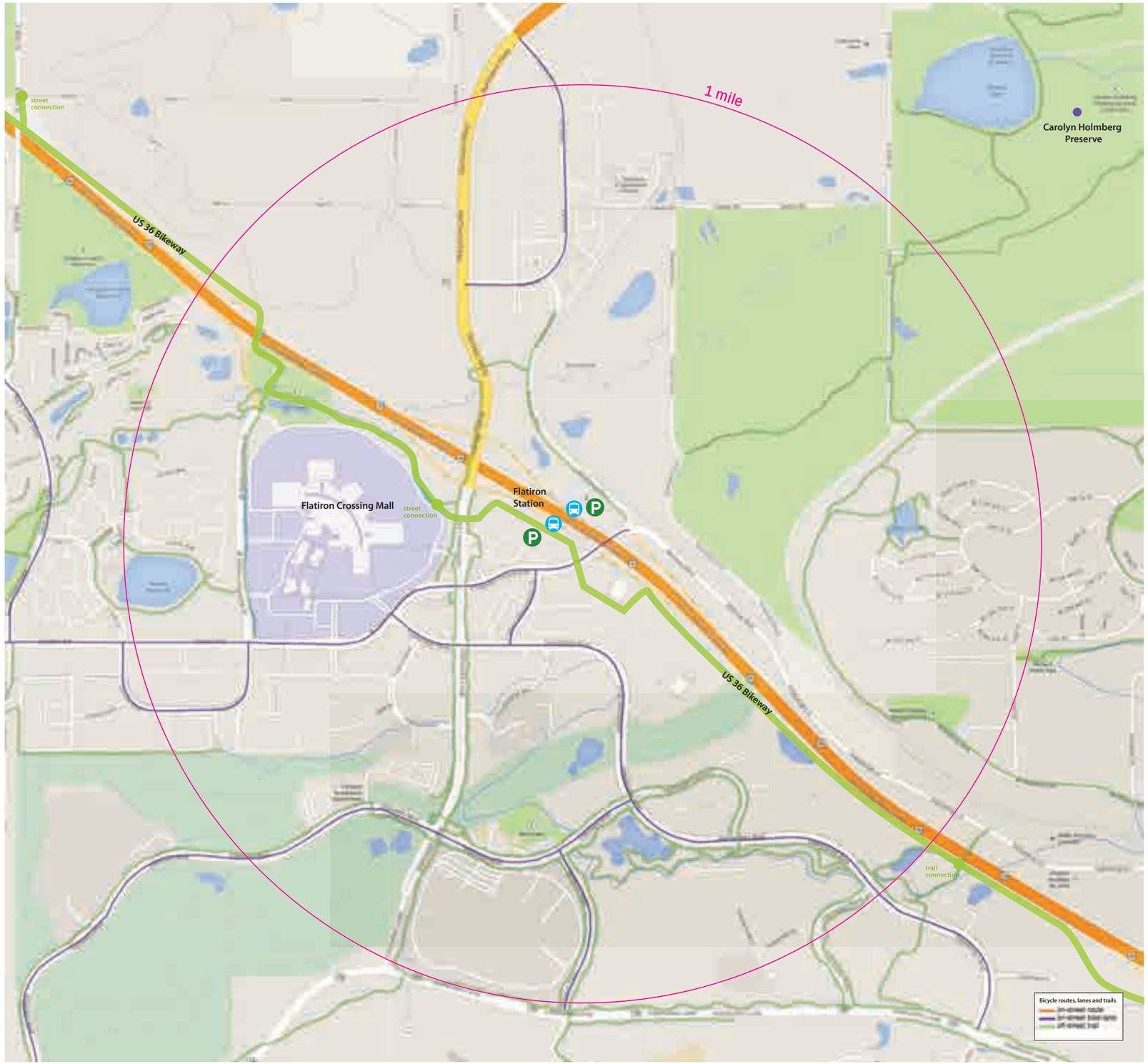
N/A

Northwest Corridor

Bicycle and Pedestrian Accessibility Study

AUDIT | 2.24

Flatiron Station 1-mile map



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Flatiron Station - Eastbound

ORIENTATION

Observation
There is no directional signage to the Station. The Station is behind a strip mall, and is not visible from the street (Fig 1). There is no identification signage at the entrance to the Station or around the platform (Fig. 2).

Other than the bus stop sign ("The Ride"), the only sign at the Station instructs patrons to use the pedestrian tunnel, but does not include a destination (Fig. 3).

Recommendation
Install orientation signage to help users understand the environment and confirm their location upon arrival.

Observation
The Flatiron Crossing Mall is a short distance from the Station, but routes out of the Station area are unclear because of the Flatiron Marketplace parking lot. There is not a clear path of travel connecting the Station to the mall. There is a walkway leading out of the Station, but it is unclear where it goes (Fig 4).

Recommendation
Orientation maps should show sidewalks and connecting streets to show the best route to the mall. Pedestrian signage may be helpful in delinating the best routes.


Fig. 1 (Flatiron Crossing Dr and Flatiron Marketplace Dr)


Fig. 2


Fig. 3


Fig. 4

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Flatiron Station - Westbound

ORIENTATION

Observation
There are no street signs on the road adjacent to the Station (Fig 5). There are no landmarks or other road intersections visible from the parking lot to aid in orientation. The only sign in this area is the RTD sign at the entrance.

Recommendation
Place an orientation kiosk near the bus platform to help users determine the direction of their destination and appropriate path of travel.

Fig. 5


Fig. 6

PEDESTRIAN

Observation
The lack of density and walkable destinations make this Station unsuitable for a pedestrian wayfinding system (Fig. 6).

Recommendation
Limit pedestrian tools at this Station to the orientation kiosk near the bus platform. When more pedestrian-friendly development occurs, a pedestrian wayfinding system can be deployed.

Biking near the Flatiron Station

ROUTE MARKINGS & DIRECTIONAL SIGNAGE

Observation
Bike lanes are marked clearly and consistently on roads around the eastbound Station (Fig. 7). “Bike Only” signs (Fig. 8) appear periodically along roads with bike lanes.

Bike lanes on the westbound side are not marked as clearly (Fig. 9). Because there are no street signs at the Station exit, cyclists cannot orient themselves and navigate via the street network directly out of the Station.

While these roads clearly identify bicycle infrastructure, there is no directional signage to retail or commerical destinations, or nearby bike trails.

Recommendation
Add directional signage, with mileage, to roads with bike lanes and off-road multi-use paths. Signs should be placed at the exits of the lots to ensure cyclists head out of the Station in the right direction.


Fig. 5

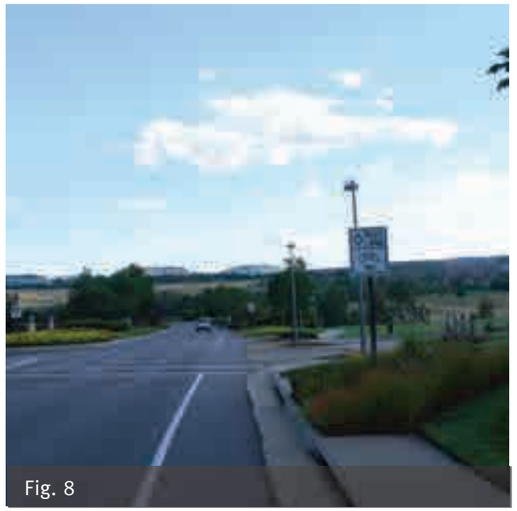
Fig. 8


Fig. 9

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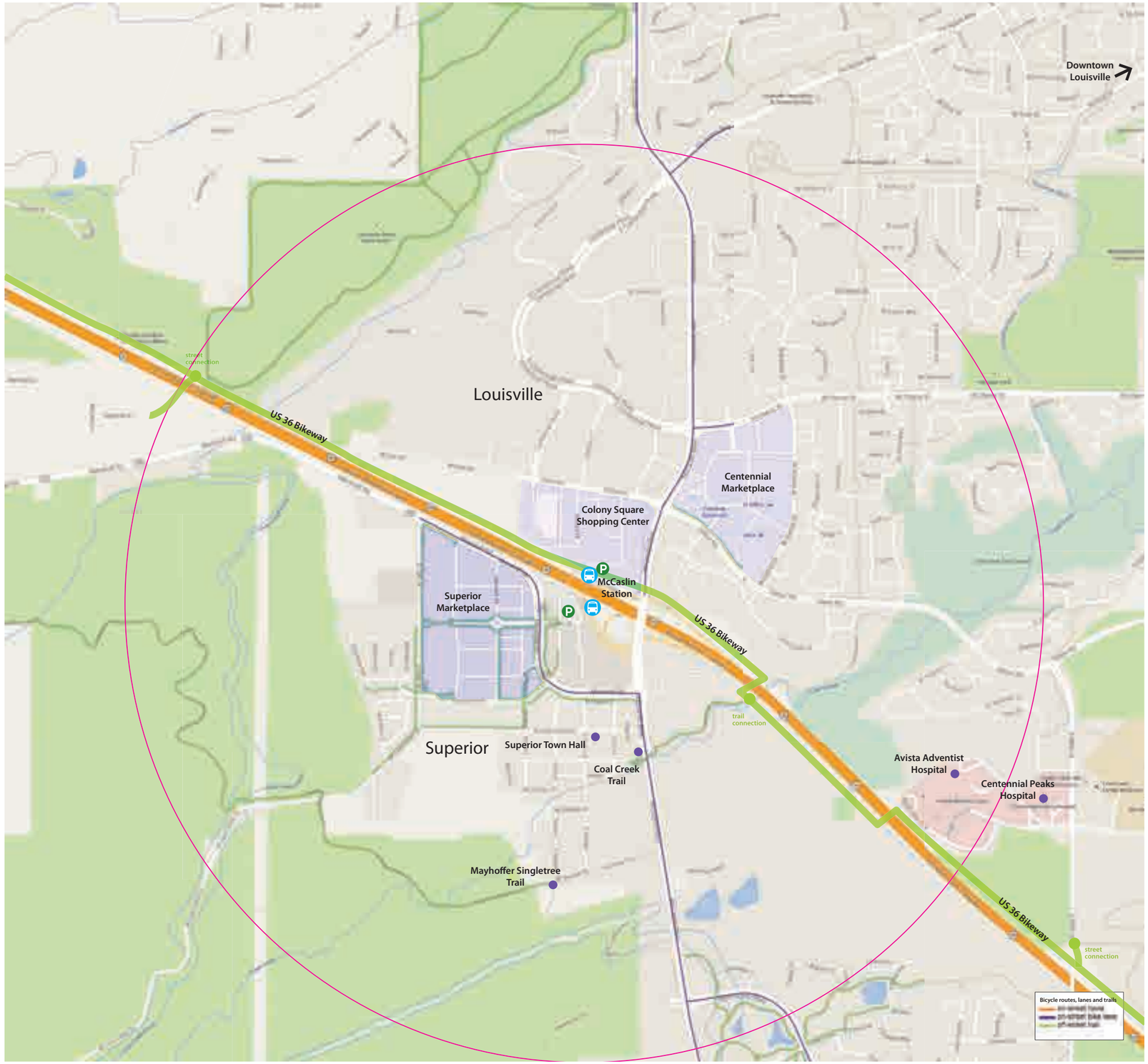
Northwest Corridor

Bicycle and Pedestrian Accessibility Study

AUDIT | 2.28

McCaslin Station 1-mile map



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McCaslin Station - Eastbound

ORIENTATION

Observation
There is no signage at or near the platform explaining what is nearby (Fig. 1). Bicycle lockers and Superior Marketplace are to the left, the parking lot is straight ahead, and the pedestrian bridge is to the right.

Recommendation
Install orientation/directional signage near the bus shelters.

PEDESTRIAN

Observation
There are challenging sightlines from the parking lot and sidewalk to the platform since it is below grade. A person unfamiliar with the Station may not realize that the ramps and stairs lead to the buses, mistaking the Kiss-n-Ride Shelter (Fig. 2) as the bus platform.

Recommendation
Install orientation/directional signage at the base of the pedestrian bridge.

Observation
A large parking lot separates the shops at Superior Marketplace and the Station (Fig. 3).

Recommendation
Include the shopping center on the map and clearly show where sidewalks are. Include a walk circle on the map to indicate that all shops in the shopping area are within a 10-minute walk.

Fig. 1

Fig. 2


Fig. 3

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McCaslin Station - Westbound

ORIENTATION

Observation
The westbound side features a Call-n-Ride sign with a simple map of Louisville at the base of the pedestrian bridge (Fig. 4). This map is focused on the Call-n-Ride service, so it only provides a basic understanding of the area. Because the map has a specific intention and is therefore is missing detail, it is not suitable for pedestrian or bicyclist wayfinding.

Recommendation
Install orientation signage in this area of the Station. The map should be detailed, focusing on pedestrian and bicycle travel and destinations.

PEDESTRIAN

Observation
The bus platform is not visible from some areas of the parking lot or from the exit of the pedestrian bridge—it is behind the wall and landscaping. There is no directional signage to platform (Fig. 5).

Recommendation
Include the bus platform location on the orientation map. Provide directional messaging directing to the platform.

Observation
The Station is situated behind a shopping center, out of view of most of the walkable destinations (Fig. 6). The sidewalk, road, and parking lot network make it challenging for users to visualize the way out. This type of development, with parking lots and a single sidewalk out of the Station (which leads to McCaslin Blvd, a multi-lane, high-traffic road) would be challenging for a pedestrian wayfinding system.

Recommendation
Improve pedestrian infrastructure and encourage more pedestrian-friendly development before implementing a pedestrian wayfinding system.

Fig. 4

Fig. 5

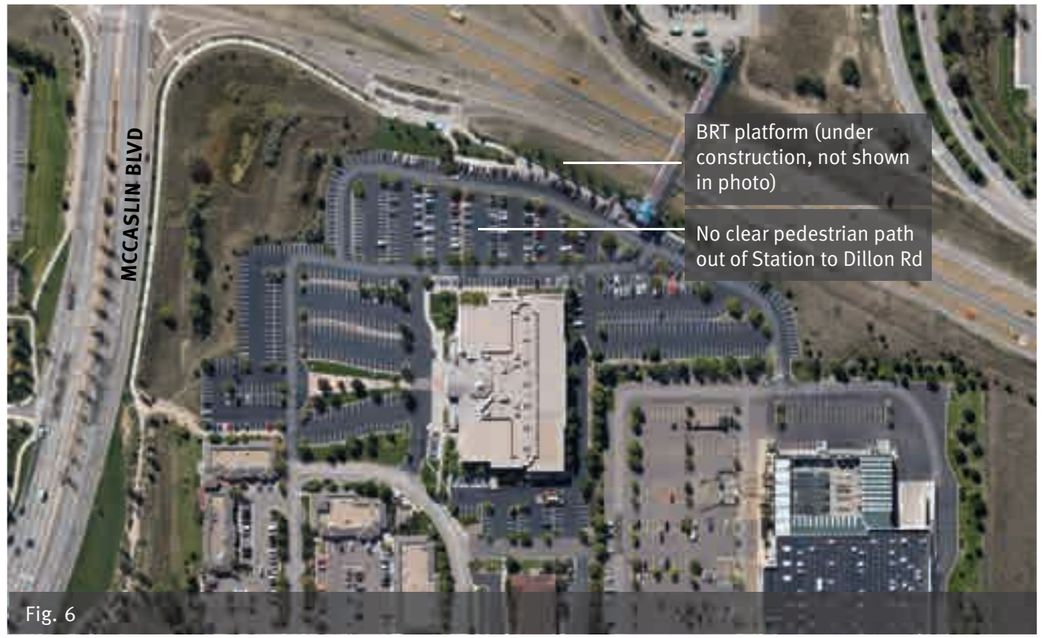

Fig. 6

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Biking near the McCaslin Station

DIRECTIONAL SIGNAGE

Observation
The Station lacks directional signage from the major artery, McCaslin Blvd, and from access roads like Marshall Drive (Fig. 12) or Dillion Road (Fig. 13).

There is no directional signage near the Stations to direct to the Coal Creek Trail or local destinations.

Recommendation
Add directional signage on roads with bike lanes.

TRAIL CONNECTIONS

Observation
There is no physical connection from the street bike lane to the Coal Creek Trail (Fig. 14).

Recommendation
Add a curb ramp from the bike lane to the trail, or direct cyclists to access the trail via the sidewalk at the Williams Street intersection.

Observation
The Coal Creek trail identification sign is too small for bicyclists traveling in the bike lane. It is also facing the opposite direction of the bike lane—so only a cyclist traveling the opposite direction of traffic and riding on the sidewalk would be able to read it (Fig. 15).

Recommendation
Install a larger sign at the trailhead.

Observation
The start/end of the Coal Creek Trail at McCaslin introduces the rider to a new network—either the street network or an off-road, recreational trail. This location could be an opportunity for an orientation kiosk (Fig. 16).

Recommendation
Install orientation signage here with a map showing routes to the Station, downtown Louisville, US 36 Bikeway and Coal Creek Trail.

Fig. 12


Fig. 13


Fig. 14


Fig. 15

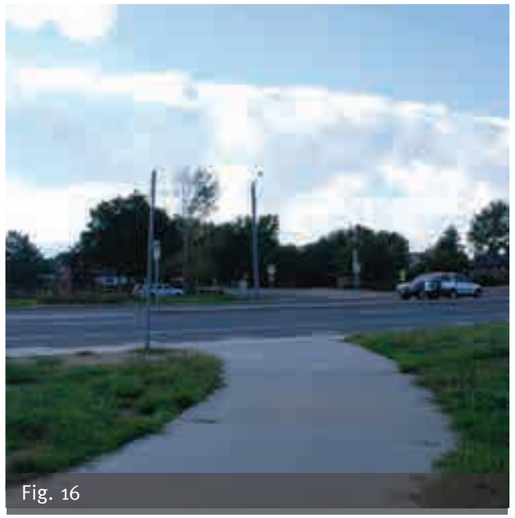
Fig. 16

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Northwest Corridor

Bicycle and Pedestrian Accessibility Study

AUDIT | 2.32

Table Mesa Station 1-mile map

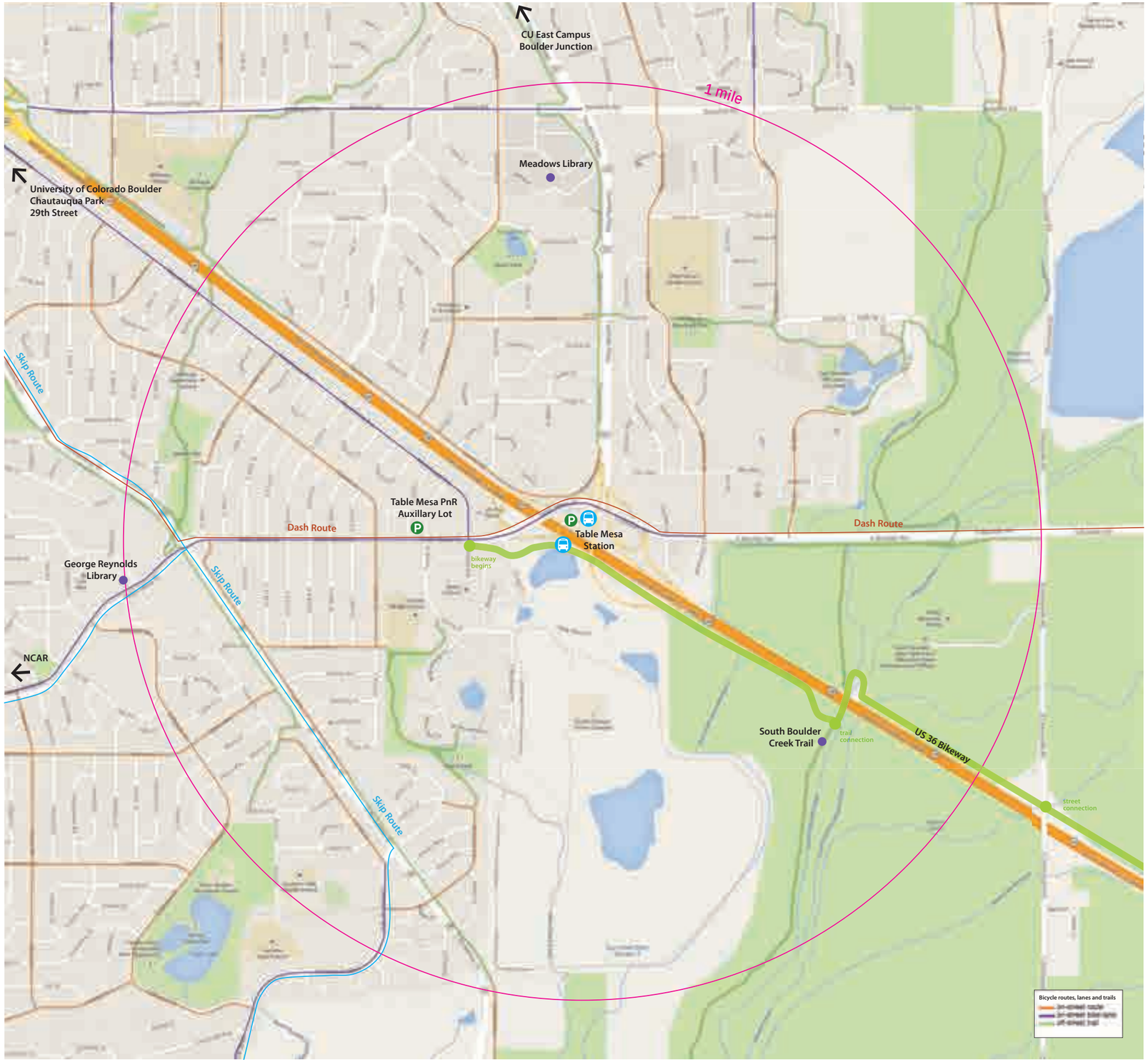

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Table Mesa Station - Eastbound

ORIENTATION

Observation
The eastbound platform does not have direct visual connections to the surrounding area. The garage blocks views to the north and grassy fields are situated on the southern side of the platform (Fig. 1). From the Station west, street signs are visible but there are no landmarks or businesses to help a user orient themselves (Fig. 2).

Recommendation
Install orientation/directional signage on the bus platform.

PEDESTRIAN

Observation
The area around the Station (Both eastbound and westbound platforms) is mostly residential. There are very few public destinations within a few blocks of the Station (Fig. 3). Given the lack of destinations, this immediate area is not appropriate for a pedestrian wayfinding system. Residents in these neighborhoods could walk to the Station, and they would most likely rely on their knowledge of their neighborhood rather than pedestrian wayfinding signs directing them to the Station.

The Station is located on a major roadway and transit route. The pedestrian entrance to the Station is unmarked (Fig. 4).

Recommendation
Orientation signage at the Stations should provide users with enough information to plan their journey from the Station.

Identify the Station name and platform side on the secure bike parking structures, which will be visible upon entering the Station.


Fig. 1


Fig. 2


Fig. 3


Fig. 4

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Table Mesa Station - Westbound

ORIENTATION

Observation
The westbound platform does not provide orientation signage to familiarize users with the area (Fig. 5).

Recommendation
Install orientation/directional signage near the Station plaza.

BICYCLE

Observation
There are bicycle route identification signs immediately in front of the Station (Fig. 7). These signs do not include destinations or the route/street.

Following the trailblazers from the Station to the multi-use path leads to a directional sign with the mileage to the destination (Fig. 8). The Boulder bicycle directional signs direct to roads, trails, and bike routes instead of specific institutions, neighborhoods, and parks.

Recommendation
Include bike routes and multi-use trail names, as identified on existing signage, on the orientation signage near the bus platform. Show destinations within biking distance so users can plan their trip, identifying the paths to take, before they leave the plaza.

Current signs could be supplemented with signage that lists more specific destinations (such as University of Colorado - Boulder campus).


Fig. 5

Fig. 6


Fig. 7


Fig. 8

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Biking near the Table Mesa Station

ROUTE MARKINGS & DIRECTIONAL SIGNAGE

Observation
Bicycle routes are marked consistently throughout the area, using the “Boulder Bikeways” sign format. Most signs serve to identify roads with bike lanes or designated bike routes. There are a few directional signs (Fig. 7). They do not consistently provide “distance to destination” mileage (Fig. 8).

All signs are too small to be legible for a cyclist traveling at a typical commuting speed of 10–12 mph. Fig. 9 shows the difference between an MUTCD Bike Lane sign (top) and a typical Boulder Bikeway sign (bottom). Type sizes are even smaller on some directional signs (Fig. 10), well under the MUTCD guidelines, and require a cyclist to stop in order to read it.

Because of their small scale and placement, signs are easy to miss (Fig. 11). Signs are typically placed at the intersection instead of a few yards before the intersection. This is problematic for cyclists that are making a left turn—they are not given enough warning to merge into the left lane.

Recommendation
Increase letter height on all signs to 2” to follow MUTCD standards. Increase the size of the sign so it is easier to see. Supplement exisiting system with directional signage to specific destinations and provide mileage.


Fig. 7


Fig. 8


Fig. 9


Fig. 10


Fig. 11

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N/A

Brands along the Corridor

There are many community and transit brands along the Corridor. While these brands were explored for integration with the system, it was ultimately determined that including logos in directional signage was not an appropriate or effective wayfinding solution.

Community names in text format have been retained and are an integral part of the system branding. RTD Station names will be featured as typographic messages on directional signs.

The following points outline the major reasons for excluding logos from directional signage:

Inconsistent format
Logos do not have a consistent format, which makes replacing one community's logo with another more difficult and requires altering the design. It creates a less modular and less uniform system when the geometries of the sign change to accommodate differently configured logos.

Logos are not designed to be legible by cyclists
Most logos would have to be overscaled in order to be legible on directional signage. Because MUTCD requires a minimum 2" copy height, logos would need to be quite large to be legible and overpower the sign.

Logos distract the user from the primary messages.
Adding more colors and shapes, signs become more complicated and more difficult to scan. Simple typographic messages are easier for users to read from a distance and while in motion.

Logos are usually updated more frequently than signs.
When a logo appears on a directional sign, it will need to be updated every time the logo is redesigned. Given that bicycle directional signs have a lifespan of 10+ years, it is quite possible that one or more of the partner logos would change before the signs would need to be replaced. This would result in a more costly and higher-maintenance system.

Too many logos for one sign
There is not enough space to add every logo of every enterprise in the area. Adding every logo associated with a Station, for instance, would include the logos of RTD, local community, the US 36 Bikeway, Flatiron Flyer, and any other branded bus route running to the Station. The sign would quickly become overloaded with indiscernible clutter. It is much more effective to list the Station name and let the brands exist only on buses and at the Stations themselves.

City of Westminster

City of Louisville

City and County of Broomfield

Town of Superior

City of Boulder

Boulder County

Regional Transportation District logo

RTD US 36 BRT bus - Flatiron Flyer

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Other wayfinding signs in the corridor

US 36 Bikeway

Westminster (off-road)

Westminster (off-road)

Westminster (on-road)

Broomfield (off-road)

Broomfield (on-road)

Superior (off-road)

Louisville

Boulder

RTD entrance sign

RTD directional sign

RTD platform sign

RTD platform sign

Bus-Bike Shelter

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section 1

Sample Journeys and Messaging

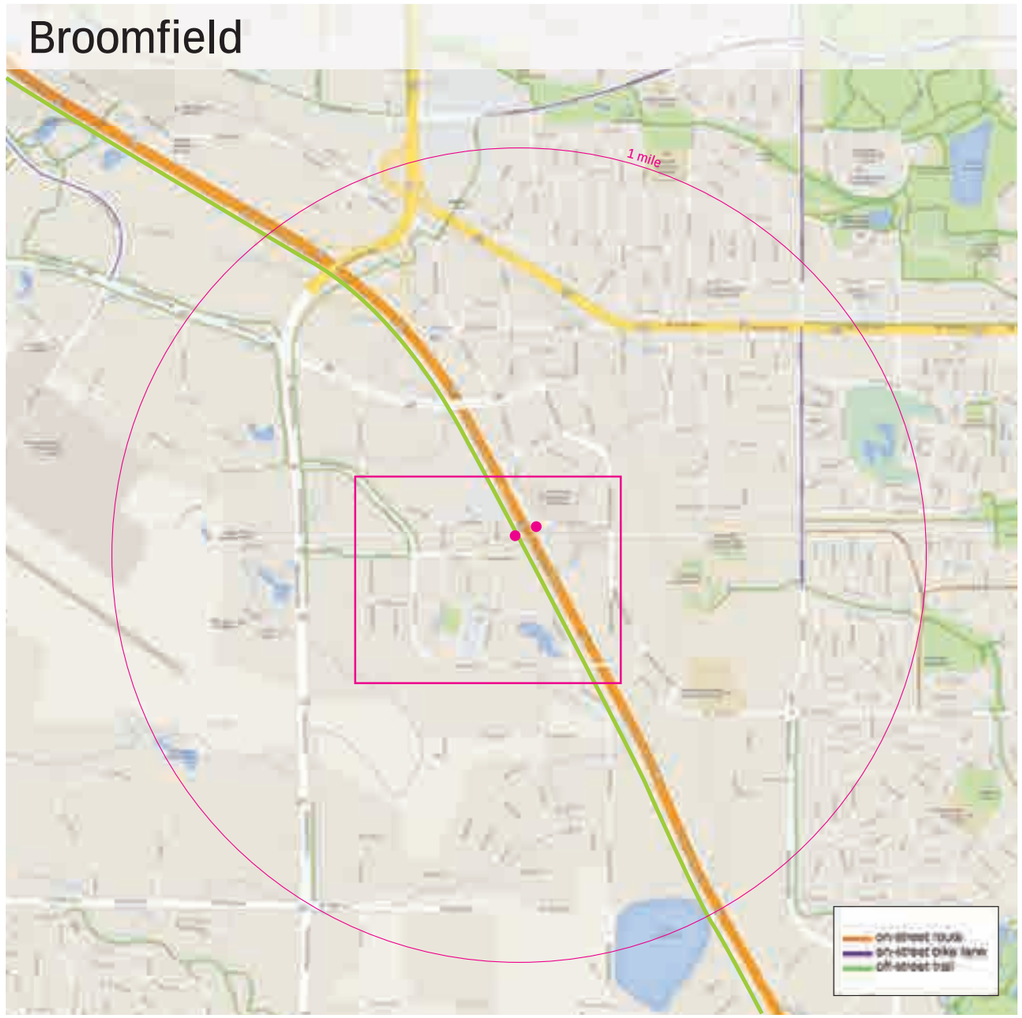
This chapter illustrates the sign types that could be encountered on selected pedestrian and bicycle routes. Sample journeys show examples of how the sign system would be deployed and what messages the signs would carry. These do not investigate every possible or recommended routes, however, we chose representative routes (sample journeys) to help determine the needs of the system. These routes were based on feedback from the first stakeholder workshop and on plans for the future Westminster Rail Station. The images in this section are not recommended designs, but show messages in a diagrammatic format.

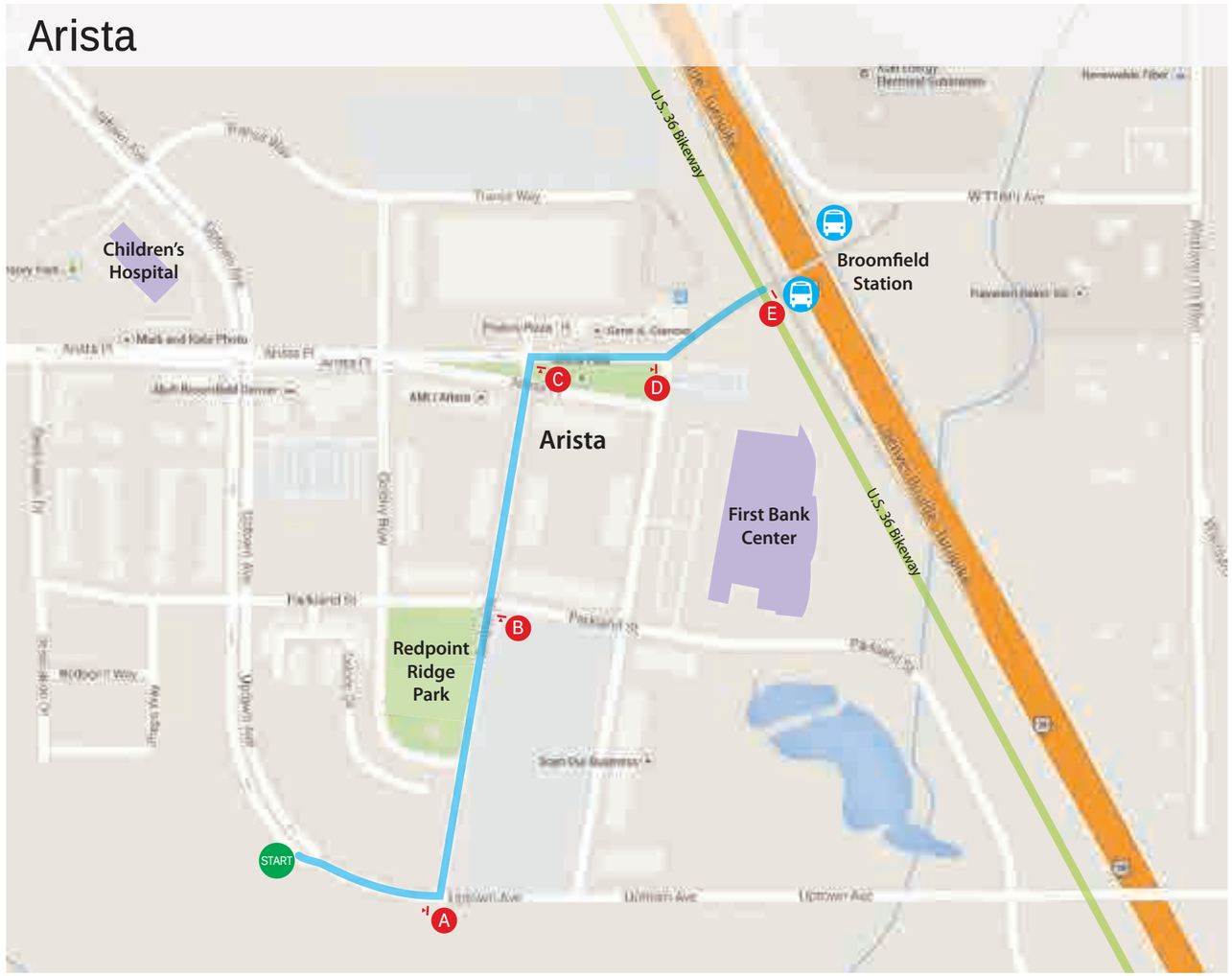
The last two pages of this chapter show a messaging matrix, showing the destinations that could be included on orientation maps, pedestrian signs and bicycle signs.

Pedestrian Sample Journey 1 - Broomfield

Navigation from Uptown Avenue to Broomfield Station

This sample journey shows how the pedestrian sign system may be deployed in Arista. The highlighted route illustrates the signs that would be encountered while traveling from Uptown Avenue to Broomfield Station. Because the signs direct to multiple destinations, you can see here how the sign system could also help pedestrians navigate to Children's Hospital, 1STBANK Center, Redpoint Ridge Park and US 36 Bikeway. As the design of the system advances, Broomfield may choose to deploy signs along a different route than what is shown here.





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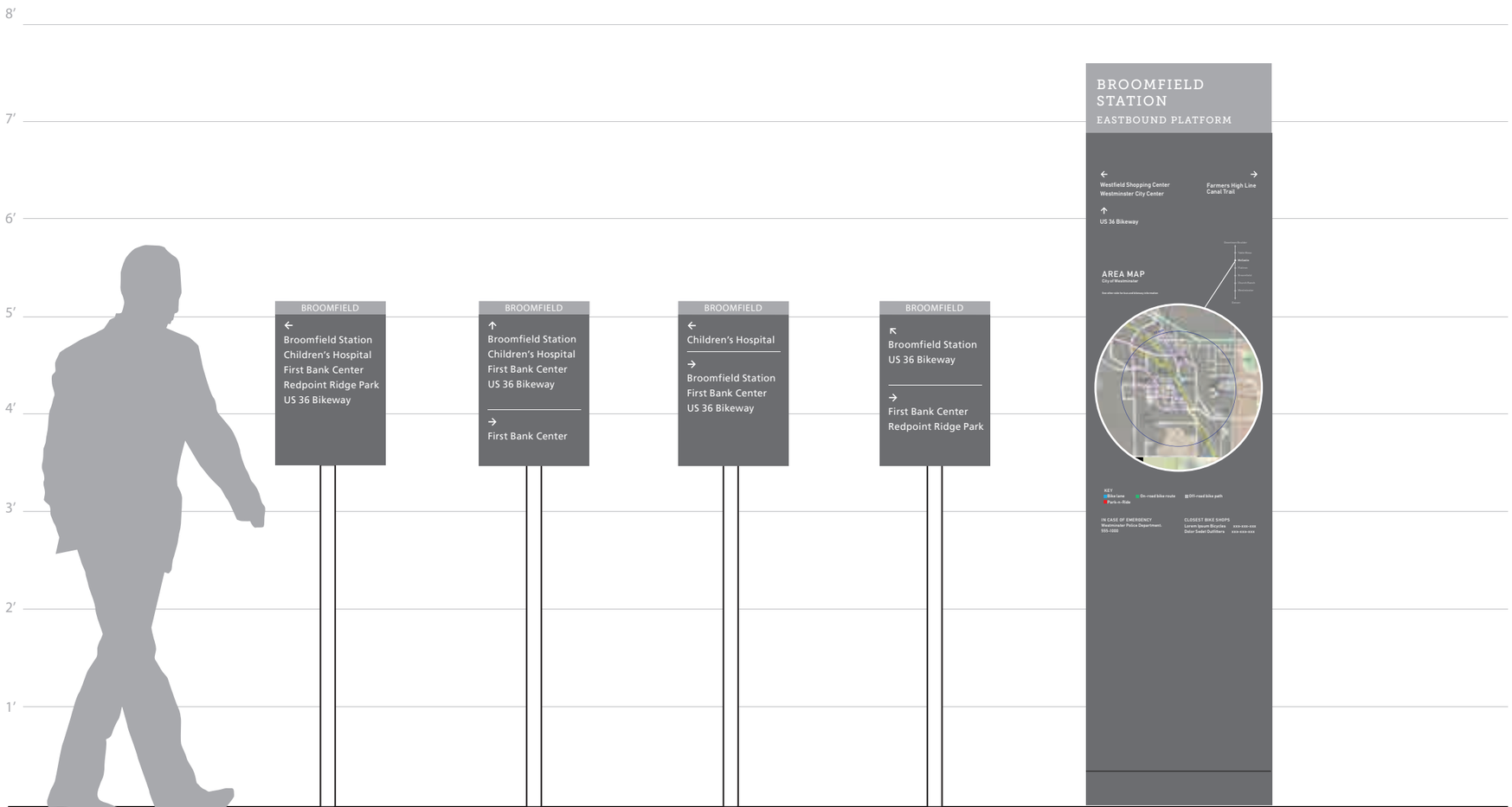
12.29.14	12.05.14	N/A

Pedestrian Sample Journey 1 - Broomfield

Sign types and messaging



A Directional signage
ped scale - low height pole option

B C D

E Orientation kiosk

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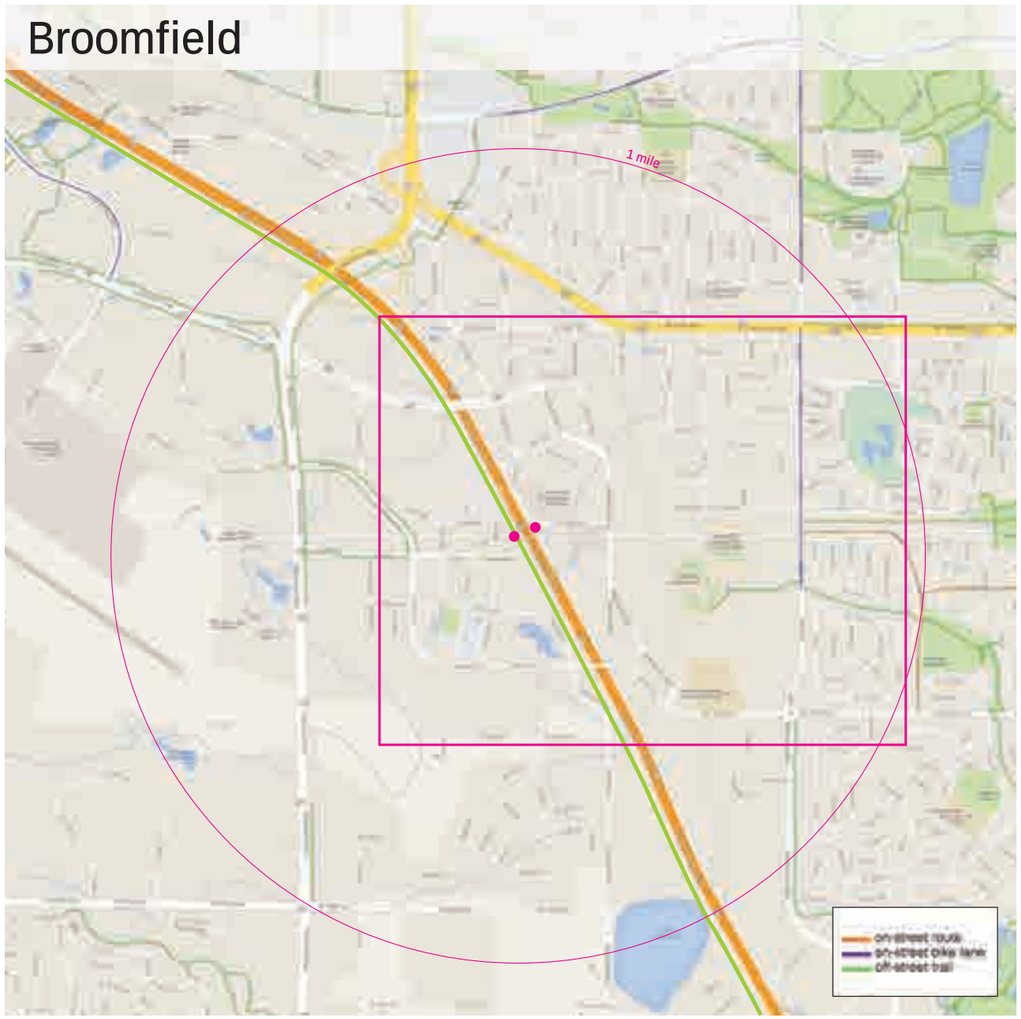
12.29.14	12.05.14	N/A

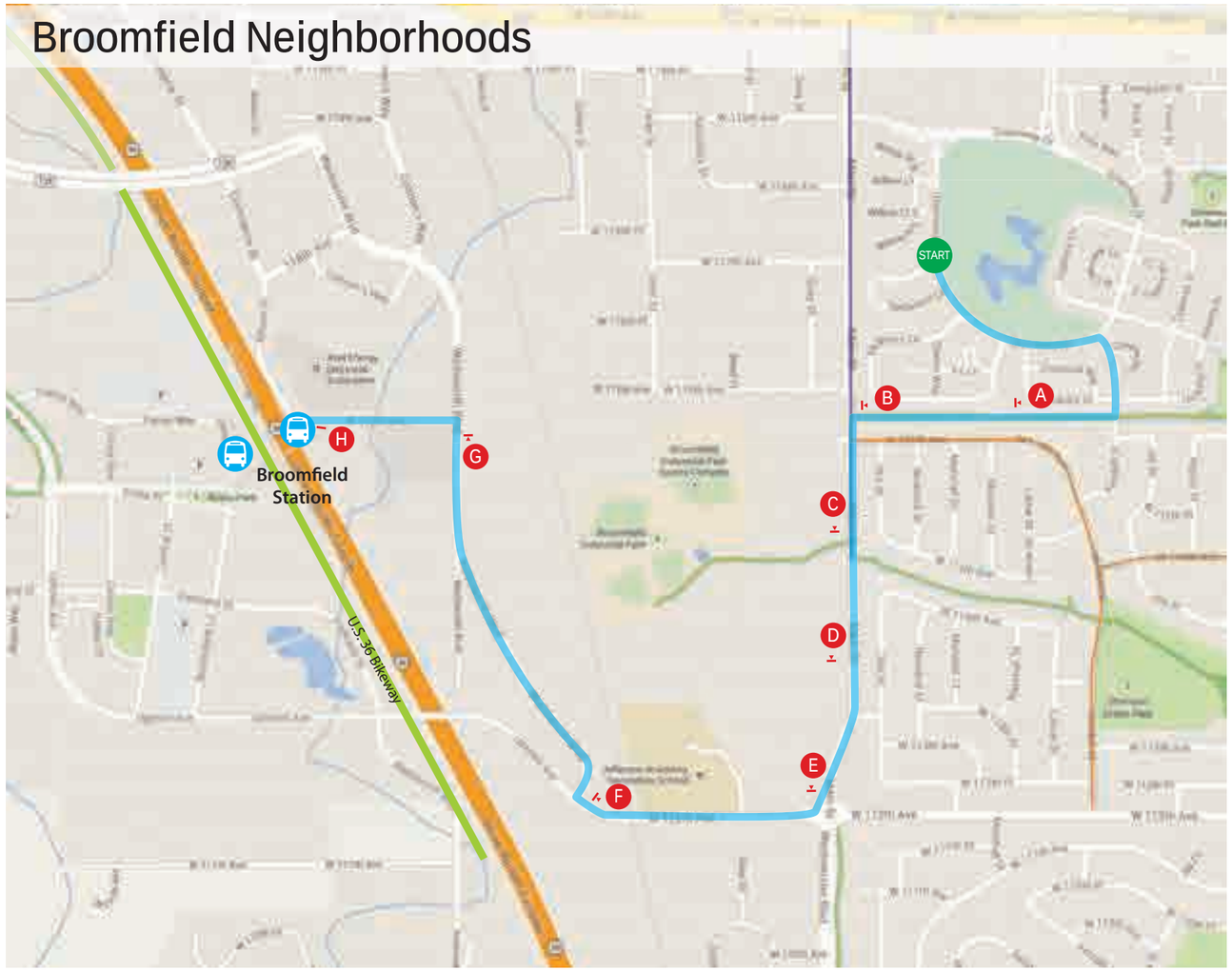
Bicycle Sample Journey 1 - Broomfield

Navigation from Greenway Park Neighborhood to Broomfield Station

This sample journey illustrates how the FFM sign system could be deployed from a nearby neighborhood to the Broomfield Station and US 36 bikeway. Because this sample journey shows a route on some streets without bike lanes or designated bike routes, it is advised that the city study this area in greater detail to determine the most appropriate route from this neighborhood to the Broomfield Station.

While the city may ultimately determine to direct cyclists via other streets and trails, the way in which signs are deployed should follow the same logic shown here: bicycle routes are marked intermittently, directional signs indicate mileage and destinations before the intersections, and the system as a whole creates a "breadcrumb trail," consistently listing destinations at each decision point so cyclists can navigate confidently.





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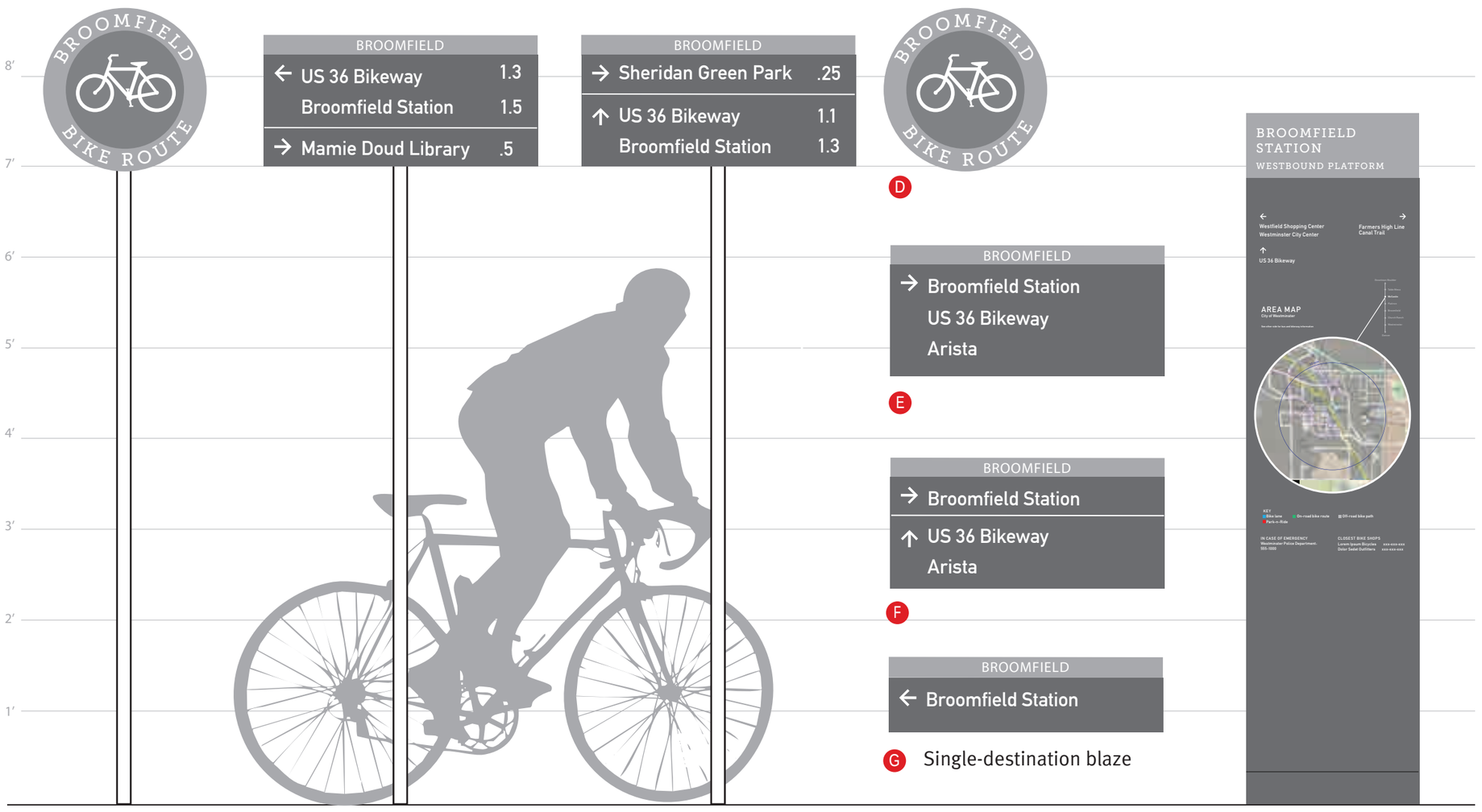
Bicycle Sample Journey 1 - Broomfield

Sign types and messaging



A Bike Route identification

B Directional signage

C Directional signage

G Single-destination blaze

H Orientation kiosk

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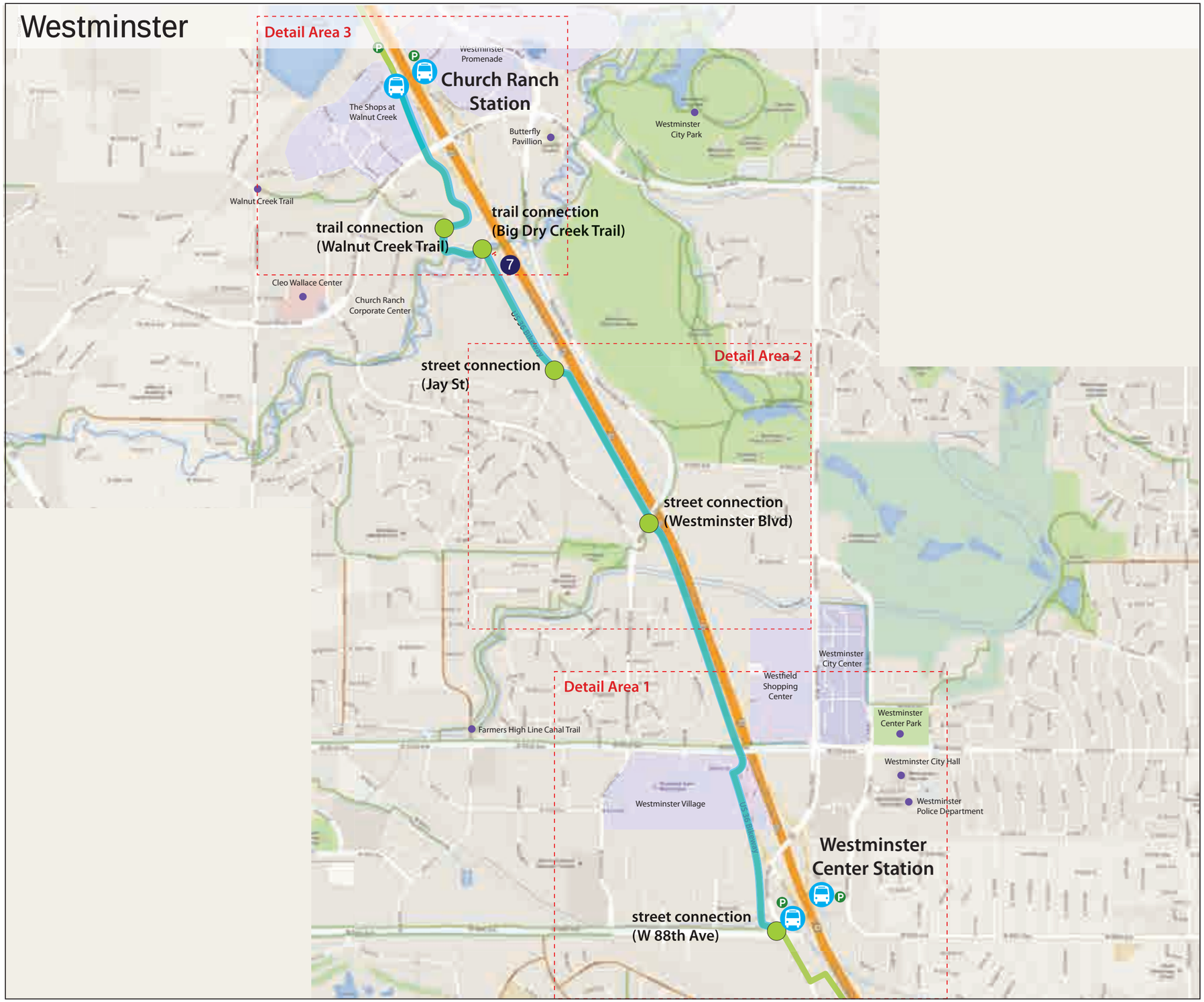

Northwest Corridor

Bicycle and Pedestrian Accessibility Study

3.7 SAMPLE JOURNEYS AND MESSAGING

Bicycle Sample Journey 2 - US 36 Bikeway

This sample journey illustrates the CDOT US 36 Bikeway, FFM and US 36 signage that a cyclist would encounter from the Westminster Center Station to the Church Ranch Station.

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Bicycle Sample Journey 2 -

US 36 Bikeway

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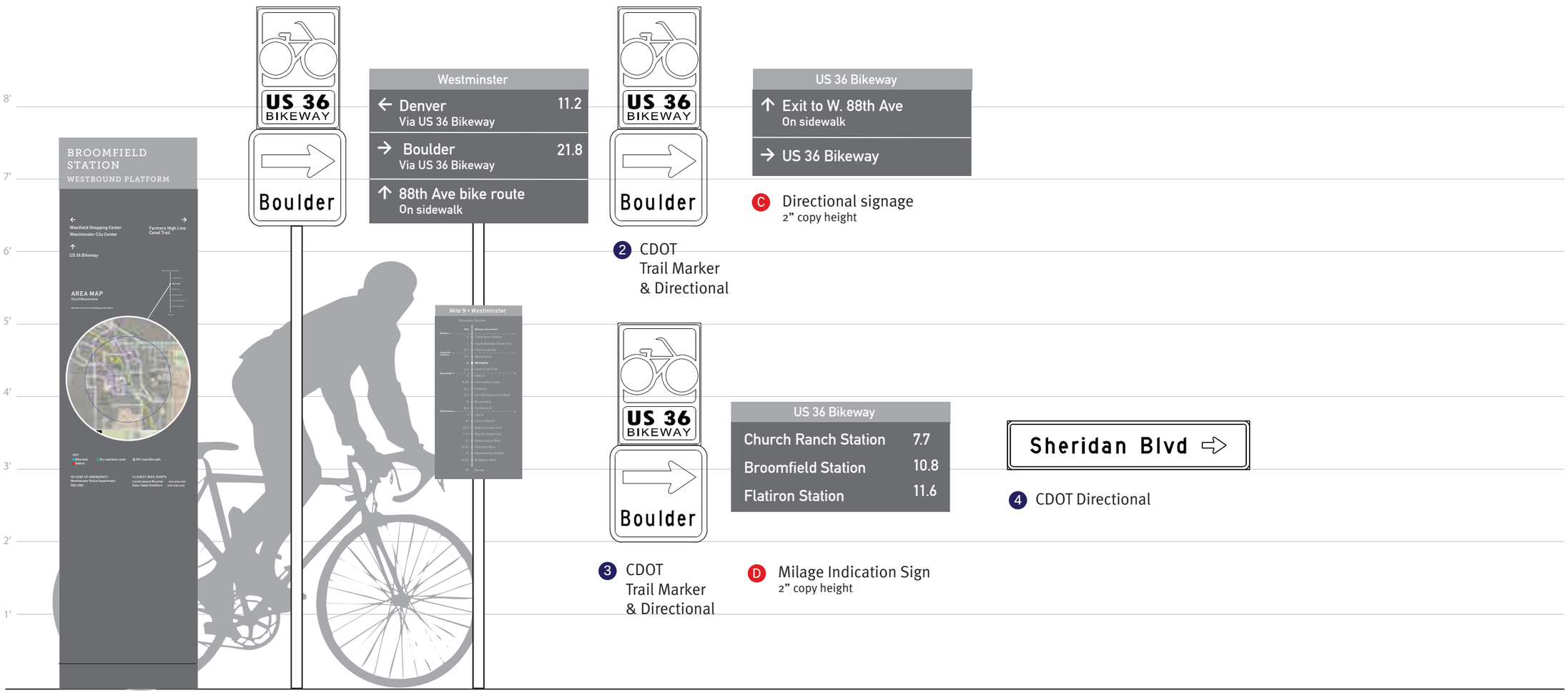
Bicycle Sample Journey 2 - US 36 Bikeway

Sign types and messaging



A Large area map
ped scale

1 CDOT
Trail Marker
& Directional

B Directional signage
2" copy height

Bikeway map
Ped scale
Diagrammatic map showing
trail intersections

2 CDOT
Trail Marker
& Directional

3 CDOT
Trail Marker
& Directional

C Directional signage
2" copy height

D Milage Indication Sign
2" copy height

4 CDOT Directional

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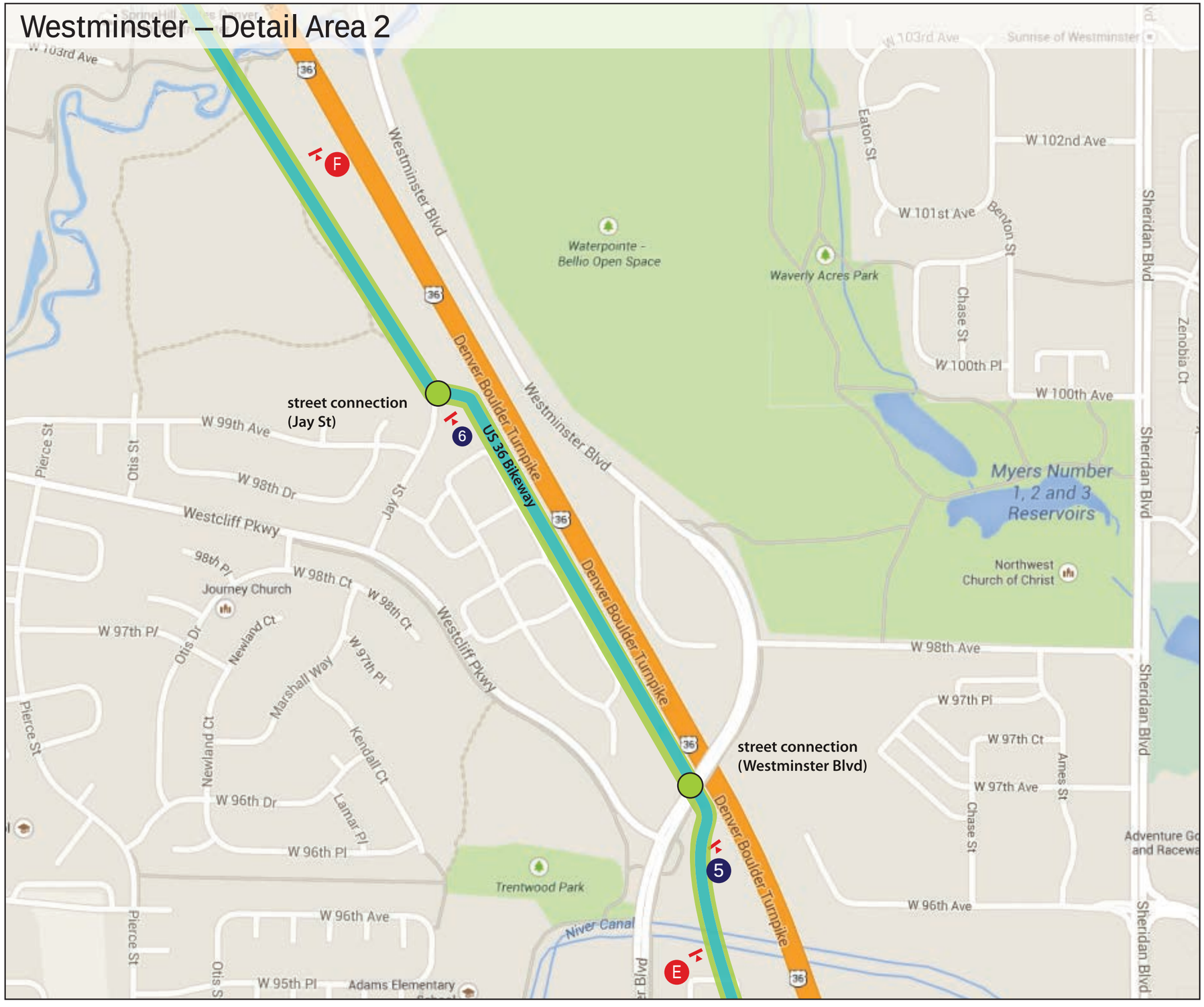
Bicycle Sample Journey 2 - US 36 Bikeway



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Bicycle Sample Journey 2 - US 36 Bikeway

Sign types and messaging

E Milage Indication Sign
2" copy height

5 CDOT Directional

6 CDOT Directional

F Milage Indication Sign
2" copy height

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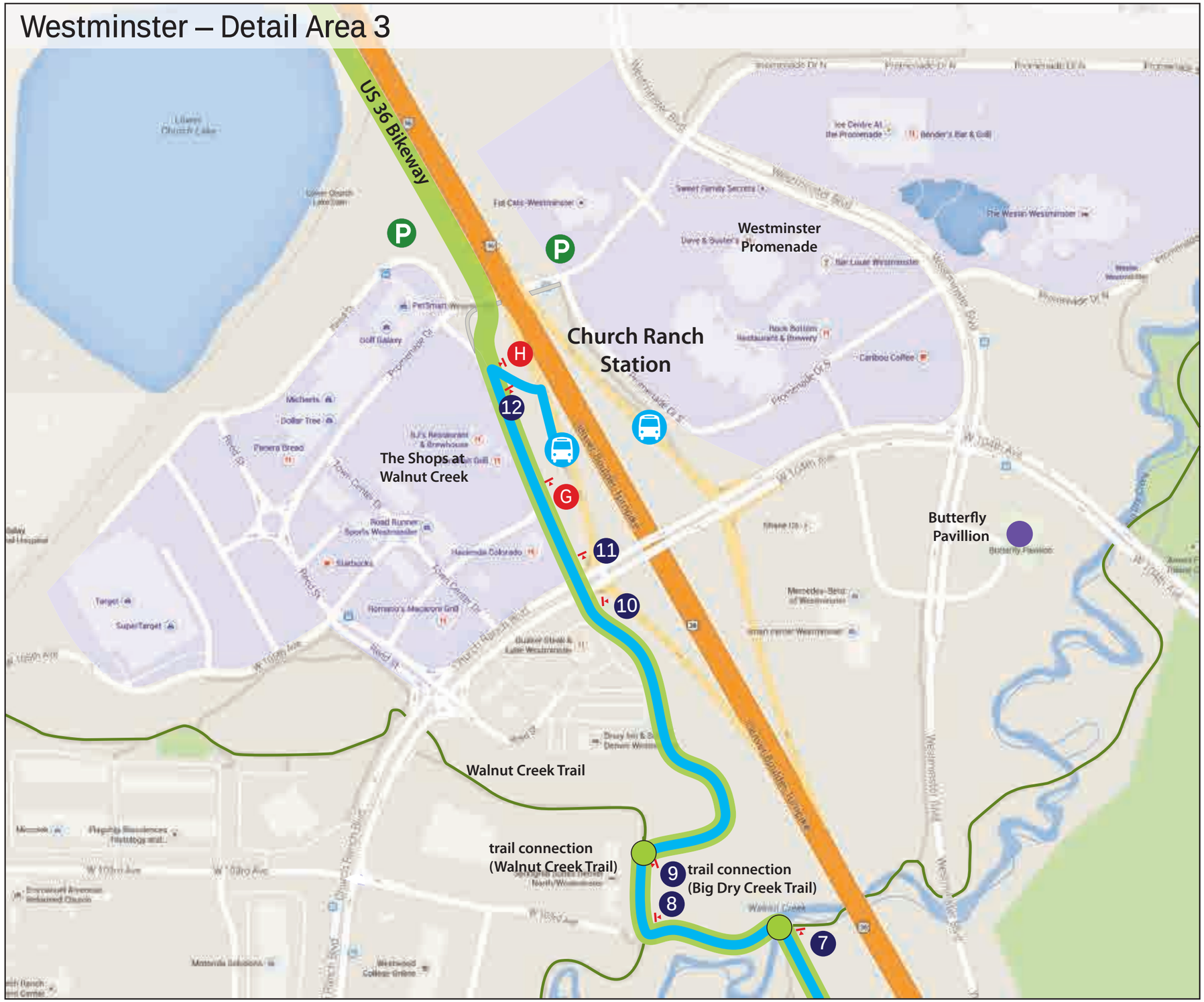
Bicycle Sample Journey 2 -

US 36 Bikeway



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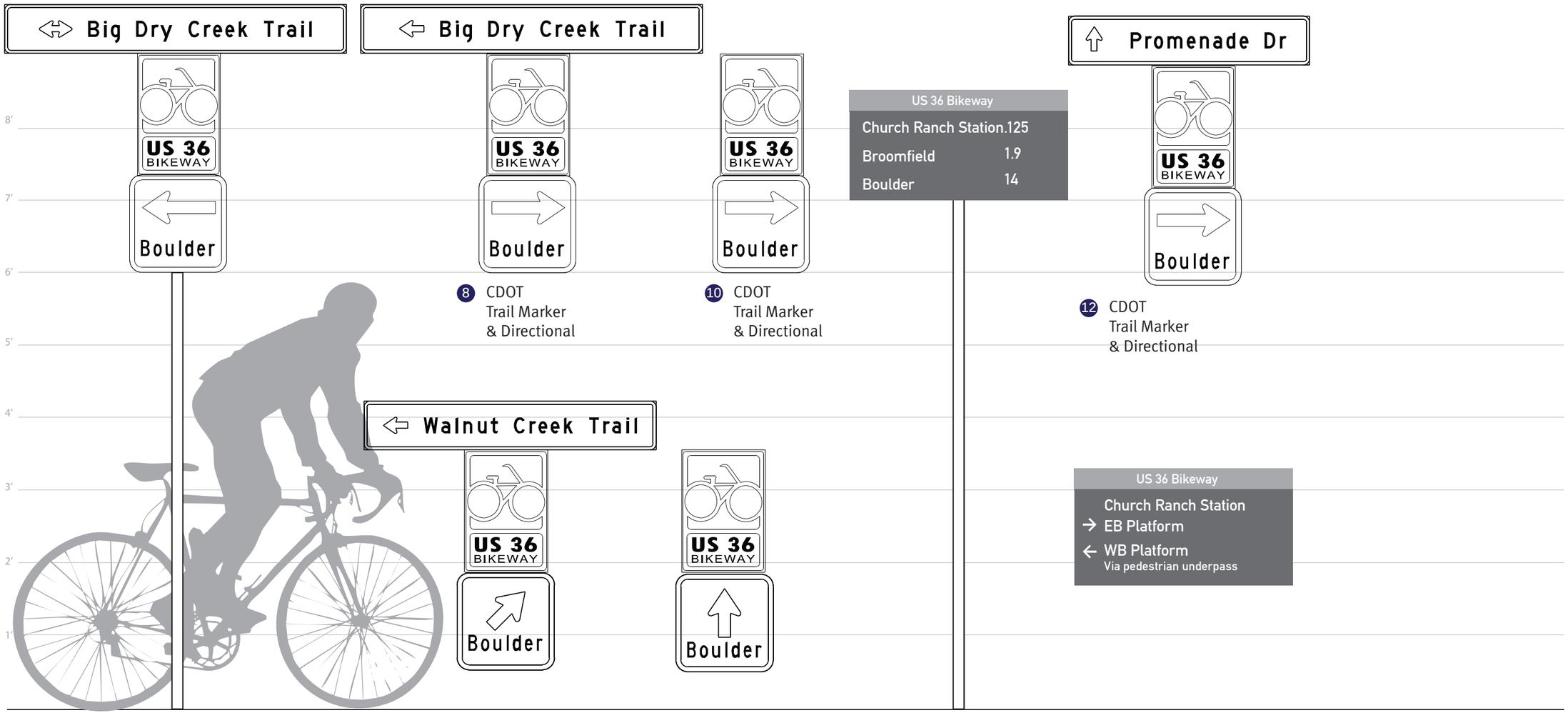
Bicycle Sample Journey 2 - US 36 Bikeway

Sign types and messaging



8 CDOT
Trail Marker
& Directional

10 CDOT
Trail Marker
& Directional

12 CDOT
Trail Marker
& Directional

7 CDOT
Trail Marker
& Directional

9 CDOT
Trail Marker
& Directional

11 CDOT
Trail Marker
& Directional

G Milage Indication Sign
2” copy height

H Directional signage
2” copy height

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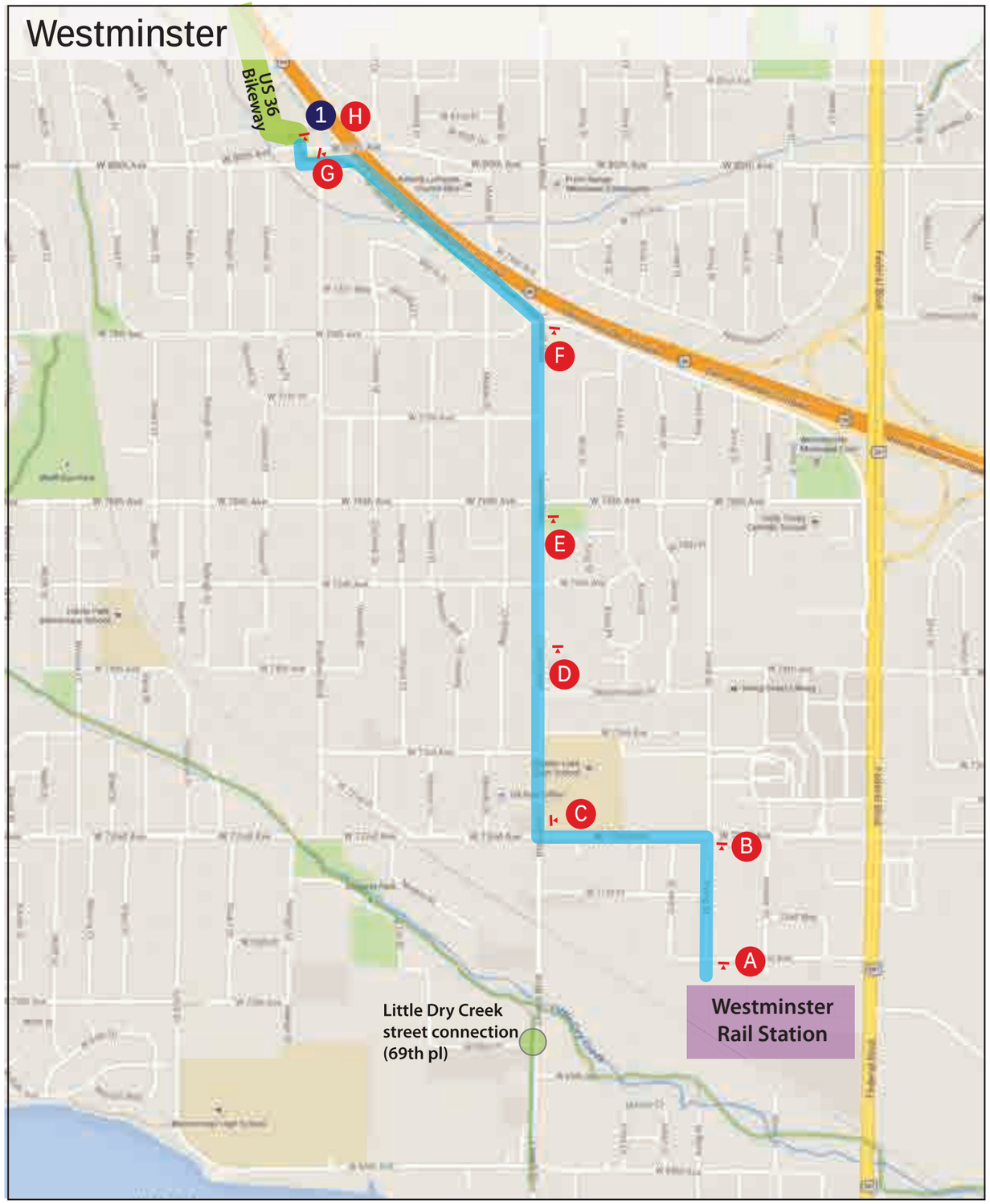
Bicycle Sample Journey 3 - Westminster

This sample journey illustrates how the FFM signage may be deployed to direct cyclists from the Westminster Rail Station to beginning of the US 36 Bikeway, which is identified with the CDOT signage.



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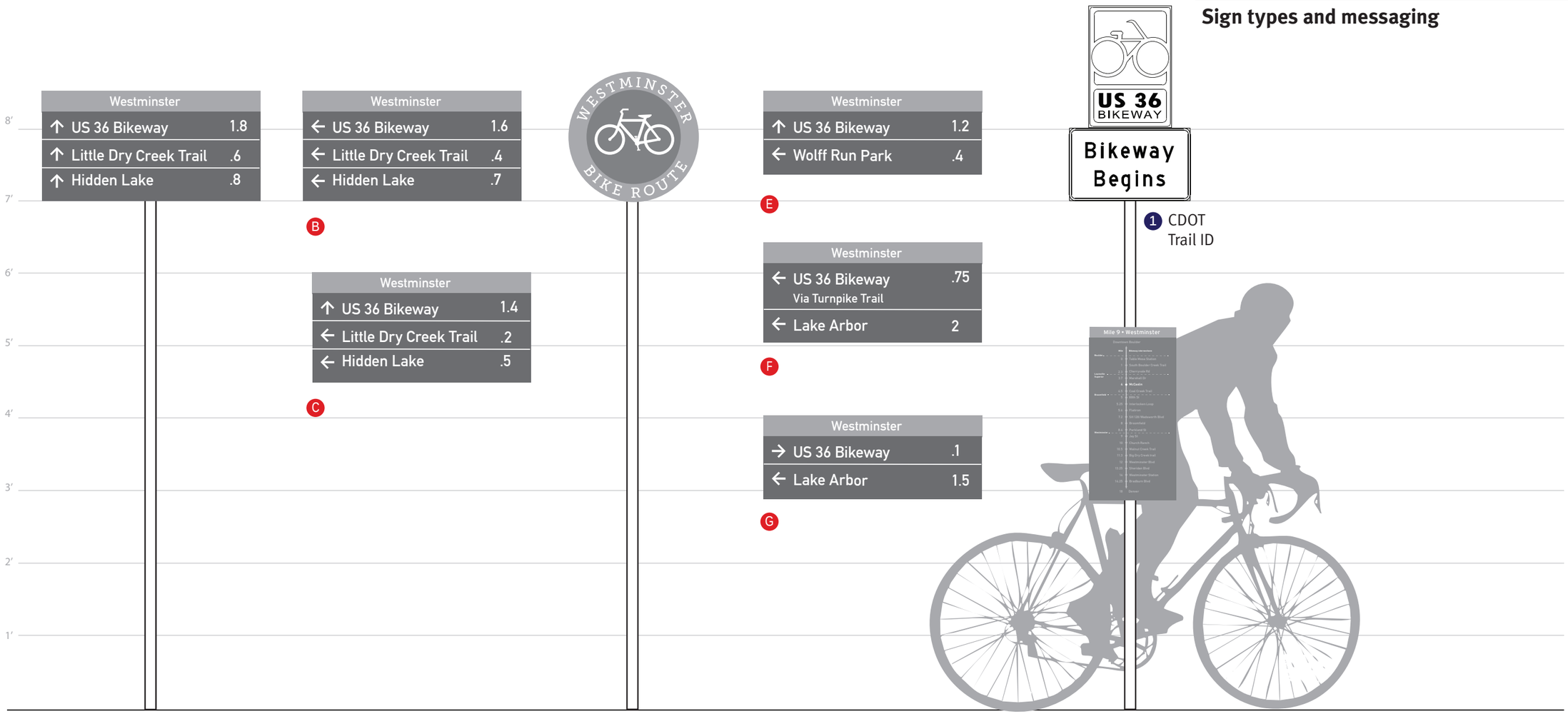
Bicycle Sample Journey 3 - Westminster

Sign types and messaging



A Directional signage
2" copy height

Directional signage
2" copy height

D Bike Route Sign
2" copy height

Directional signage
2" copy height

B Bikeway map
Ped scale
Diagrammatic map showing
trail intersections

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Messaging Matrix

NOTES

Not all areas are currently conducive to a pedestrian wayfinding system. These communities should focus on encouraging more pedestrian-friendly development before implementing a pedestrian wayfinding system. For these communities, we have left the "Destinations on ped directional" column blank.

Next steps:

1. Review, edit, and approve destinations for each sign type
2. Ensure that consistent nomenclature and destinations are used throughout the corridor (ie, all communities direct to shopping districts, all roads have "Rd", "Blvd", "St" etc.)
3. Determine abbreviations for each destination—some names are too long for direction signage

	Destinations on map	Destinations on ped directional	Destinations on bike directional	Destinations on US 36 bikeway (westbound)	Destinations on US 36 bikeway (eastbound)
Westminster Rail	Camenisch Park Little Dry Creek Trail Lake Arbor Wolff Run Park US 36 Bikeway Westminster Rail Station Hidden Lake Sherrelwood Park Lake Sangraco Denver Westminster Center Station St Anthony North Hospital		Camenisch Park Little Dry Creek Trail Lake Arbor Wolff Run Park US 36 Bikeway Westminster Rail Station Hidden Lake Sherrelwood Park Lake Sangraco Westminster Center Station		
Westminster Center	Westminster City Hall Westminster Police Dept Westminster City Park Westfield Shopping Center Westminster City Center Farmers High Line Canal Trail US 36 Bikeway Westminster Station Station parking lot Station garage		Westfield Shopping Center Westminster City Center Marketplace Farmers High Line Canal Trail US 36 Bikeway Westminster Center Station	Church Ranch Station Broomfield Boulder	Denver Bradburn Blvd Sheridan Blvd Westminster Blvd Jay St Big Dry Creek Trail
Church Ranch	Arista First Bank Center Big Dry Creek Trail Westminster City Park Butterfly Pavilion Westminster Promenade The Shops at Walnut Creek Church Ranch Corporate Center Cleo Wallace Center Westmoor Technology Center Standley Lake Church Ranch Station Station parking lot US 36 bikeway	Westminster Promenade The Shops at Walnut Creek Station parking lot US 36 bikeway	Arista First Bank Center Big Dry Creek Trail Westminster City Park Butterfly Pavilion Standley Lake Church Ranch Station US 36 bikeway	Broomfield Station Superior-Louisville Boulder	Westminster Center Station Denver Big Dry Creek Trail Walnut Creek Trail Promenade Dr Parkland St

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N/A

Messaging Matrix

	Destinations on map	Destinations on ped directional	Destinations on bike directional	Destinations on US 36 bikeway	Destinations on US 36 bikeway
Broomfield	Rocky Mountain Airport Arista First Bank Center Harvest Station Children's Hospital Therapy Clinic Broomfield Industrial Park Mamie Doud Public Library Broomfield Community Park Broomfield Combined Courts Redpoint Ridge Park US 36 bikeway Broomfield Station Station parking garage Standley Lake	First Bank Center Children's Hospital Therapy Clinic Redpoint Ridge Park US 36 Bikeway Broomfield Station	Arista First Bank Center Children's Hospital Therapy Clinic Mamie Doud Public Library Broomfield Community Park Redpoint Ridge Park US 36 bikeway Broomfield Station Sheridan Green Park	Flatiron Station Superior-Louisville Boulder	Church Ranch Station Westminster Denver Parkland St SH 128/Wadsworth Blvd Interlocken Loop
Flatiron	Flatiron Crossing Mall Flatiron Marketplace Interlocken Business Park Arista Carolyn Holmberg Preserve Flatiron Station Station parking lot US 36 bikeway		Flatiron Crossing Mall Interlocken Business Park Arista Carolyn Holmberg Preserve Flatiron Station US 36 bikeway	McCaslin Station Boulder	Broomfield Station Westminster Denver 88th St Interlocken Loop SH 128/Wadsworth Blvd
McCaslin	Avista Adventists Hospital Centennial Peaks Hospital Centennial Marketplace Colony Square Shopping Center Coal Creek Trail Superior Marketplace Mayhoffer Singletree Trail Downtown Louisville McCaslin Station Station parking lots US 36 bikeway Louisville Superior Superior Town Hall		Coal Creek Trail Superior Marketplace US 36 bikeway Mayhoffer Singletree Trail Downtown Louisville McCaslin Station Louisville Superior Colony Square Shopping Centennial Marketplace Superior Town Hall	Boulder Louisville Superior (arrows pointing to appropriate direction at exit)	Flatiron Station Broomfield Denver McCaslin Blvd Dillon Rd 88th St Coal Creek Trail Cherryvale Rd Marshall Dr
Table Mesa	George Reynolds Public Library NCAR Skip Route DASH Route University of Colorado 29th street park Meadows Library Chautauqua Park Table Mesa Station Table Mesa Auxillary lot Station garage US 36 Bikeway		George Reynolds Public Library NCAR CU East Campus CU Main Campus Pearl Street Mall 29th street park Meadows Library Chautauqua Park Table Mesa Station US 36 bikeway		McCaslin Station Broomfield Denver Cherryvale Rd South Boulder Creek Trail

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Scale
N/A

section 2

Graphic Standards

NOTES ABOUT CLEARVIEW

Clearview is an MUTCD and FWHA approved font for vehicular and bicycle signage. See page 4.5 for a more detailed analysis of the typefont.

Typefonts for bicycle signage

Clearview Hwy 2-B

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890 &!?,."

Typefont for US 36 Bikeway - CDOT signs

InInterstate bold condensed

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
1 2 3 4 5 6 7 8 9 0 &!?,."

Typefont for branding

Museo Slab 500

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890 &!?,."

Typefont for pedestrian signage

Clearview Hwy
3-B

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890 &!?,."

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Symbols

This is the recommended set of symbols for maps, bicycle and pedestrian signage. These symbols should be used across all signage to maintain consistency throughout the system.

S1. Bus

S2. Parking

S3. Accessible

S4. Bicycle

S5. Walk

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12.29.14

Revisions

Scale
N/A

About Clearview

An excerpt from:

Meeker, Donald. “Extending the Threshold: The Evolution of Typeface Design.” SEGDdesign, January 2003.

As of this writing, the Federal Highway Administration is preparing to allow use of ClearviewHwy® as an "approved alternative" based on the research studies and the latest upgrade. Clearview was scheduled to be added to the FHWA Standard Highway Signs book in late fall of 2002. If the latest version realizes our assumption of a greater than 20+ percent improvement in legibility and recognition over the existing federal standard, it will provide significant value for all drivers, with the greatest benefit for older drivers, and with little or no increase in overall sign size.

But, Clearview is for more than road signs. As the font was being developed, our team received various commissions for specific new weights for applications as diverse as safety signs, magazines covering a variety of subjects, and architectural letters made by Gemini. With these commissions, James Montalbano created a design matrix that allowed the production of various weights and widths of the font software. From this, an extensive 120 font ClearviewOne® text (and sign) type system has been developed that includes regular, condensed, and compressed widths, in eight weights including small caps, italics, as well as old style, lining, and tabular figures.

The development of the new ClearviewADATM was completed in September, 2002 for use on ADA compliant interior signing projects. This is a three weight, two width design with corresponding italics and small caps.

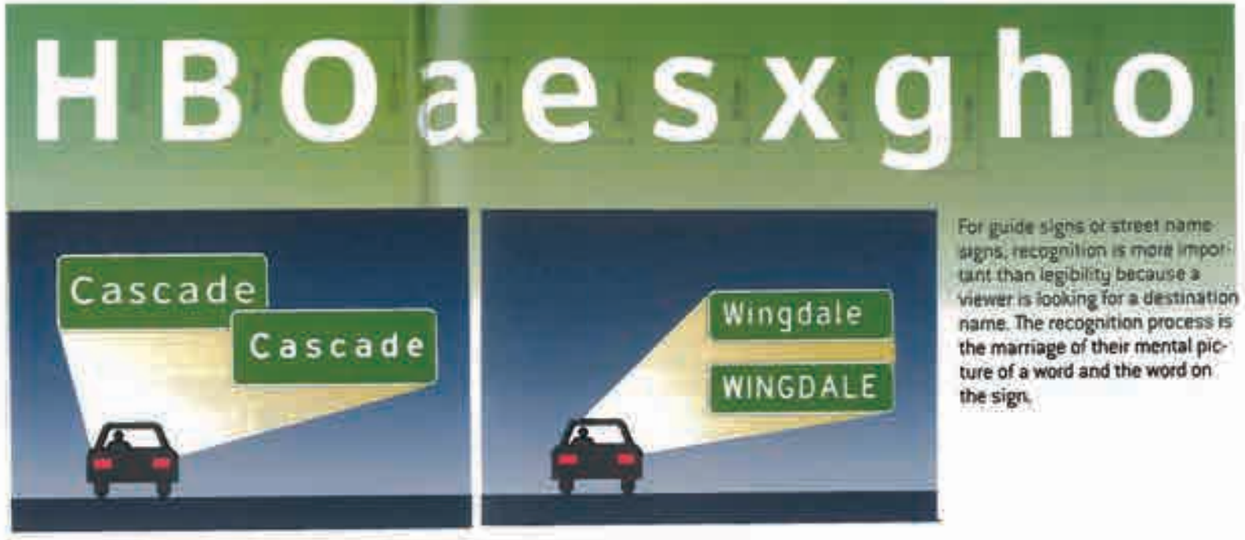
This process has truly been an evolution. We knew what we wanted but did not have a preconceived notion of where we would end. Although this work was based on principles of type design dating back to the 15th century, there were no specific design or research models for this exploration in road sign applications.

Through this process, we have learned how different a word or letterform appears when viewed in the environment from a great distance, and what was required to optimize the letterform. The goal has been to hang weight on a typeface with a prescribed stroke width to height ratio while keeping it from looking too heavy or closing up when viewed from a distance. It was very difficult to predict results, and the design process required constant review of large scale samples viewed at the appropriate distance. As we have optimized the type, we have become extremely respectful of the importance of letterspace and the effect of adjustments for positive and negative contrast within the same weight of letter. It has also been exciting to see our road sign typeface become a text face.

The development of the Clearview typeface has been an enlightening creative experience for Meeker & Associates and Terminal Design. We exposed James Montalbano to a broader universe of type design applications and he certainly has given us an education as our ideas were refined with great care and craft. As we learned scientific method from the traffic engineers and human factors researchers at the Pennsylvania Transportation Institute, they learned the value of design, intuition, and field review. This mutual understanding enabled us to develop the best variables before testing. This has truly been an interdisciplinary effort.

Finally, we are very appreciative of the support we received from the states of Pennsylvania and Texas, and grateful that the Federal Highway Administration has been receptive to our recommendations.

If the latest version realizes our assumption of a greater than 20+ percent improvement in legibility and recognition over the existing federal standard, it will provide significant value for all drivers, with the greatest benefit for older drivers, and with little or no increase in overall sign size.



For guide signs or street name signs, recognition is more important than legibility because a viewer is looking for a destination name. The recognition process is the marriage of their mental picture of a word and the word on the sign.

Above: In two PTI studies, use of the original version of Clearview (left position) improved nighttime sign reading distance by up to 16 percent when compared with the E-modified road sign typeface (right position). For drivers traveling at 45 mph, that legibility enhancements could easily translate into 80 extra feet of reading distance, or a substantial 1.2 seconds of additional reading time. On a road with a posted speed of 45 mph, a driver travels at 66 feet per second. With Clearview, the desired destination legend is recognized 1.3 seconds earlier (84 feet) and with greater accuracy, giving the driver significantly more time to react to the information displayed.

Above: By allowing a viewer to read the irregular footprint of the word when displayed in upper/lowercase letters, there is an increase in accuracy, viewing distance, and reaction time. The research revealed that when the upper/lowercase Clearview Condensed (upper position) was compared to the most commonly used all-capital-letter typeface (FHWA Series D, lower position), there was a 14 percent increase in recognition when viewed by older drivers at night, with no loss of legibility. When the size of Clearview was increased by 12 percent to equal the overall footprint of the uppercase display, the recognition gain doubled to 28 percent with little change in overall sign size.

Right: The ClearviewHwy® type system includes six weights with a positive (W) and negative (B) contrast version of each. The negative contrast version is slightly heavier to appear equal to the weight of the reverse contrast letter.

Below: This chart provides a general equivalence guideline between current FHWA Highway Gothic series and the ClearviewHwy®.

FHWA Highway Gothic	ClearviewHwy	Letter Proportion (H:W)	Stroke Width to Height Ratio
Series B	ClearviewHwy-1-W	1:470	1:78
	ClearviewHwy-1-B	1:481	1:70
Series C	ClearviewHwy-2-W	1:580	1:6.6
	ClearviewHwy-2-B	1:601	1:6.0
Series D	ClearviewHwy-3-W	1:686	1:5.9
	ClearviewHwy-3-B	1:707	1:5.7
Series E	ClearviewHwy-4-W	1:720	1:5.6
	ClearviewHwy-4-B	1:743	1:5.0
Series E-Mod.	ClearviewHwy-5-W	1:775	1:5.1
	ClearviewHwy-5-B	1:799	1:4.6
Series F	ClearviewHwy-6-W	1:851	1:4.9
	ClearviewHwy-6-B	1:850	1:4.5

ClearviewHwy-6-W
ClearviewHwy-6-B
ClearviewHwy-5-W
ClearviewHwy-5-B
ClearviewHwy-4-W
ClearviewHwy-4-B
ClearviewHwy-3-W
ClearviewHwy-3-B
ClearviewHwy-2-W
ClearviewHwy-2-B
ClearviewHwy-1-W
ClearviewHwy-1-B

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section 2

Sign system overview

Sign System Branding

BRAND IDENTITY

It is our understanding that there is no single umbrella name identified for use and application to the Northwest Corridor FFM bicycle and pedestrian wayfinding system.

Absent a name or wordmark for application to the physical system, the word “branded” should therefore be taken to mean a unified and integrated system of component signage and graphic elements, designed to be recognizable wherever deployed within the FFM along the Corridor. Bicycle/walk icons coupled with town names may be introduced as a signature element to provide identity and to clarify location purpose and function.

This system will cooexist with other partner systems and will be deployed within the RTD Station facilities, FFM communities and along the new US 36 corridor bike path right-of-way.

ICONS AND COMMUNITY NAMES

The use of community names may be introduced in a consistent typographic format as part of a signature disc element. This disc element would change from community to community, highlighting the users location. This will serve two important purposes:

The use of city/town names

1. The use of names will serve to elevate partner communities along the corridor
   Communicates a sense of place in a clear and consistent manner.

2. It is flexible and allows for expandability to other uses and applications
   Other towns, destinations and neighborhoods can join the system.

The use of bicycle and pedestrian icons

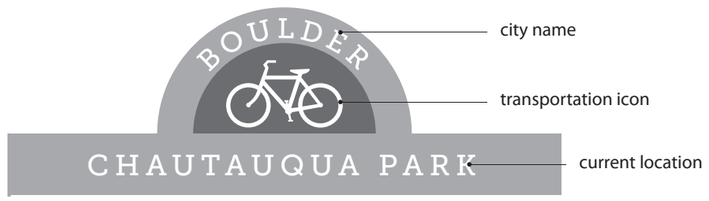
1. The use of bicycle and pedestrian icons will communicate function and purpose
   It is simple and recognizable

2. Its clear and visible from great distances
   In busy environments, it will stand out clearly and be readable from distances

The use of color

Color will unify the system across the corridor and distinguish it from other signage and information systems
It should clearly stand out. Multi-colored programs are complex and undermine clarity and recognition

sample locations



kiosk with ped/bike map (local)

kiosk with bus/bike map (regional)

pedestrian directional

bicycle directional

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Sign System and Logic

US 36 BIKEWAY SIGNAGE

CDOT has developed a bikeway identity and signage system based on MUTCD standards. This system will soon be deployed throughout the corridor along the new US 36 Bikeway only. It consists of signage placed at major intersections of roadways and trails, pointing to Denver or Boulder. The CDOT signage indicates where the bikeways leads and how to stay on the bikeway. The CDOT system also includes mile markers along the bikeway.

CDOT will allow additional destination signage to be placed within their right-of-way, provided someone other than CDOT, agrees to manage and maintain the additional signs. No advertising will be permitted along the US 36 Bikeway.

This study will explore additional decision and destination signage for placement on the US 36 Bikeway. This signage will be located before every bikeway intersection to alert the rider of upcoming turns.

The includes two options:

1. Follows planned CDOT/MUTCD standards in design, color and material specification

2. Builds on the modular design format being developed for the FFM bicycle system and more generally adheres to the CDOT/MUTCD material specifications.

Types of Destinations

Cities/towns
Intersections with the bikeway

Types of Signs

Distance to destination signs
Directional signs
US 36 Bikeway map
Regulatory signs

Typefont and messaging

Maximum of 3 listings per sign, with a maximum of 2 lines per message or destination.
2” Type size for directional messages. Interstate bold condensed typefont is used by CDOT. However, Clearview is the recommended font for all bicycle signage.

Placement of Signs

Distance signs - between directional signs
Directional signs - at all defined ramps and exits off the bikeway
US 36 Bikeway map - one at least every mile on the bikeway

Obstacles

- Management and maintenance
- Implementation - responsibility, maintenance and cost

FFM BICYCLE SIGNAGE

This system will be deployed along designated bike paths and on-street routes for bicyclists to travel to and from Stations and the surrounding communities within the FFM. It is our understanding that while the stakeholders would like the system to follow MUTCD guidelines, additional consideration may be given to adding special features, fonts, and colors that could enhance the aesthetic character of the signage.

The bicycle signage will be flag or center-mounted to its own freestanding pole system. It will also have the capability of being affixed to existing infrastructure, surfaces and poles to give it maximum flexibility for implementation.

Types of Destinations

RTD Stations and Station shelters
Civic and community destinations
Local or regional parks and trails
Hospitals, bridges and schools
Entertainment and retail venues
Business centers
US 36 Bikeway

see page 3.16 & 3.17 for examples of destinations in each community

Types of Signs

Route markers
Directional signs
Off-road pavement markings

Typefont and messaging

Maximum of 3 listings per sign, with a maximum of 2 lines per destination.
Type size for directional messages should be 2” in all conditions.
Clearview is the recommended font for all bicycle signage.
Destinations use mixed case letters (upper and lower case)
For long destination names that do not fit on two lines, shorten using common abbreviations.
Do not use periods after abbreviations of destination names (eg. Wadsworth Parkway becomes Wadsworth Pkwy).

Sign layout

All arrows should be positioned to the left of the message.
All messages should be left justified, with each line aligning (eg. do not indent the second line)

Sign color

Color contrast should be maintained at 70% or greater between the typeface and the field

Sign placement

Route markers - along bike routes and bike paths
Directional signs - just before intersections and at mid points along routes
Off-road pavement markings - on off-road bike routes and multi-use paths to indicate the direction of travel and the continuation of the path.
This treatment may also be used on the US 36 Bikeway where the bikeway intersects with another trail to indicate the continuation of the bikeway.

Obstacles

- Gaps in bicycle network
- Need for online information about routes to Stations
- Management and maintenance
- Consensus across Corridor communities around a cohesive signage system and consistent deployment
- Implementation - responsibility, maintenance and cost

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Sign System and Logic

PEDESTRIAN ORIENTATION SIGNAGE

Because of its function and placement, this system is not required to meet MUTCD standards. It will be deployed along designated pedestrian paths to support movement and access to and from RTD Stations and their surrounding communities within the FFM. This system will be supported by a central kiosk that will provide map orientation to the US 36 Bikeway and important public destinations and services within the local community.

The kiosk will be located at RTD Station facilities, however other central locations could be considered such as Westminster City Center, Downtown Louisville and the Coal Creek Trailhead. The directional signs, where desirable, will be pole mounted along pathways extending to and from the RTD Stations within the FFM.

Types of Destinations

Civic and community destinations
RTD Stations and Station shelters
Local or regional parks and trails
Hospitals and schools
Entertainment and retail venues
Business centers

see page 3.16 & 3.17 for examples of destinations in each community

Types of Signs

Station kiosk w/local and regional maps
Directional signs (overhead - pole mounted and ground mounted, low profile)

Sign messaging and placement

Station kiosks w/map(s) -— key locations adjacent to pedetrian access and stairways.

Directional signs (overhead - pole mounted and ground mounted) — off-site, guiding pedestrian to and from Stations and important destinations within the community.

Obstacles

- ADA clearance and mobility conditions
- Lack of sidewalk infrastructure
- Unfriendly pedestrian crossings
- Development that is not pedestrian-oriented
- Consensus across Corridor communities around a cohesive signage system and consistent deployment
- Implementation - responsibility, maintenance and cost
- Management and maintenance
- RTD does not currently have such signage on site
- Compliance with RTD policies, standards, and guidelines

BICYCLE SHELTER SIGNAGE

The signage, information and graphic needs for the bicycle shelters is an important part of the overall program.

This is understood to mean establishing a clear visual connection with the rest of the elements in the system. Typically these elements will be applied to the shelters but may include some freestanding or telescoping signs as well. The goal is to work with the shelter specifications and guidelines provided by the team shelter designers and insure the signage is modular, easily applied and part of the unified look.

Types of Information

Name identity/icon - on structure and/or pole extending up from with illumination
Station name and platform direction (EB/WB)
Area orientation map

Types of Signs

LED illuminated overhead, pole mounted sign - attached or freestanding from structure
Sign panels mounted to Station structure

Environmental Enhancements

There is a potential for graphic treatments, screens, fence elements, and other patterned applications to existing structures and surfaces.

Obstacles

- Management and maintenance
- Upgrading existing Boulder Bus-then-Bike shelters to match the rest of the system

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Recommended sign types and placement

Sign Type	Sign Purpose/Messaging	Recommended locations
Pedestrian		
Orientation Kiosk	Directional messaging Local and regional map Information about bus network, bike network and secure bicycle parking	Near station platforms and at major community hubs/public facilities
Directional signage- low pole and overhead option	Directional messaging to destinations within FFM	Pedestrian-friendly areas near stations

Recommended sign types and placement

Sign Type	Sign Purpose/Messaging	Recommended locations
FFM Bicycle signage		**In communities**
Bike route Identification - pole-mounted	Identifies bike routes	On and off-road bike routes
Bike Directional sign	Up to three directional messages With mileage	On designated bike routes 15'-50' before intersection
Bike Route Identification - Pavement marking	Identifies and guides cyclists on off-road bike routes with directional arrow	On sidewalks/multi-use paths May also be used on US 36 Bikeway at intersections to show the continuation of the bikeway *these do not replace standard MUTCD on-street pavement markings; these are to clarify where a bike route begins, ends or turns when it is not on a roadway

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Recommended sign types and placement

Sign Type	Sign Purpose/Messaging	Recommended locations
US 36 Bicycle signage		**On US 36 Bikeway**
Distance-to-destination sign	Upcoming bikeway intersections with mileage	Between directional signs
Directional sign	Way to Denver/Boulder Stations Corridor communities Station areas, when bikeway intersects directly with station pathways (such as Church Ranch and Broomfield) Mileage	15'-50' before intersection
US 36 Bikeway diagrammatic map	All bikeway intersections and amenities (such as restrooms)	At major bikeway intersections (such as BRT Stations)

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MUTCD Guidelines

Specific Guidelines		
MUTCD Code	**Guideline**	**Compliant?**
9B.01.01	Bicycle signs shall be standard in shape, legend, and color.	2D.50.17: MUTCD allows for unique sign colors and pictograms for community wayfinding. 2D.50.21: Identification enhancement markers (the half circle at the top of each sign) may deviate from rectangular format.
9B.01.02	All signs shall be retroreflectorized for use on bikeways	Yes
9B.02.02	Meets minimum sign size requirements (differs per sign type)	Yes
9B.20.05	Adequate separation should be made between any destinations	Yes
9B.05.06	An arrow pointing to the right, if used, shall be at the extreme right-hand side of the sign. An arrow pointing left or up, if used, shall be at the extreme left-hand side of the sign.	2A.06.08: MUTCD allows changes to proportion or orientation of symbols, width of borders, and message layout.
9B.05.10	If several individual name signs are assembled into a group, all signs in the assembly should have the same horizontal width.	Yes
9B.21.02	Bicycle Route signs shall include a pictograph or words that are associated with the route or with the agency that has jurisdiction over the route.	Yes

The Manual on Uniform Traffic Control Devices provides federal guidelines for all vehicular and bicycle signals, signage and markings.

Enforcement of and compliance with MUTCD guidelines are at the discretion of CDOT.

The matrix below and to the left general and specific MUTCD standards and how the proposed sign system observes those guidelines.

General Guidelines	
Guideline	**Compliant?**
Acceptable abbreviations used for messaging	Yes
Mounting height and sign placement	Yes
Acceptable typefaces and mixed-case lettering	Yes
Acceptable letter height	Yes
Acceptable symbols	Yes

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section 2

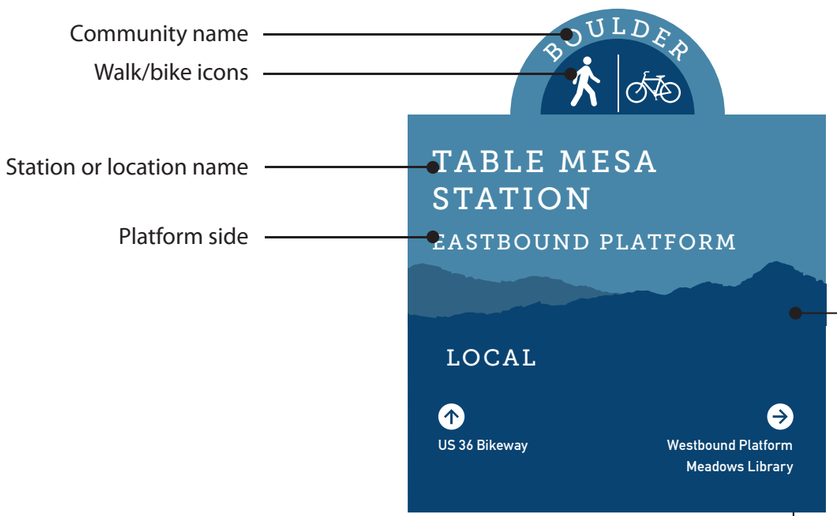
Schematic Design

This chapter shows the design option preferred by the Corridor Working Group.
The reasons stated included:

It is simple and legible
The single color tones help minimize varying design elements throughout the Corridor
The mountain silhouette and blue color link to the Flatiron Flyer branding
The landscape element provides a sense of place

After this project, this design should be advanced with more detailed design development, construction documentation, and implementation.

Sign system branding

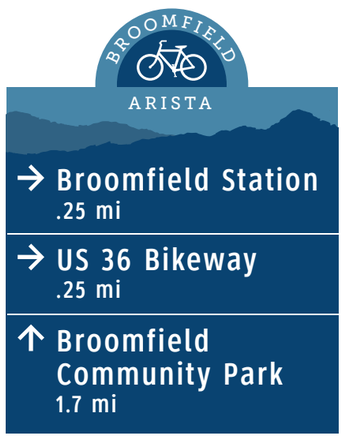


Orientation kiosk

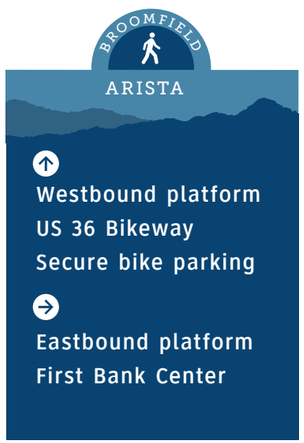
view from McCaslin station

Flatirons forms

System-wide color palette



Bike directional signage



Pedestrian directional signage

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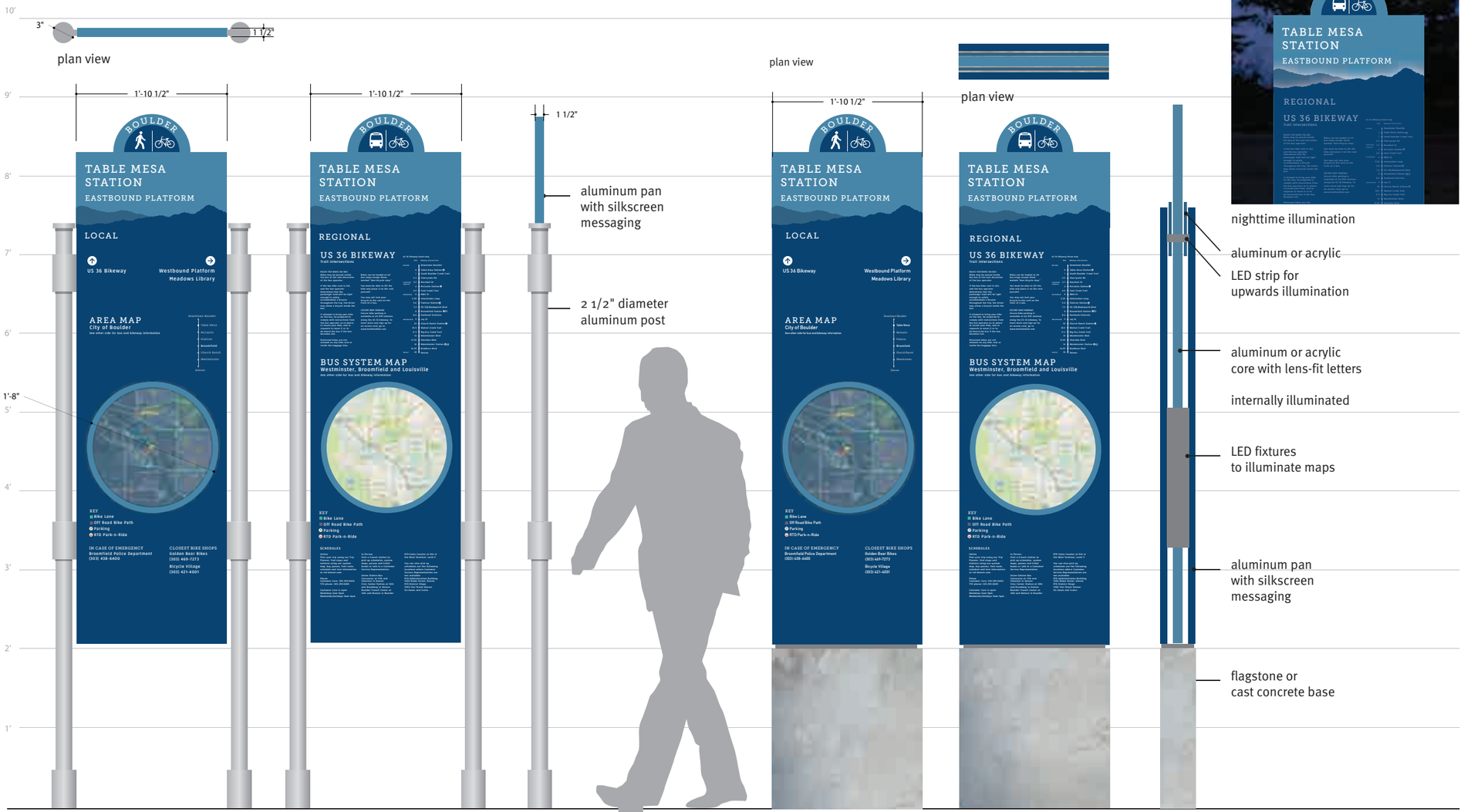
Orientation kiosk



Orientation Kiosk
Pole-mounted
Non-illuminated
Side A: Local

Orientation Kiosk
Pole-mounted
Non-illuminated
Side B: Regional

Orientation Kiosk
Ground-mounted
Illuminated
Side A: Local

Orientation Kiosk
Ground-mounted
Illuminated
Side B: Regional

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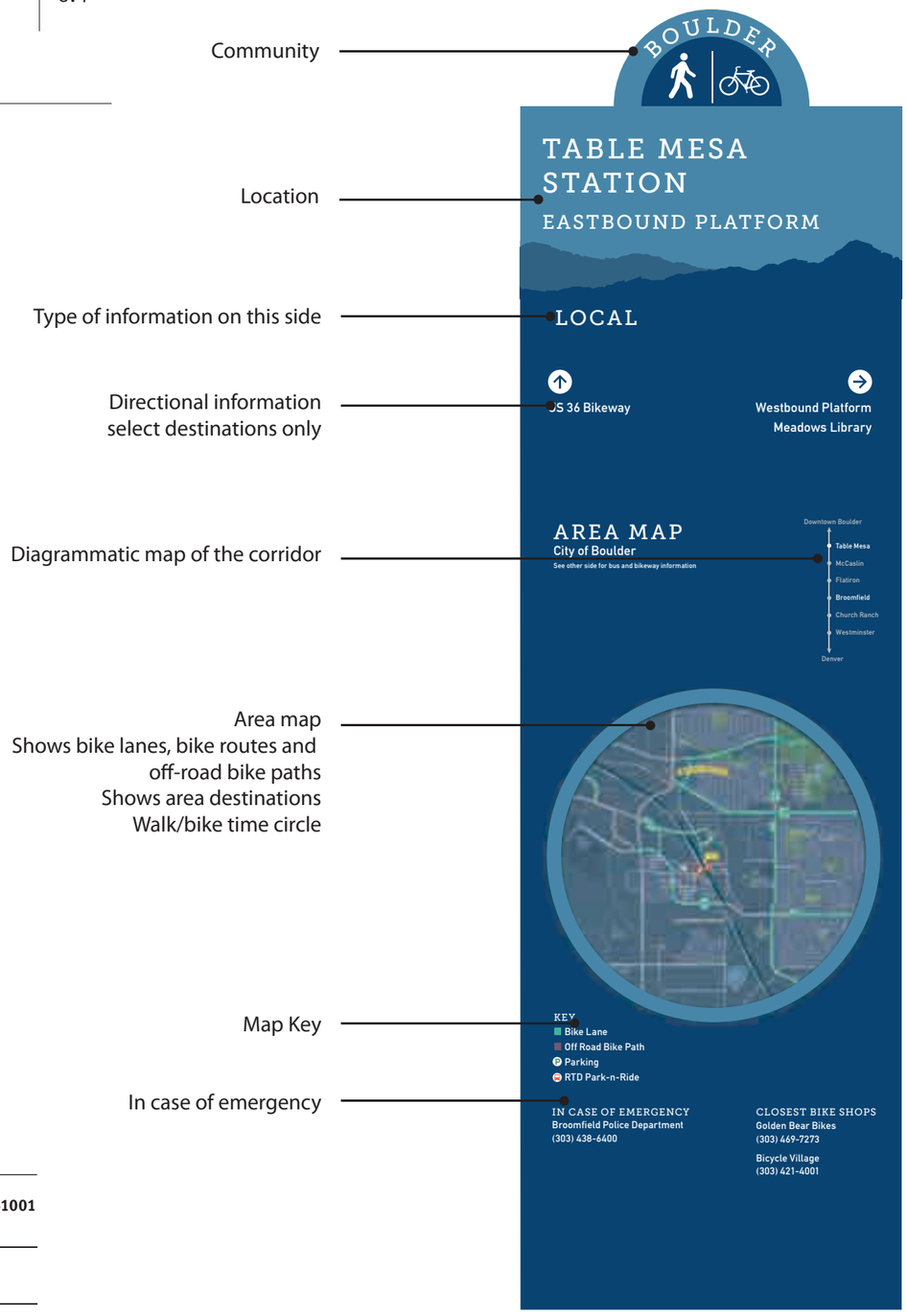
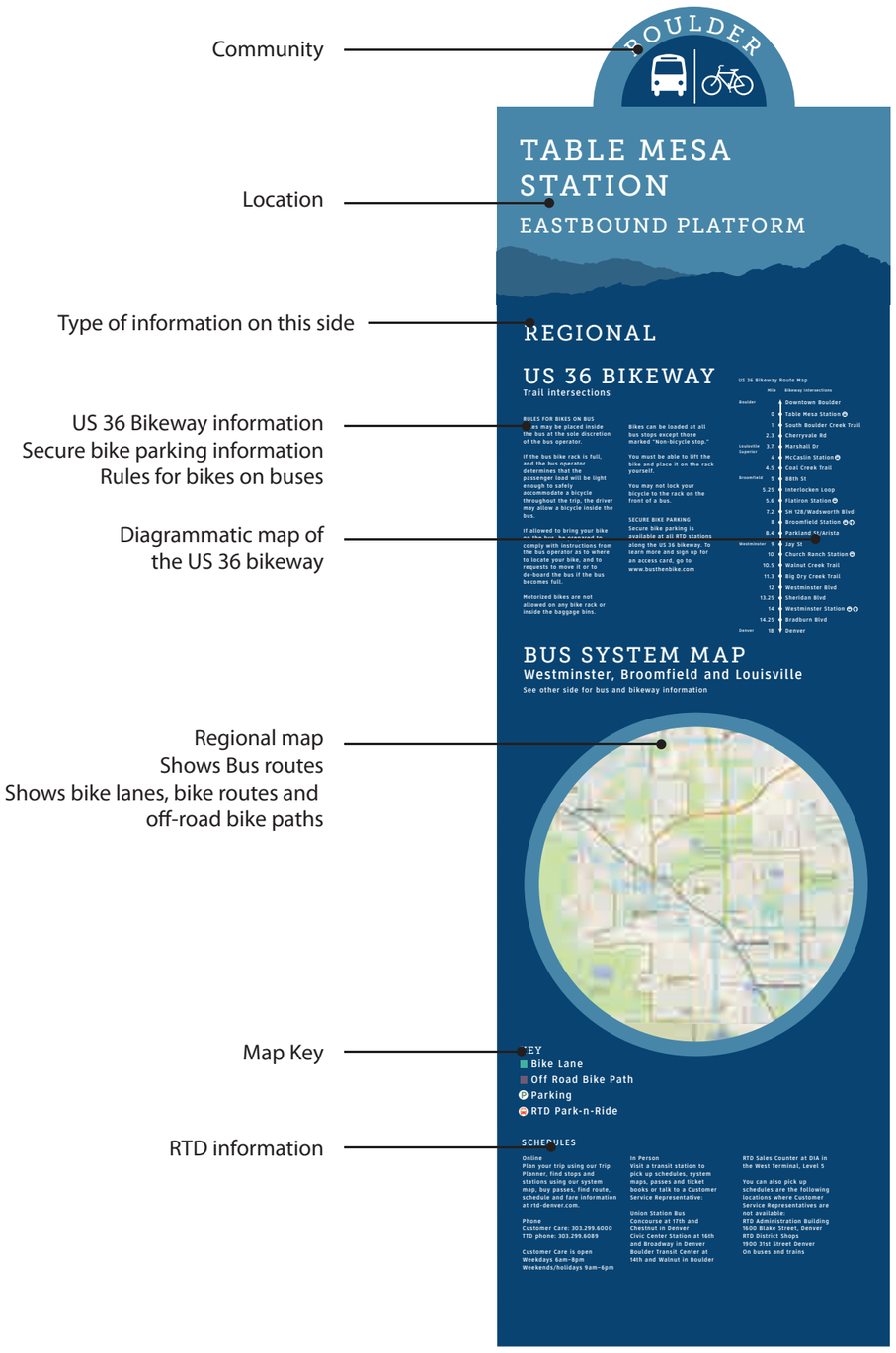
Orientation kiosk detail





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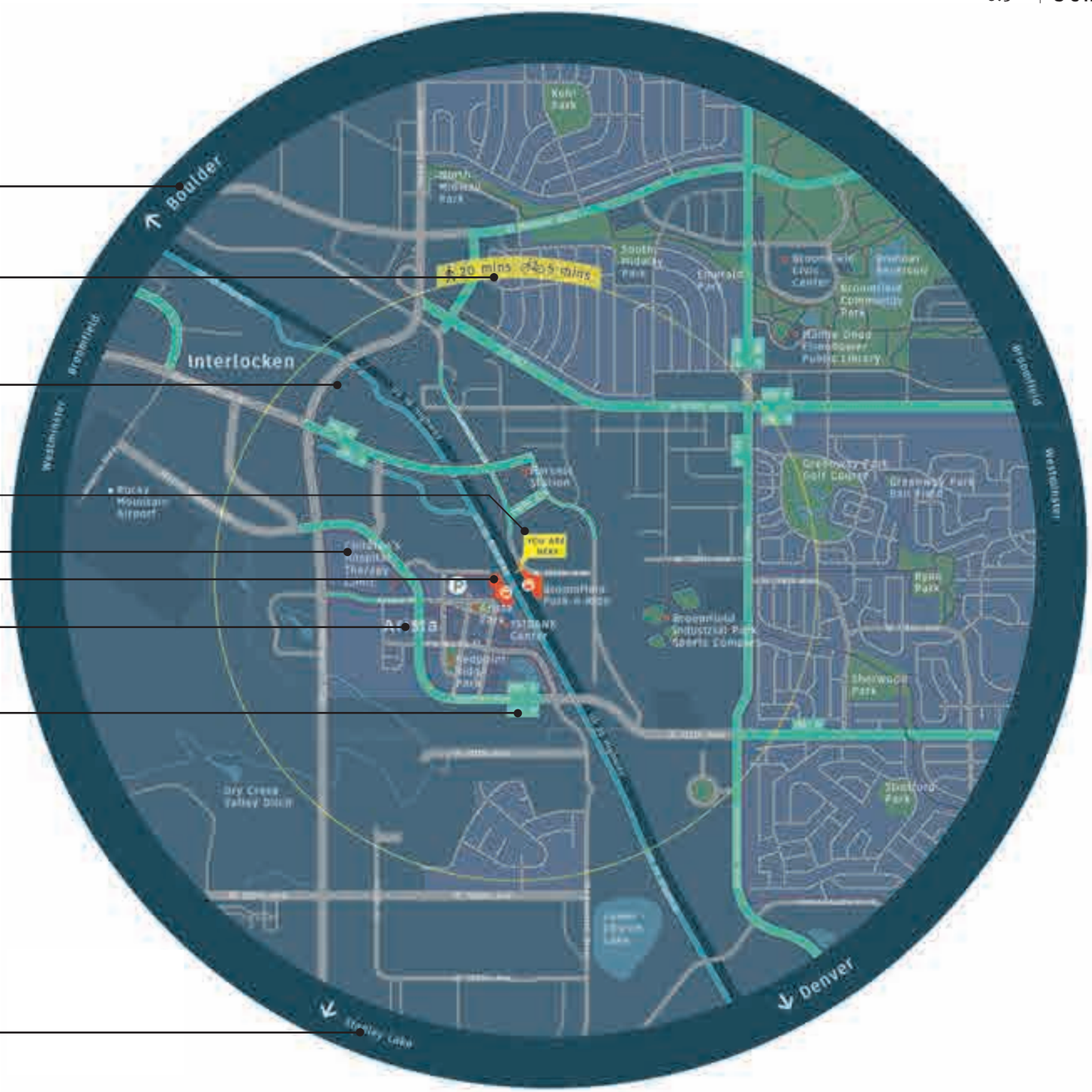
Local map detail



Boulder/Denver directions for orientation

Walk/bike time circle

Off-road bike paths

You are here

Area destinations and landmarks

RTD station callout with bus symbol

Neighborhoods

Bike paths with directional arrows (not all bike lanes are on both sides of the road)

Off-map destinations with arrows

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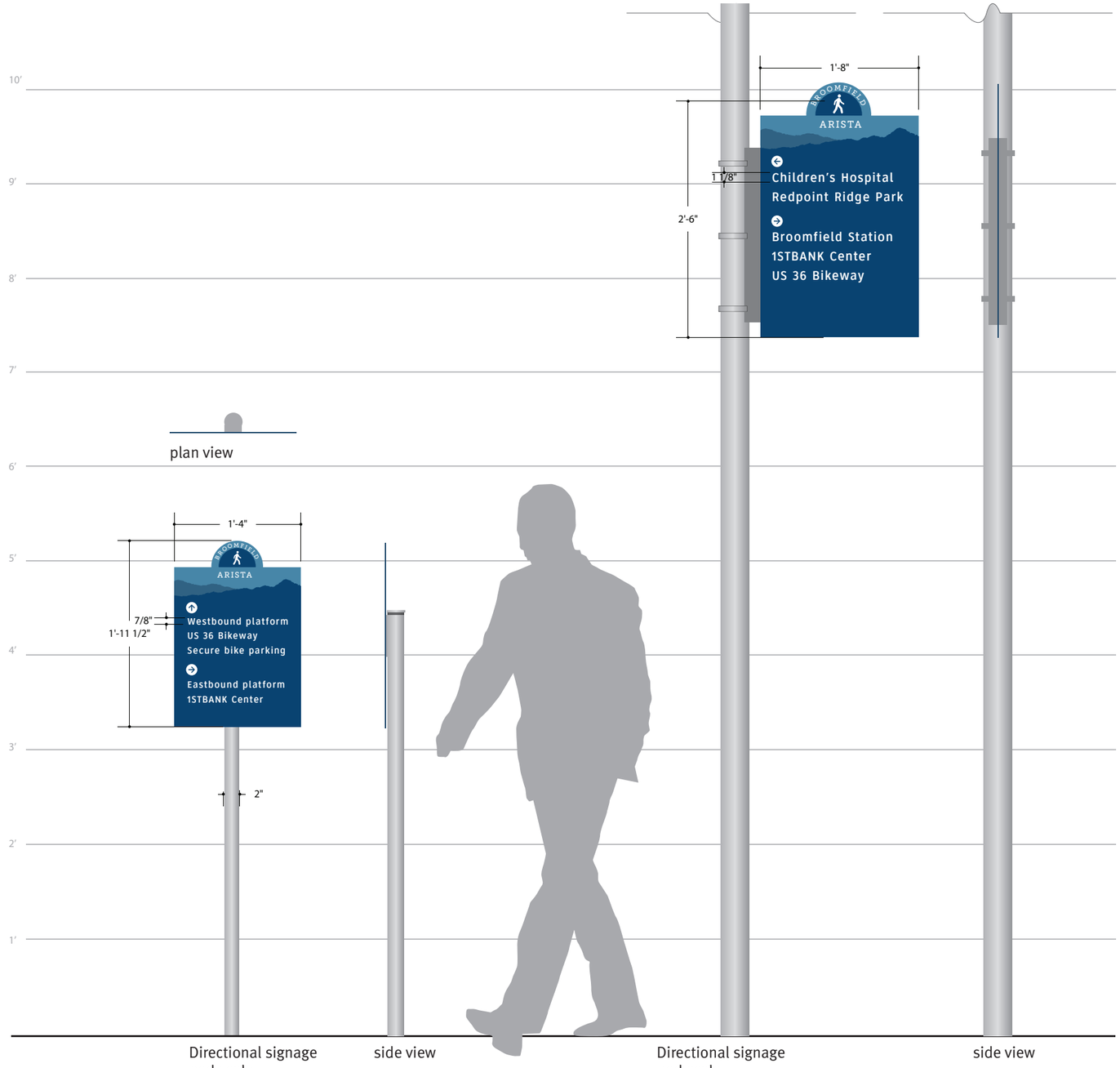
Northwest Corridor

Bicycle and Pedestrian Accessibility Study

SCHEMATIC DESIGN II | 6.6

Pedestrian Signage



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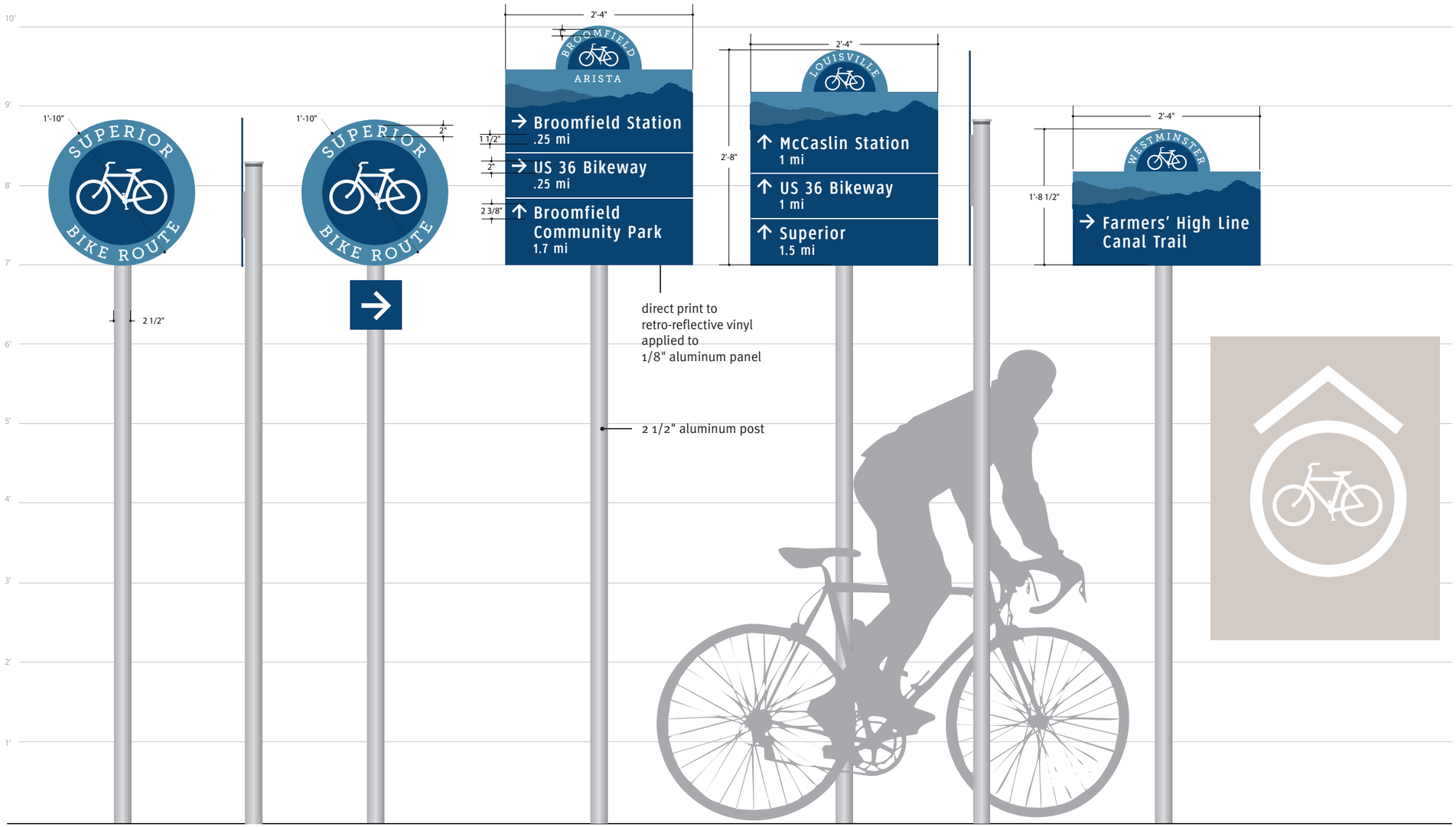
FFM bike signage



Bike Route Identification
Retro-reflective vinyl

side view

Bike Route Identification
with arrow
Retro-reflective vinyl

Directional signage
(with neighborhood)
Retro-reflective vinyl

Directional signage
Retro-reflective vinyl

side view

Single-destination blaze
Retro-reflective vinyl

Bike Route Identification
Pavement marking
for on-sidewalk routes
preformed thermoplastic marking
approx. 6 year lifespan

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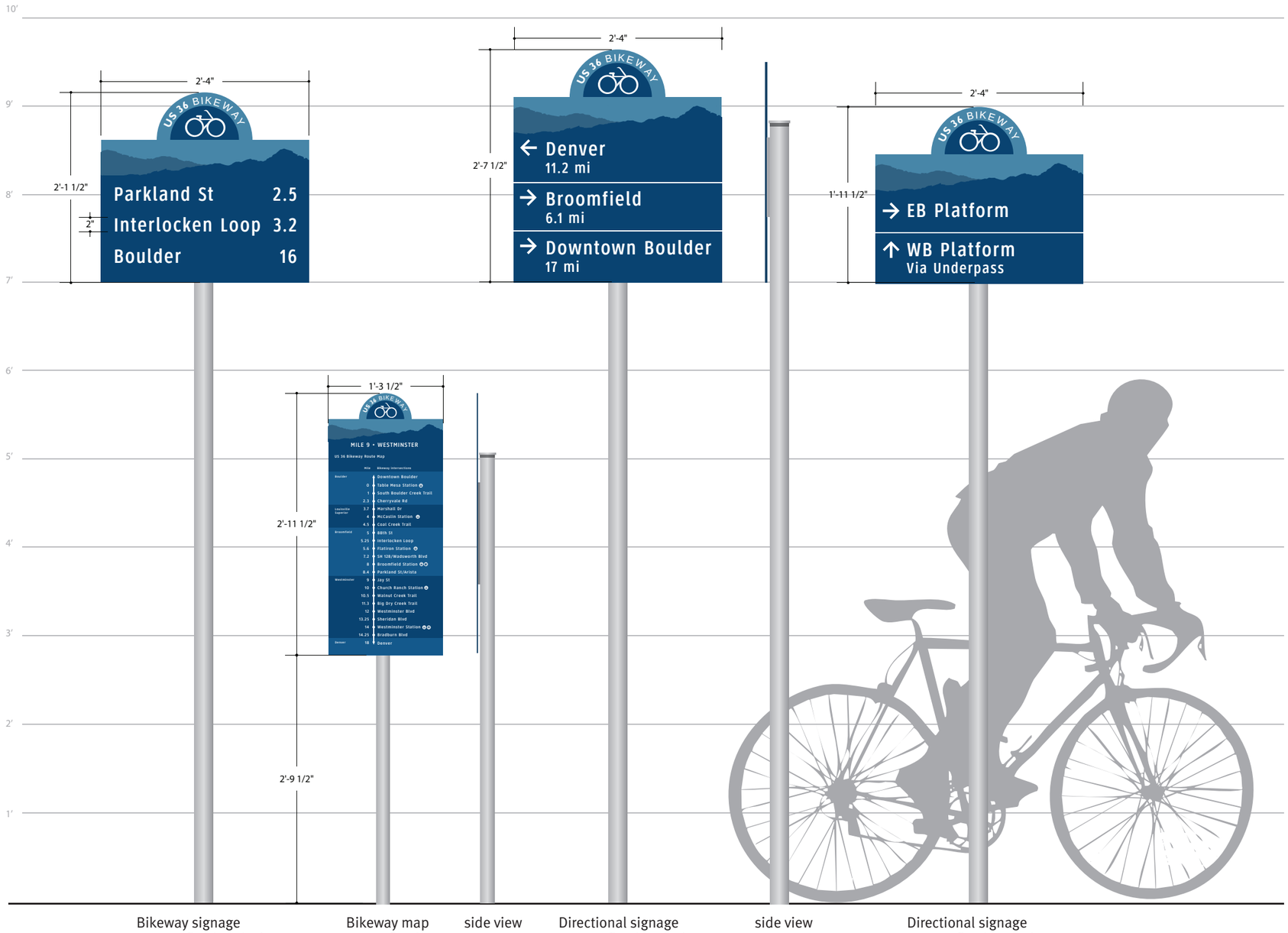
US 36 Bikeway signage



Bikeway signage
Retro-reflective vinyl

Bikeway map
Non-reflective

side view

Directional signage
Retro-reflective vinyl

side view

Directional signage
Retro-reflective vinyl

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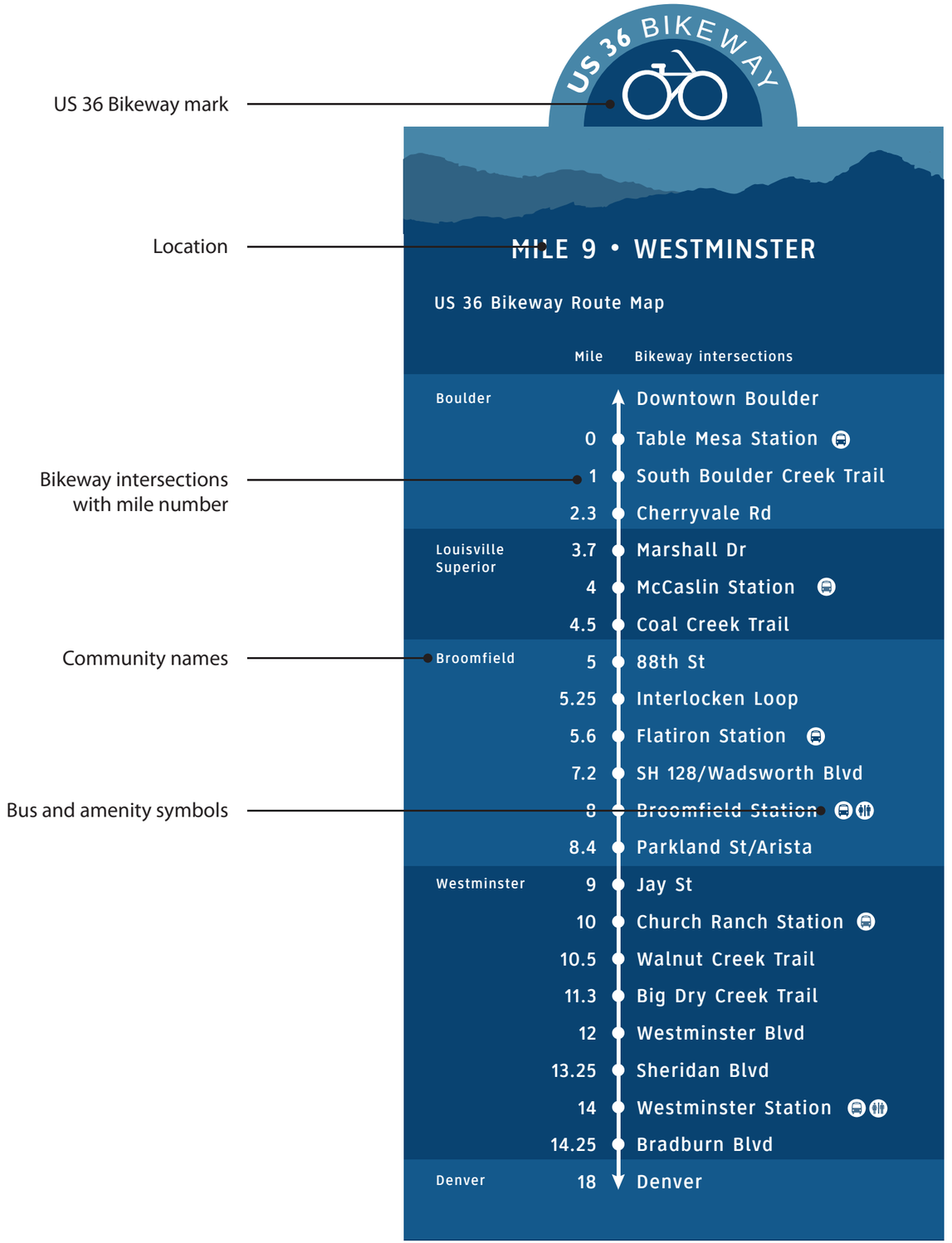
US 36 Bikeway map detail



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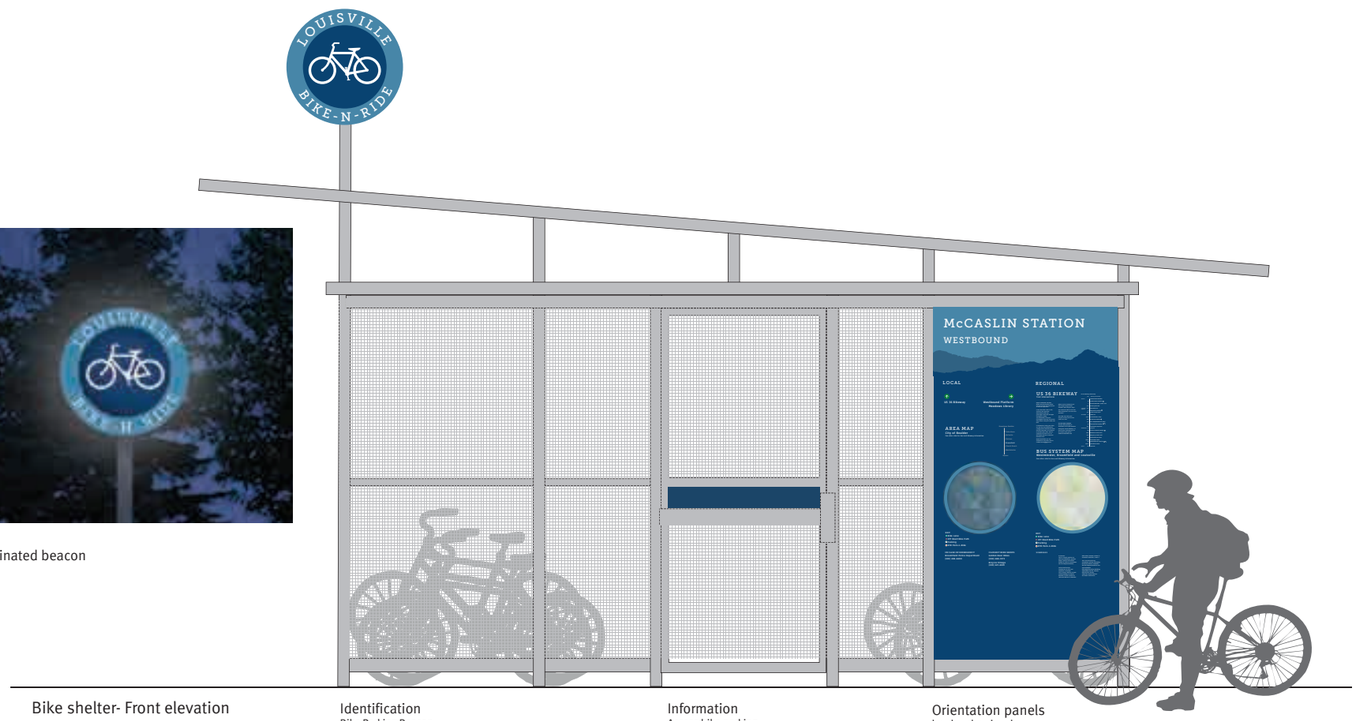
Bike-N-Ride shelter

illuminated beacon

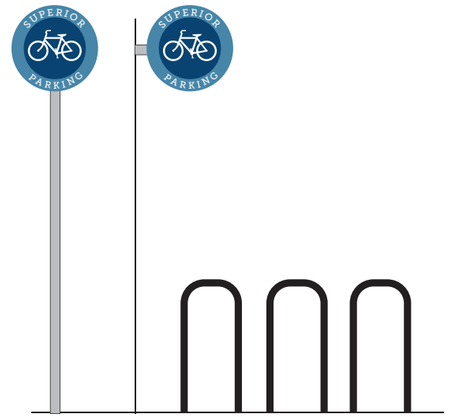


Bike shelter- Front elevation

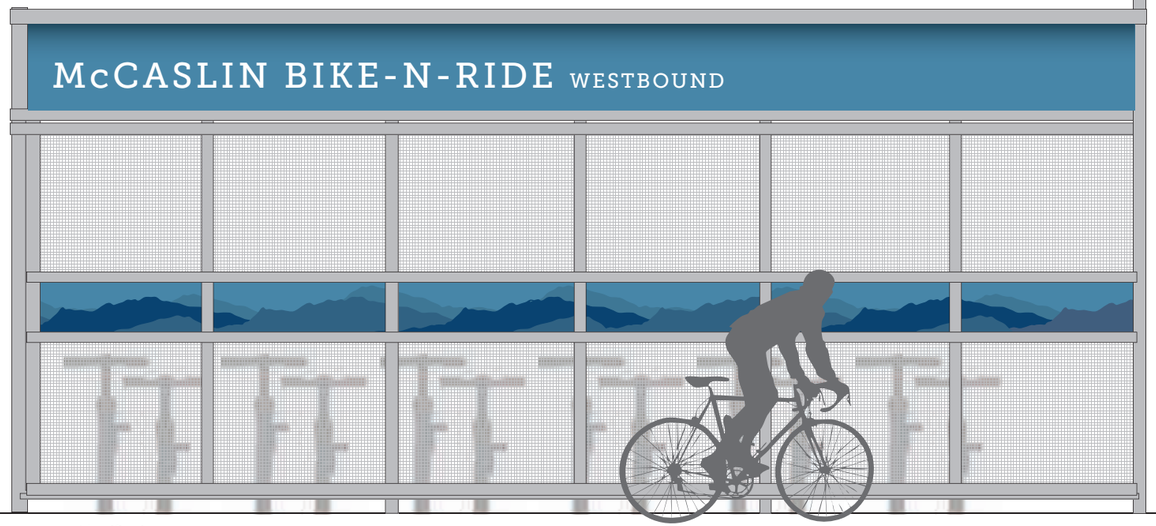
Identification
Bike Parking Beacon
On parking structure
Illuminated

Information
Access bike parking
On parking structure

Orientation panels
local and regional maps
Shows bike routes and area destinations
On parking structure



Bike Parking ID
Building-mounted or pole-mounted
for bike racks



Bike shelter- Side elevation

Identification
Large station/shelter identification
On parking structure

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section 3

Next steps and budgetary pricing

Next Steps

This report features a high-level, but fully implementable, system of tools that responds to the needs of the community and US 36 Bikeway. There are several future stages of design that are necessary for a signage system to be implemented:

Design Development
- Create a core Stakeholder group to determine ultimate sign system design, messaging and location
- Discuss RTD and Local Government sign integration for messaging, sign placement, sign quantities and sign types on RTD property
- Discuss sign management, maintenance, cost, and operations on local and corridor-wide scales. Maintenance requirements and costs will be determined by ultimate sign system design and materials chosen.
- Review and edit messaging matrix for each community
- Finalize design for all sign types
- Study full-size printed mock-ups
- Update cost estimate for fabrication and installation.
- Discuss possible detailing and value engineering of sign system with preferred fabricator.
- Prepare final draft of sign location plans and message schedules for directional signs.

Construction Documentation
- Compile design intent drawings for each sign type with necessary information on sizes, materials, fabrication techniques, typography, colors, hardware and typical installation/mounting elevations.
- Complete performance specifications and shop drawings to be prepared by fabricator.
- Include final message schedule and location plans. Fabricator to be responsible for final, exact sign locations and checking of underground utilities.

Implementation
- Assist client in negotiating a favorable bid with the preferred vendor. Discuss any pricing options with client prior to commencement of fabrication.
- Issue clarifications with vendor as required.
- Review samples, shop drawings and specifications prepared by fabricator. Answer fabricator and installer questions as work progresses.
- Obtain CDOT/RTD permits required to install any signs that are in CDOT/RTD right of way.
- Survey finished phase one project; prepare punch list.

Budgetary Pricing

Signtype Description	Unit Cost	Unit Install	Total cost	Ped SJ Qty - high	Total cost for Ped SJ - high	Ped SJ Qty - low	Total cost for Ped SJ - low	Bike SJ 1 Qty - high	Total cost for Bike SJ 1 - high	Bike SJ 1 Qty- low	Total cost for Bike SJ 1 - low
Pedestrian											
Orientation kiosk - stone base illuminated	9,790	2,150	11,940	1	11,940			1	11,940		
Orientation kiosk - post & panel non-illuminated	2,975	1,150	4,125			1	4,125			1	4,125
Pedestrian directional - low mount version	1,250	265	1,515	4	6,060	4	6,060				
Pedestrian directional - overhead version	1,425	265	1,690								
Bicycle - with new posts											
Bike Route identification	795	265	1,060					6	6,360		
Directional signage (large)	1,575	265	1,840					3	5,520		
Bikeway signage - distance to destination	1,500	265	1,765								
Directional signage (small)	1,455	265	1,720								
Bike Route identification - pavement marking	275		275								
Bikeway map	1,400	265	1,665								
Bicycle - bandit-strap mounted to existing poles											
Bike Route identification - round sign	590	265	855							6	5,130
Directional signage (large)	1,365	265	1,630							3	4,890
Bikeway signage - distance to destination	1,250	265	1,515								
Directional signage (small)	1,200	265	1,465								
Bikeway map	1,200	265	1,465								
Subtotals Pedestrian Sample Journey				5	18,000	5	10,185				
Subtotals Bicycle Sample Journey 1								10	18,300	10	14,145
Totals with 20% Contingency					21,600		12,222		21,960		16,974

Notes:

Pricing is based on producing 4 of each sign type. Unit costs will decrease as the quantity increases.
Contingency includes possible costs for shop drawings, samples, project management, engineering, mobilization etc.
Most signs are all aluminum construction. Finishes of sign panels will be either paint or custom reflective sheeting.
Pricing does do not include any site electrical work, landscaping, permits, state sales tax, attic stock or sign removal.
Budgets have been prepared in advance of design developement, and are based on costs from similar past projects.
They are intended for general planning purposes.
Estimates are based on 2014 prices.

Budgetary Pricing

Signtype Description	Unit Cost	Unit Install	Total cost	Bike Sj 2 Qty high	Total cost for Bike SJ 2 - high	Bike Sj 2 Qty low	Total cost for Bike SJ 2 - low	Bike SJ 3 Qty - high	Total cost for Bike SJ 3 - high	Bike SJ 3 Qty - low	Total cost for Bike SJ 3 - low
Pedestrian											
Orientation kiosk - stone base illuminated	9,790	2,150	11,940	1	11,940						
Orientation kiosk - post & panel non-illuminated	2,975	1,150	4,125			1	4,125				
Pedestrian directional - low mount version	1,250	265	1,515								
Pedestrian directional - overhead version	1,425	265	1,690								
Bicycle - with new posts											
Bike Route identification	795	265	1,060					1	1,061		
Directional signage (large)	1,575	265	1,840	3	5,520						
Bikeway signage - distance to destination	1,500	265	1,765	4	7,060			6	10,590		
Directional signage (small)	1,455	265	1,720								
Bike Route identification - pavement marking	275		275								
Bikeway map	1,400	265	1,665	1	1,665			1	1,665		
Bicycle - bandit-strap mounted to existing poles											
Bike Route identification - round sign	590	265	855							1	855
Directional signage (large)	1,365	265	1,630			3	4,890				
Bikeway signage - distance to destination	1,250	265	1,515			4	6,060			6	9,090
Directional signage (small)	1,200	265	1,465								
Bikeway map	1,200	265	1,465			1	1,465			1	1465
Subtotals Bicycle Sample Journey 2				9	26,185	9	16,540				
Subtotals Bicycle Sample Journey 3								8	13,316	8	11,410
Totals with 20% Contingency					31,422		19,848		15,979		13,692

Notes:

Pricing is based on producing 4 of each sign type. Unit costs will decrease as the quantity increases.
Contingency includes possible costs for shop drawings, samples, project management, engineering, mobilization etc.
Most signs are all aluminum construction. Finishes of sign panels will be either paint or custom reflective sheeting.
Pricing does do not include any site electrical work, landscaping, permits, state sales tax, attic stock or sign removal.
Budgets have been prepared in advance of design developement, and are based on costs from similar past projects.
They are intended for general planning purposes.
Estimates are based on 2014 prices.

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14NW251001

Date
12.29.14

Revisions

Scale
N/A

Budgetary Pricing

Signtype Description	Unit Cost	Unit Install	Total cost
Bike-n-Ride Shelter signage			
Thermoform illuminated "lollipop" ID sign	3,675	1,180	4,855
Orientation/map panel	1,890	790	2,680
Large ID panel	2,410	1,100	3,510
Mountain graphic panels (6)	2,366	1,100	3,466
Subtotals Bike-N-Ride Shelter signage			**14,511**
Totals with 20% Contingency			**17,413**

Notes:

Pricing is based on producing 4 of each sign type. Unit costs will decrease as the quantity increases.
Contingency includes possible costs for shop drawings, samples, project management, engineering, mobilization etc.
Most signs are all aluminum construction. Finishes of sign panels will be either paint or custom reflective sheeting.
Pricing does do not include any site electrical work, landscaping, permits, state sales tax, attic stock or sign removal.
Budgets have been prepared in advance of design developement, and are based on costs from similar past projects.
They are intended for general planning purposes.
Estimates are based on 2014 prices.

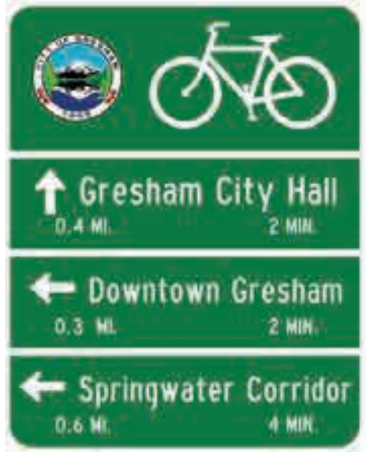
section 4

Relevant Examples

Standard bicycle directional signage

Seattle

Gresham, Oregon



Denver

Portland

Washington DC

Minneapolis

Sound Bend, Indiana

Philadelphia

San Diego

Los Angeles

image credits are on page 4.8

Regulatory, identification and Bicycle parking signage

Regulatory signs




Bikeway identification




Bicycle parking signage


image credits are on page 4.8

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Secure Bicycle Parking

Signage integrated with structure

Patterns and graphics

Eye-catching and recognizable from a distance

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8.5 RELEVANT EXAMPLES

Bicycle sign system examples

London Cycle Superhighway

Berkeley Bicycle Boulevard

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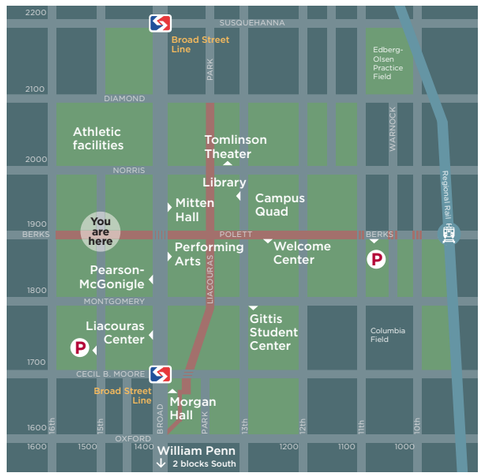
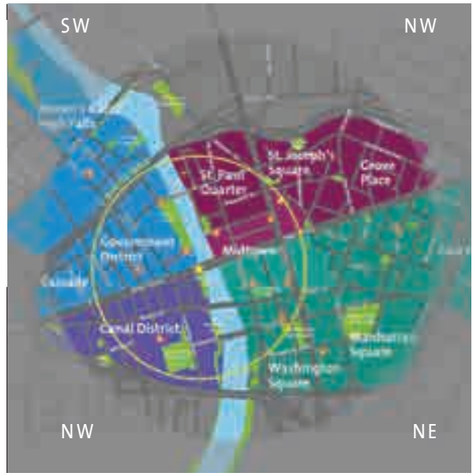
Maps

Local maps - more detailed





Regional maps - less detailed

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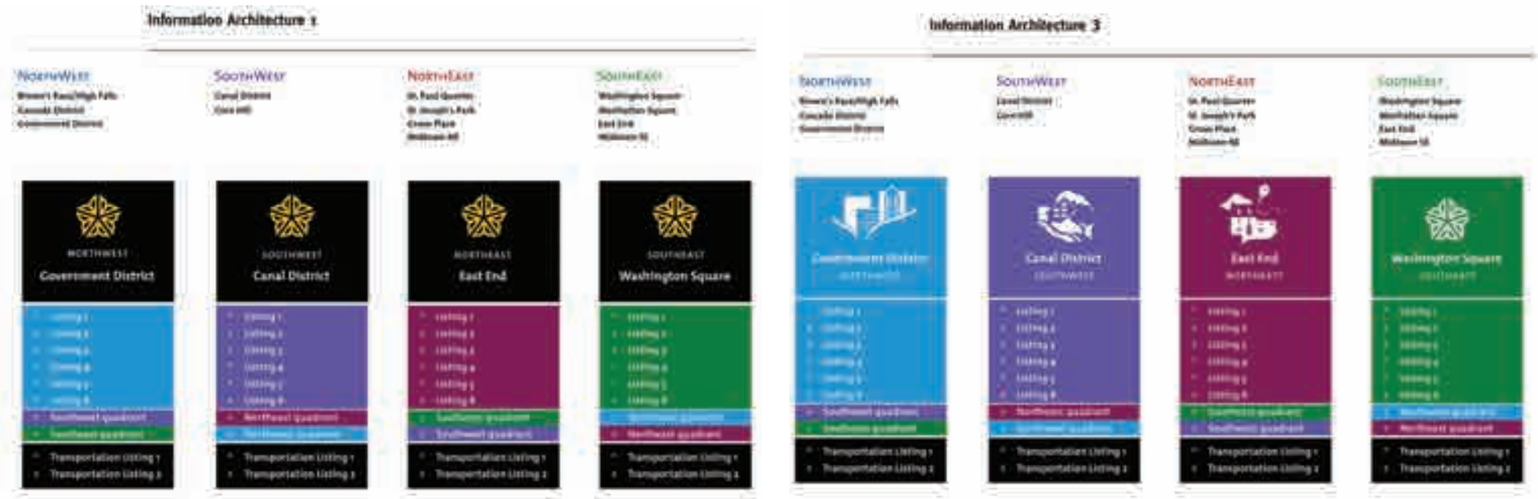
Pedestrian sign system examples

City of Rochester



Walk! Philadelphia

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Image credits

Listed by row, left to right, top to bottom.

Standard directional signage
1. Transportationchoices.blogspot.com
2. Greshanoregon.gov
3. Bikedenver.org
4. Transportationchoices.blogspot.com
5. Cyclemoco.com
6. Velotraffic.com
7. Bikemichiana.org
8. Bmorebikes.com
9. Socalregion.com
10. LADOTbikeblog.wordpress.com

Regulatory signs
1. Bronx River Greenway design Manual
2. The3dstudio.com
3. Themiamibikescene.com
4. Urbanindy.com

Bikeway identification
1. Thefoxisblack.com
2. Toole Design group
3. Natco.org
4. Seattlebikeblog.com
5. Deucedesign.com.au
6. flickr.com/photos/nanobikerdotcom
7. Eric Sandy/Sun News
8. Nigreenways.wordpress.com
9. Blog.oregonlive.com
10. Koonceportland.blogspot.com

Secure bicycle parking
1. caa.org.nz
2. statesmancom
3. commons.wikimedia.org
4. hildundk.de
5. been-seen.com
6. clickonwales.org
7. onespeedgo.blogspot.com
8. dailycamera.com
9. pulse.8z.com

Legible London
1. lcc.org.uk
2. bikers-delight.com
3. bikers-delight.com
4. bikers-delight.com
5. thisbigcity.net
6. bikers-delight.com
7. thisbigcity.net

Berkeley Bicycle Boulevard
1. ci.berkeley.ca.us
2. streetsblog.org
3. natco.org
4. studiolimage.com

Maps
1. CityID
2. CGA
3. CGA
4. PentaCityGroup
5. CGA
6. CGA

City of Rochester
1. CGA
2. CGA

Walk! Philadelphia
1. Joel Katz Design
2. Lhsigns.com
3. Center City District

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Revisions

Scale
N/A

section 4

Schematic design process

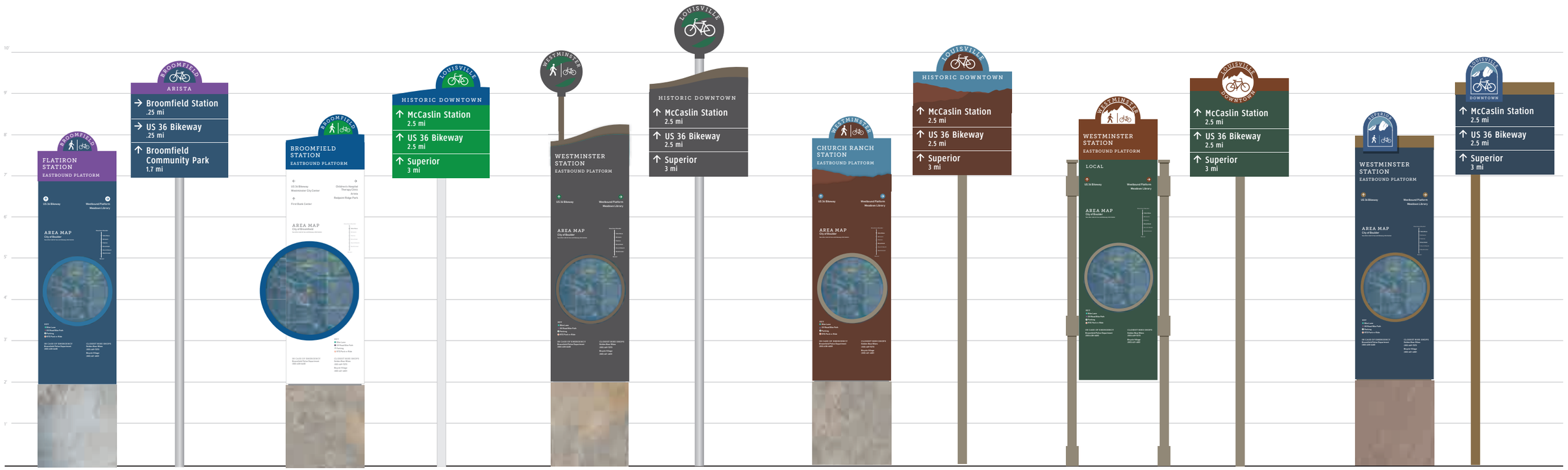
The following pages show all of the design options developed and presented to the Corridor Working Group throughout the course of this project.

Northwest Corridor

Bicycle and Pedestrian Accessibility Study

SCHEMATIC DESIGN PROCESS | 9.2

Schematic Design I options



Option 1 | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6**

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Date	Revisions	Scale
12.29.14		N/A

Schematic Design II options

Option 1 - color palette A | **Option 1 - color palette B** | **Option 2** | **Option 3 -color palette A** | **Option 3 - color palette B**

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Northwest Corridor Branding and Wayfinding Report	**14NW251001**
Date: 12.29.14	Revisions:	Scale: N/A

Appendix B

Connectivity Improvements Conceptual Design

Toole Design Group

1067 Delaware Street
Denver, CO 80204
303.470.4332
www.tooledesign.com

MEMORANDUM

Date: December 31, 2014

To: Denver Regional Council of Governments
Northwest Corridor Working Group

From: Toole Design Group

Project: Northwest Corridor Bicycle/Pedestrian Accessibility Study

Re: Task 5 Connectivity Improvements: Conceptual Design Submittal

Introduction

The state of Colorado and the Regional Transportation District (RTD), along with its local jurisdiction partners, have made significant transportation investments in the Northwest Corridor (the Corridor) in recent years. Along with the Colorado Department of Transportation (CDOT) US 36 Express Lanes Project, which includes the US 36 Bikeway, RTD is currently constructing two FasTracks projects in the corridor: the US 36 bus rapid transit (BRT) Line and a segment of the Northwest Rail Line (from Denver Union Station to Westminster Rail Station), both scheduled to open in 2016. Together, these transportation projects will improve multimodal mobility and access between Denver and Boulder and points in between.

In order to maximize investments that have been made in the Corridor, the Denver Regional Council of Governments (DRCOG), through its Sustainable Communities Initiative (SCI), hosts a partnership of Corridor public and private sector organizations whose goals include enhancing bicycle and pedestrian access and mobility within the first and last mile of new transit stations. The Northwest Corridor Bicycle/Pedestrian Accessibility Study (NW Corridor Study) is charged with the same goal. The project builds upon the 2013 US 36 First and Final Mile (FFM) Study by 36 Commuting Solutions and advances the top priorities identified in that study.

This submittal is a presentation of one of the six NW Corridor Study tasks: Connectivity Improvements. This memorandum (memo) includes a brief description of the recommendations for each station area. Additionally, this memo includes an attachment with conceptual design plans for each station area.

Study Area

The study area for this project, shown in **Figure 1**, consists of the following seven transit stations:

- Table Mesa BRT Station
- McCaslin BRT Station
- Flatiron BRT Station
- Broomfield BRT Station
- Church Ranch BRT Station
- Westminster Center BRT Station
- Westminster Rail Station

These seven stations comprise the Northwest Corridor.

Scope of Work

The NW Corridor Study builds upon the 2013 US 36 First and Final Mile (FFM) Study. For this task, the FFM Study list of infrastructure recommendations, organized by station, was reviewed and compiled for local jurisdiction review. The project team met with each local jurisdiction in the study area to identify one priority connection for each station area, which was defined as a one-mile radius around each station. Conceptual design plans were then developed, using high-resolution aerial photography provided by DRCOG.[1] Based on these designs, construction cost estimates were developed. The designs were refined based on comments received from stakeholders. This information will help local jurisdictions and partner agencies advance implementation of the connectivity improvements; these next steps would include pursuing funding opportunities and performing more advanced design.

The key stakeholders and local jurisdictions included members of the Corridor Working Group: DRCOG, RTD, 36 Commuting Solutions, Adams County Housing Authority, City and County of Boulder, Town of Superior, City of Louisville, City and County of Broomfield, City of Westminster, and CDOT.

[1] GIS data was obtained for Louisville, Superior, and Broomfield, however, the level of detail varied and was typically not detailed enough to use as a base file for conceptual drawings.

Figure 1: Location Map and Study Area

Recommended Connectivity Improvements

The identified priority connections build off of the connections identified in the FFM Study and were a joint effort by the project team and local jurisdictions. The following improvements are based on recommendations by each local jurisdiction, and are shown in the Attachment A Conceptual Design Plans.

City of Boulder

- Table Mesa Station Area

Add bicycle facility upgrades to Table Mesa Drive from Morehead Avenue to Manhattan Drive to mitigate conflict zones.

The improvements identified on the Conceptual Design Plans improve the existing on-street bicycle facilities by providing high-visibility green paint to more clearly define the bicycle facility, and to highlight conflict points between bicycles and vehicles. Although off-street facilities were considered during the review process, off-street improvements could result in potential modification of the bridge over US 36, as well as potential abutment modifications and grading below the Foothills Parkway overpasses. Although off-street imrovements should be considered in the long-term, the recommended improvements will assist to improve the definition of conflict zones as a short-term solution.

City of Louisville, Town of Superior and Boulder County

- McCaslin Station Area

  Add a clear bicycle route at the station to reduce bus/bicycle/pedestrian/vehicle conflicts and increase access to transit and bicycle parking.

The recommended improvements include sharrows (or shared lane bicycle markings) to define the bicycle route to and from the station and bicycle parking area. A missing sidewalk connection is also recommended to provide a more direct pedestrian route.

City and County of Broomfield

- Flatiron Station Area

Connect the existing sidewalk on Midway Boulevard/ Industrial Lane to the Hoyt Street bridge with an on-street bicycle facility and a continuation of the existing eight-foot wide path.

The recommended shared-use path follows an alignment along Industrial Lane, including a minimum ten-foot wide path and minimum two-foot wide buffer between the roadway and path. A curbline is also required along the edge of road to provide separation between the roadway and path. Reconstructed driveway aprons with marked path crossings are recommended for each of the existing driveway intersections to slow entering/exiting motorists, draw attention to path users, and provide priority to the path users. The route also includes appropriate signing and pavement markings at roadway and station interaction points, as well as at the at-grade railroad crossing. A wayside (rest area) is proposed at the intersection of the recommended path and the existing path near the eastern limit of the path.

- Broomfield Station Area

Add a shared-use path from Broomfield Industrial Park to the Park-n-Ride along NB US 36.

The proposed shared-use path follows the alignment recommended by the project stakeholders. The route includes appropriate signing and pavement markings at roadway and station interaction points. A tunnel is also recommended to be constructed under the existing railroad tracks; however, consideration for widening the existing culvert to accommodate a shared use path should also be considered during the design development process.

City of Westminster

- Church Ranch Station Area
  Add a bicycle connection between Westmoor Office Park/Green Knolls Subdivision and the US 36 Bikeway. This off-street connection will begin at West 108th Avenue and Wadsworth Boulevard and cross to the north of Lower Church Lake to the US 36 Bikeway.

The recommended improvements include a shared-use path following the alignment proposed by the project stakeholders. The intersection of West 108th Avenue and Wadsworth Boulevard will require ADA compliant crossings, including curb ramps, pedestrian hand-man signals, and signal timing changes to accommodate the pedestrian crossing times. The plans also include an alternate alignment that may be considered during the design development process. This alternative alignment may alleviate drainage impacts that may be associated with the preferred (direct) alignment.

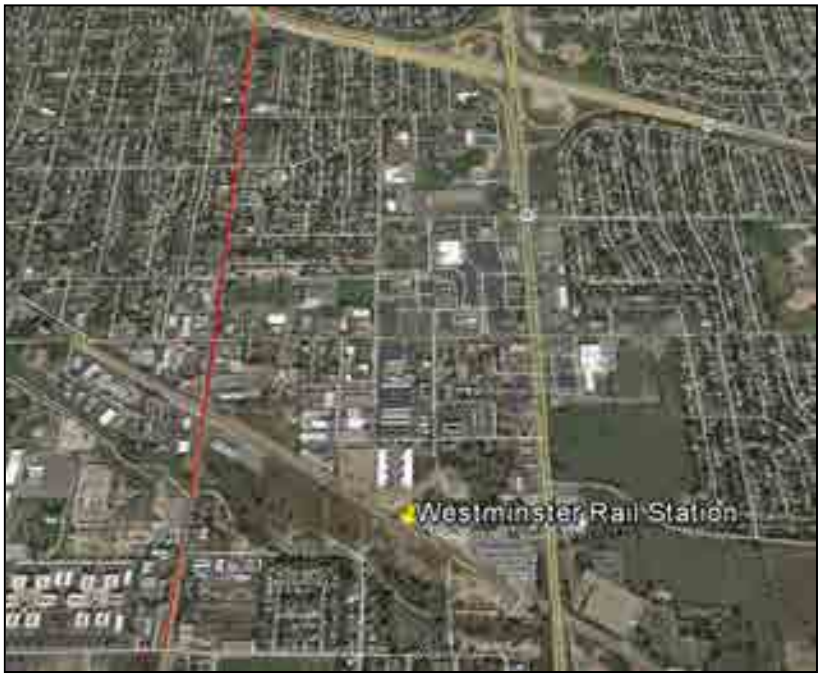
- Westminster Center Station Area

Add bicycle lanes on 88th Avenue between Wagner Drive and the Park-n-Ride.

The recommended improvements focus on bicycle improvements along 88th Avenue to provide bicycle lanes that reduce the number of conflict points between bicyclists and motorists. The

recommended improvements include the removal of the existing right-turn acceleration and deceleration lanes between Yates Drive and Wanger Drive, and narrowing the lane widths to ten-feet, to reduce motorist speeds throughout this conflict zone. High-visibility green paint is also recommended to highlight the conflict areas between bicyclists and motorists.

- Westminster Rail Station Area
  Add bicycle lanes or shared lane markings on Lowell Boulevard between US 36 and West 68th Avenue.



The recommended improvements focus on providing bicycle facilities that can be implemented quickly without reducing parking or travel lanes. Buffered bicycle lanes are recommended between W. 68th Ave. and W. 73rd Ave., with sharrows and bicycle signing proposed between W. 73rd Ave. and US 36. A parking study and intersection study should be considered during the design development process to assess if additional improvements can be provided between W. 73rd Ave. and US 36. Alternately, the roadway cross-section could be revised to provide a shared-use path or separated bicycle lanes along one side of the road with narrower sidewalks on the opposite side of the road. This improvement is not the overall recommendation of this study because of the recent lighting and streetscape improvements that occurred along Lowell Boulevard that would need to be reconstructed to accommodate this change in the roadway cross-section; however it is worth consideration during the design development process.

Summary of Estimated Construction Costs

Below is a summary of the estimated construction costs anticipated for the improvements shown in Attachment A. These costs were developed using cost data from the CDOT 2013 Cost Data Book, historical bid pricing, and the estimator's engineering judgment. The costs include the following:

- Proposed trail areas, including excavation to the bottom of the trail section (assumes the trail is installed at grade);
- Proposed pavement markings and signing;
- Proposed driveway adjustments;
- Proposed pavement and curbing removal; and
- Maintenance of traffic, erosion and sediment control, utility impacts, and mobilization were included as an assumed percentage of the overall project cost.

Right-of-Way or Temporary Construction Easements, grading adjacent to the trail or to adjust trail grades (including meeting at-grade railroad crossings), lighting, and potential signal equipment upgrades were not specifically included in this estimate due to a lack of available existing information.

A contingency of 15 to 25 percent was applied to each estimate based on the anticipated level of complexity and the information available for each proposed project area.

The estimated construction costs for each station area are as follows:

- Table Mesa Station Area: $193,000
- McCaslin Station Area: $9,000
- Flatiron Station Area: $948,000
- Broomfield Station Area: $4,793,000[2]
- Church Ranch Station Area: $174,000
- Westminster Center Station Area: $59,000
- Westminster Rail Station Area: $27,000

[2] Includes an estimate of $1,000,000 for railroad coordination.

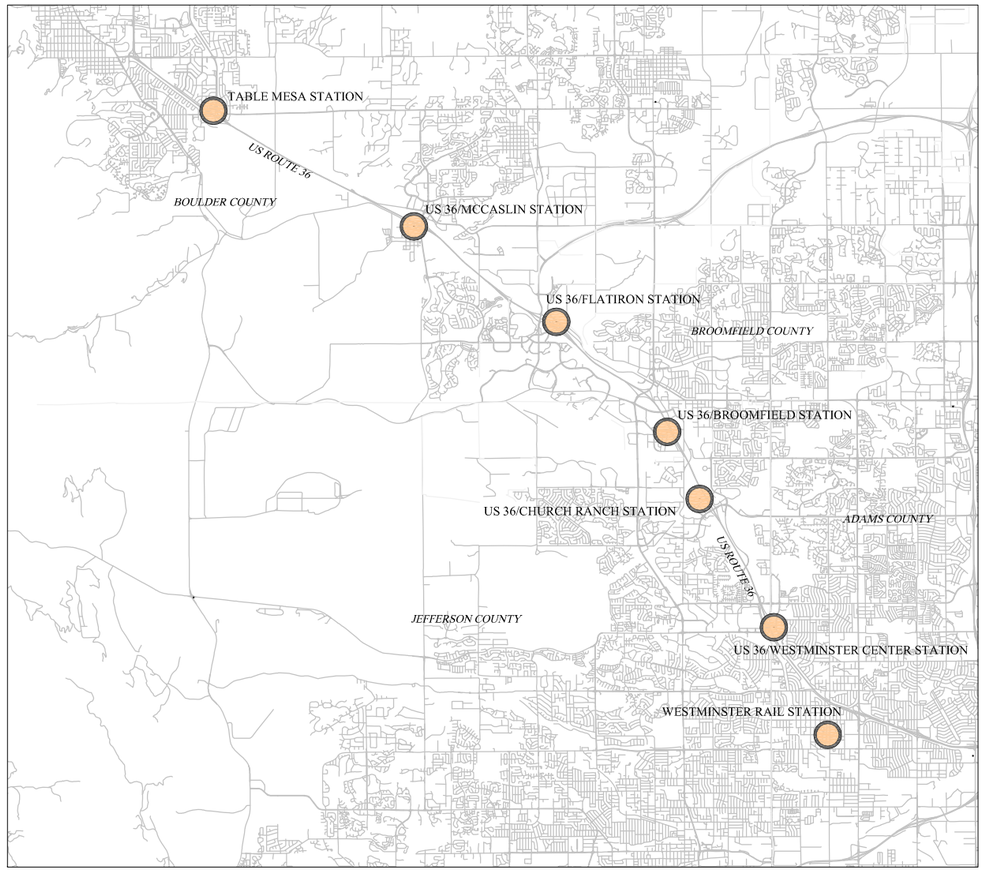
Attachment A

Conceptual Design Plans

Appendix B

Attachment A: Connectivity Improvements

NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY



LOCUS PLAN
NOT TO SCALE

SHEET INDEX

TooleDesignGroup
1062 DELAWARE ST., DENVER, CO 80204
www.tooledesign.com

DRCOG
DENVER REGIONAL COUNCIL OF GOVERNMENTS
We make life better!

NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY
PEDESTRIAN AND BICYCLE CONNECTIVITY

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: COVER SHEET

SHEET NUMBER
01 OF 24

PAVEMENT MARKINGS SPECIFICATIONS

MATERIALS: ALL THERMOPLASTIC MARKING MATERIALS SHALL CONFORM TO THE CDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

APPLICATION METHOD: ALL PAVEMENT MARKING APPLICATION METHODS SHALL BE APPROVED BY PROJECT DESIGNER PRIOR TO START OF WORK.

1. PAINTED STRIPING FOR PATH

MATERIAL SPECIFICATIONS:	SPRAYABLE NON TOXIC LEAD FREE WATER BOURNE PAVEMENT MARKING PER MDSHA SECTION 550 AT THICKNESS OF 18 ±1 MILS.
STRIPE WIDTH / COLOR:	4" / TRAFFIC YELLOW
STRIPE POSITION:	CENTER OF PATHWAY
STRIPE CHARACTER:	SMOOTH EDGE WITH CONSTANT ARC IN CURVES (NO WAVERING OR SERPENTINE APPEARANCE WILL BE ACCEPTED)
SOLID LINE:	BEGINNING 150 FEET (OR PER MARKING PLANS) ON EACH SIDE OF A BRIDGE OR INTERSECTION THERE SHALL BE A SOLID LINE PATTERN IMPLEMENTED IN PLACE OF THE DASHED PATTERN.
DASHED:	3' STRIPE / 9' BREAK. DASHED LINE SHALL END ONE FOOT BEFORE RUMBLE STRIPS, CROSSWALKS OR OTHER PAVEMENT MARKINGS.

2. THERMOPLASTIC RUMBLE STRIPS:

MATERIAL SPECIFICATIONS:	90 MILS BEADED
STRIPE WIDTH / COLOR:	2", 4", AND 6" WIDE / WHITE
PATTERN:	THREE SEPARATE LINES BEGINNING AT 150' FROM THE CROSSING FOR THE FIRST LINE, THE NEXT TWO LINES SHALL BE PLACED 30" ON CENTER HEADING TOWARD THE INTERSECTION. EACH STRIP SHALL EXTEND THE ENTIRE WIDTH OF THE TRAIL.

3. PAINTED ADVANCE MARKINGS FOR PATH

MATERIAL SPECIFICATIONS:	SPRAYABLE NON TOXIC LEAD FREE WATER BOURNE PAVEMENT MARKING PER MDSHA SECTION 550 AT THICKNESS OF 18 ±1 MILS.
SIZE / COLOR:	4' HEIGHT / WHITE
LETTER WIDTH / SPACING:	2" / 5' SPACING
LOCATION:	MINIMUM 70' FROM CONCRETE THRESHOLD OR STOP SIGN
EXAMPLE:	YIELD TO PEDS

DETAILS

CONSTRUCTION DETAILS, OTHER THAN THOSE FOUND ON SHEETS 2 AND 3, ARE PROVIDED IN THE COLORADO DEPARTMENT OF TRANSPORTATION M&S STANDARD DRAWINGS DATED JULY 4, 2012, OR MOST CURRENT AS APPLICABLE.

SIGN NOTES

1. APPLICABLE SPECIFICATIONS AND STANDARDS: CDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM), AND ALL LOCAL JURISDICTIONAL SPECIFICATIONS. THE MOST STRINGENT SPECIFICATIONS SHALL GOVERN.
2. PREPARATION:
   - A. IF SITE CONDITIONS VARY FROM PLAN, CONTRACTOR SHALL NOTIFY OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION
   - B. DIMENSIONS FOR LEGEND SIZE AND ALL RELATED DIMENSIONS FOR SIGN LAYOUT, PANEL SIZES, POST SIZES, MOUNTING DIMENSIONS ARE AS SPECIFIED IN THE PLANS.
   - C. ALL GRAPHIC FORMATS, USE OF TYPOGRAPHY, COLOR, DIRECTIONAL ARROW GRAPHICS, AND PICTOGRAMS ARE AS SPECIFIED IN THE PLANS. SHOP DRAWINGS OF PROPOSED SIGN LAYOUTS SHALL BE SUBMITTED AND APPROVED PRIOR TO SIGN PANEL FABRICATION.
   - D. ALL STRUCTURES SHALL BE ENGINEERED TO MEET A VARIETY OF SITE CONDITIONS. SIGNS SHALL BE ENGINEERED FOR WIND LOADS, SOIL CONDITIONS, FROST DEPTH, AND STRUCTURAL INTEGRITY. SPECIAL CONDITIONS THAT ARE OUTSIDE THESE PARAMETERS ARE TO BE ENGINEERED ON A SITE-SPECIFIC BASIS. THE DESIGN OF THE STRUCTURAL REQUIREMENTS OF SPECIAL ONE-OF-A-KIND SIGNS SHALL CONFORM TO THE BASIC ASSEMBLY SPECIFICATIONS FOR SIMILAR SIGN TYPES, THE MODIFIED ASSEMBLY SHALL FULFILL THE REQUIREMENTS OF LOCAL CRITERIA FOR WIND PRESSURE, SOIL, AND FROST DEPTH. ALL SIGN ENGINEERING AND STRUCTURAL INTEGRITY WILL BE THE RESPONSIBILITY OF THE CONTRACTOR UNLESS OTHERWISE NOTED.
   - E. ALL FINISHED SIGN PANELS SHALL BE PROVIDED WITH A 1-1/4" X 2-1/2" WEATHER RESISTANT IDENTIFICATION PLACED ON THE BACK OF THE SIGN INDICATING SIGN PLAN ID NUMBER, MANUFACTURER, DATE OF FABRICATION, AND INSTALLATION DATE.
3. FABRICATION:
   - A. PROVIDE SHOP AND FABRICATION DRAWINGS FOR REVIEW AND APPROVAL DETAILING THE PROPOSED FABRICATION OF ALL SIGNS AND STRUCTURES INDICATED IN PLAN DOCUMENTS.
   - B. THE CONTRACTOR SHALL PREPARE, FOR REVIEW BY THE OWNER'S REPRESENTATION'S FABRICATION SHOP DRAWINGS. UPON REVIEW OF THE SHOP DRAWINGS THE CONTRACTOR SHALL MAKE ALL CORRECTIONS AND ADJUSTMENTS. AS INDICATED AND RESUBMIT FOR REVIEW AND APPROVAL, REVISIONS TO SHOP DRAWINGS SHALL INCLUDE A REVISION DATE. FABRICATION SHOP DRAWINGS SHALL INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   - C. ALUMINUM PANEL, TUBULAR STEEL POSTS, MOUNTING HARDWARE AND MATERIAL FINISHES SHALL MEET OR EXCEED THE STANDARDS AND SPECIFICATIONS HEREIN OR BY REFERENCE. ALL MATERIALS SHALL COMPLY WITH THIS SPECIFICATION OR APPROVED EQUAL.
   - D. ALL SIGN USED FOR TRAFFIC CONTROL SIGNS SHALL BE MOUNTED ON 2" GALVANIZED STEEL, PERFORATED ("QUICK PUNCH"), SQUARE TUBE POSTS (14 GAUGE) INSERTED INTO A 2-1/2" GALVANIZED STEEL SQUARE TUBE SLEEVE (3' LONG). THE ANCHOR SHALL NOT EXTEND MORE THAN TWO QUICK PUNCH HOLES ABOVE GROUND LEVEL.
4. INSTALLATION:
   - A. ALL TRAFFIC CONTROL SIGNS LOCATED WITHIN COUNTY RIGHTS-OF-WAY ARE TO BE ARE TO BE STAKED AND BE FIELD APPROVED PRIOR TO INSTALLATION BY THE LOCAL REPRESENTATIVE.
   - B. ALL TRAFFIC CONTROL DEVICES AND THEIR LOCATIONS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE 'MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES' (MUTCD) AND COLORADO SUPPLEMENT.
   - C. SIGN LOCATIONS SHALL BE MARKED WITH A STAKE AND SHALL HAVE THE SIGN TYPE CODE, AND LOCATION CODE, AND CORRESPOND TO THE SIGN LOCATION IN THE PLAN DRAWINGS.
   - D. UNFORESEEN OBSTRUCTIONS MAY LIMIT THE DEPTH OF A STANDARD FOOTING OR REQUIRE SPECIAL MITIGATION TO PREVENT DAMAGE TO EXISTING TREE ROOTS. WHERE POSSIBLE, MOVE THE SIGN AS NEEDED TO ALLOW UNCONSTRAINED SUBSURFACE INSTALLATION. ADJUST SIGN INSTALLATION LOCATIONS TO KEEP THEM BEYOND THE DRIP LINE OF TREES WHEREVER POSSIBLE. NOTIFY THE PROJECT DESIGNER OF ANY PROPOSED SIGN LOCATIONS WITHIN THE DRIP LINE OF THE TREES. THE DRIP LINE SHALL BE DEFINED AS THE AREA BELOW THE FARTHEST-SPREADING BRANCHES OF A TREE. IF A SIGN PLACEMENT LOCATION MUST BE MOVED, THE CONTRACTOR SHALL GET APPROVAL OF THE PROJECT DESIGNER AND/OR COUNTY REPRESENTATIVE. IF THE SIGN CAN BE LOGICALLY MOVED, VERIFY SIGHT-LINES OF ADJUSTED LOCATIONS TO AFFIRM THAT SIGN IS STILL VISIBLE FROM THE DESIGNATED APPROACH.
5. TRAFFIC CONTROL SIGNS SHOULD BE INSTALLED AT A MINIMUM 7' HEIGHT WITH A MINIMUM CLEAR SPACE FROM EDGE OF TRAIL.
6. SIGN POSTS: 2-PUNCH SQUARE TUBULAR POSTS.

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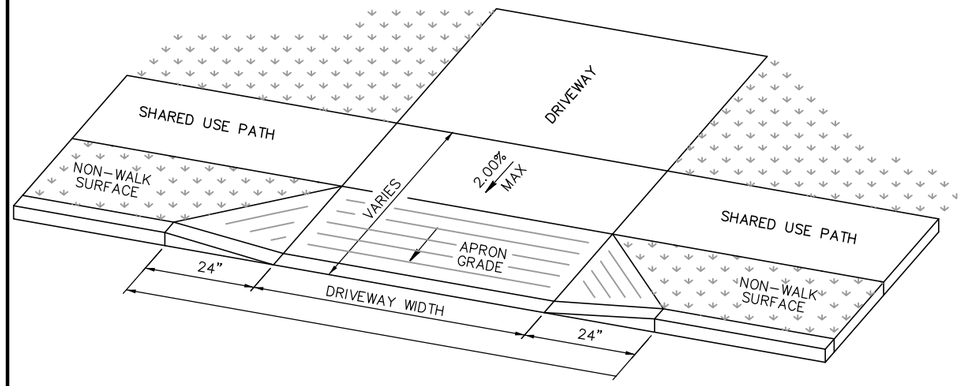
NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY
PEDESTRIAN AND BICYCLE CONNECTIVITY

REV. 1:
REV. 2:
REV. 3:

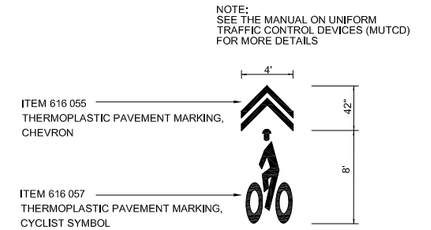
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: GENERAL NOTES/ DETAILS

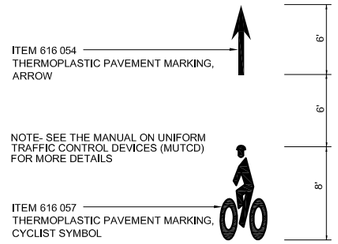
SHEET NUMBER
02 OF 24



A DRIVEWAY APRON
NTS



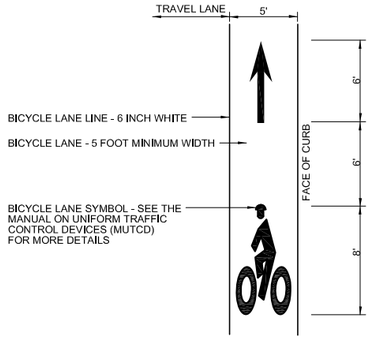
C SHARED LANE SYMBOL
NTS



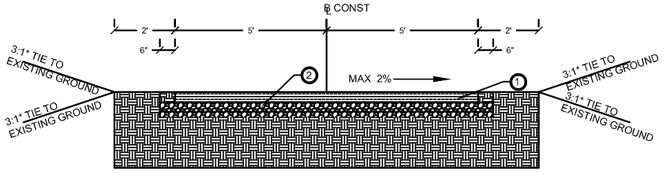
E BICYCLE LANE SYMBOL
NTS

BICYCLE LANE SYMBOL PLACEMENT NOTES:

1. DO NOT PLACE SYMBOLS ON LANE LINES.
2. PLACE BICYCLE LANE SYMBOLS WITHIN CENTER OF BICYCLE LANE.
3. SEE PLAN SHEETS FOR SYMBOL LOCATIONS.



F BICYCLE LANE STRIPING
NTS

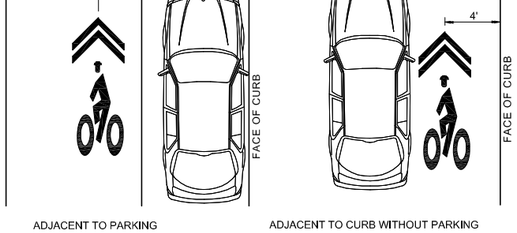


B TYPICAL TRAIL CROSS SECTION
NTS

1. 6" PORTLAND CEMENT CONCRETE PAVEMENT
2. 6" AGGREGATE BASE COURSE ON 24" MOISTURE-TREATED SUBGRADE

TYPICAL TRAIL CROSS SECTION NOTES:

* MAXIMUM SLOPE 3:1 OR IN ACCORDANCE WITH LOCAL JURISDICTIONAL REQUIREMENTS, WHICHEVER IS LESS STEEP.



D SHARED LANE SYMBOL PLACEMENT
NTS

SHARED LANE SYMBOL PLACEMENT NOTES:

1. IN LOCATIONS WITH ON-STREET PARKING, SHARED LANE MARKING SYMBOLS SHALL BE PLACED SO THAT THEIR CENTERS ARE A MINIMUM OF 11 FEET FROM THE ADJACENT FACE OF CURB, UNLESS SHOWN OTHERWISE ON THE PLAN SHEETS.
2. IN LOCATIONS WITHOUT PARKING, SHARED LANE MARKING SYMBOLS SHALL BE PLACED SO THAT THEIR CENTERS ARE 4 FEET FROM THE ADJACENT FACE OF CURB, UNLESS SHOWN OTHERWISE ON THE PLAN SHEETS.
3. IF LOCATED IN A TURN LANE, SHARED LANE MARKING SYMBOLS SHALL BE CENTERED IN THE LANE UNLESS OTHERWISE NOTED ON THE PLAN SHEETS.
4. DO NOT PLACE SYMBOLS ON LANE LINES.
5. SEE PLAN SHEETS FOR SYMBOL LOCATIONS.

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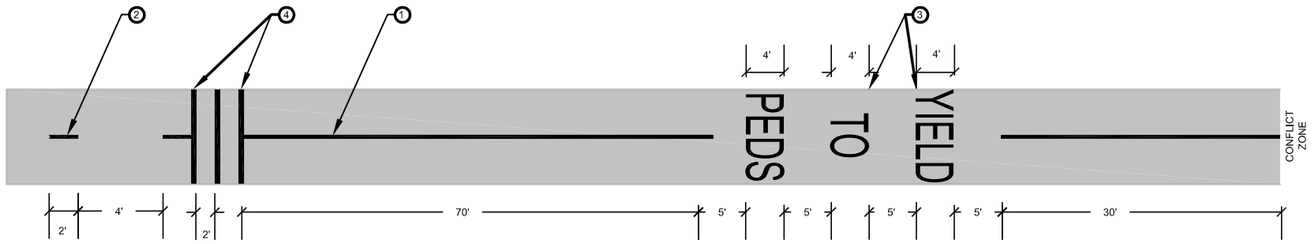
NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY
PEDESTRIAN AND BICYCLE CONNECTIVITY

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: DETAILS

SHEET NUMBER
03 OF 24

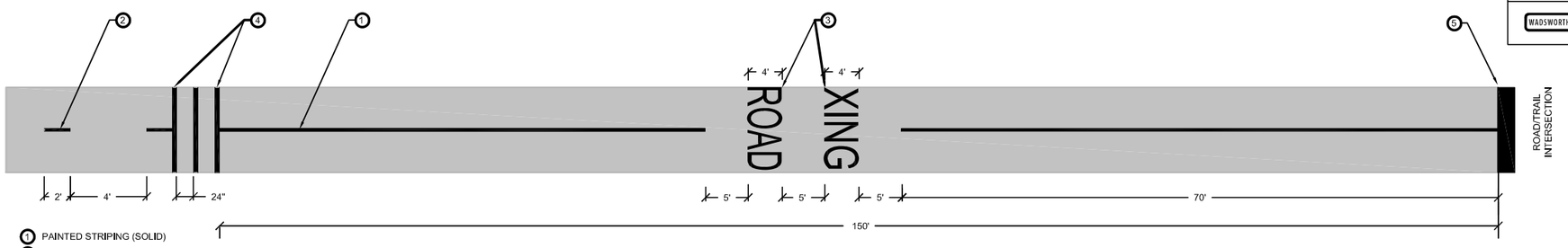


1. PAINTED STRIPING (SOLID)
2. PAINTED STRIPING (DASHED)
3. PAINTED "ROAD XING" PAVEMENT MARKING
4. (3) RUMBLE STRIPS 30" ON CENTER

1 TRAIL PAVEMENT MARKING SYMBOL PLACEMENT
NTS

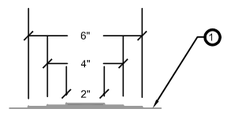
SIGN SCHEDULE	SIGN NAME	QTY	
YIELD TO PEDS	R9-6	1	
	W11-15	6	
STOP	W3-1	1	
	W3-3	1	
	W16-7P	6	
WADSWORTH BLVD	W16-8	1	

STOP	R1-1	3	
BEGIN RIGHT TURN LANE / YIELD TO BIKES	R4-4	1	
YIELD	R1-2	2	
	W11-1	6	
SHARE THE ROAD	W6-1	6	
BIKE LANE	R3-17	4	
ENDS	R3-17bP	2	



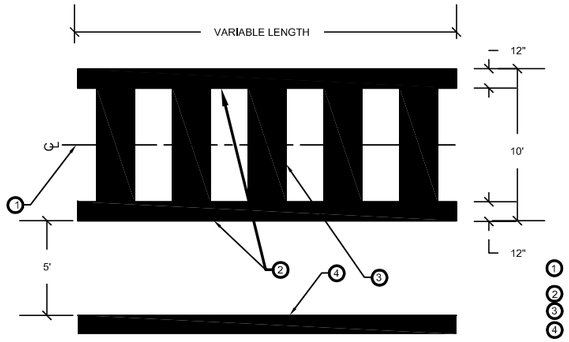
1. PAINTED STRIPING (SOLID)
2. PAINTED STRIPING (DASHED)
3. PAINTED "ROAD XING" PAVEMENT MARKING
4. (3) RUMBLE STRIPS 30" ON CENTER
5. 12" STOP BAR (INC. "STOP" MARKING DEPENDING ON TRAFFIC CONTROL)

2 TRAIL PAVEMENT MARKING SYMBOL PLACEMENT
NTS



1. WHITE THERMOPLASTIC PAVEMENT MARKING (EACH MARKING LAYER SHALL BE 80 TO 95 MILS EACH IN ORDER TO ACHIEVE AN OVERALL RUMBLE STRIP THICKNESS OF APPROXIMATELY ½". REFER TO PLAN FOR SPACING LAYOUT AND LOCATION.

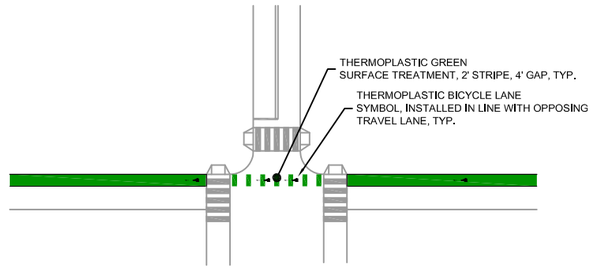
3 RUMBLE STRIP DETAIL
1"=1'



1. CENTERLINE OF CROSSWALK TO BE AT CENTERLINE OF PEDESTRIAN RAMPS UNLESS OTHERWISE NOTED
2. 12" SOLID WHITE THERMOPLASTIC MARKING
3. 24" SOLID WHITE THERMOPLASTIC MARKING
4. 24" SOLID WHITE THERMOPLASTIC STOP BAR (MOTOR VEHICLE)

4 CROSSWALK DETAIL
1/2"=1'

NOTES:
1. PEDESTRIAN CROSSWALK - TEN FEET WIDE, UNLESS OTHERWISE NOTED.
   A. MAKE STRIPES PARALLEL TO CURB LINE OF STREET.
   B. ALL HANDICAP RAMPS MUST BE LOCATED WITHIN A CROSSWALK, INCLUDING SIDE FLARES OF RAMPS. ONE SIDE FLARE MUST ALIGN WITH BACK EDGE OF CROSSWALK IF CROSSWALK WIDTH IS GREATER THAN FIFTEEN FEET.
   C. CROSSWALK MARKINGS SHALL BE INSTALLED WITH PREFORMED HEAT APPLIED THERMOPLASTIC OR LIQUID THERMOPLASTIC.



4 BIKE LANE CROSSWALK DETAIL
NTS

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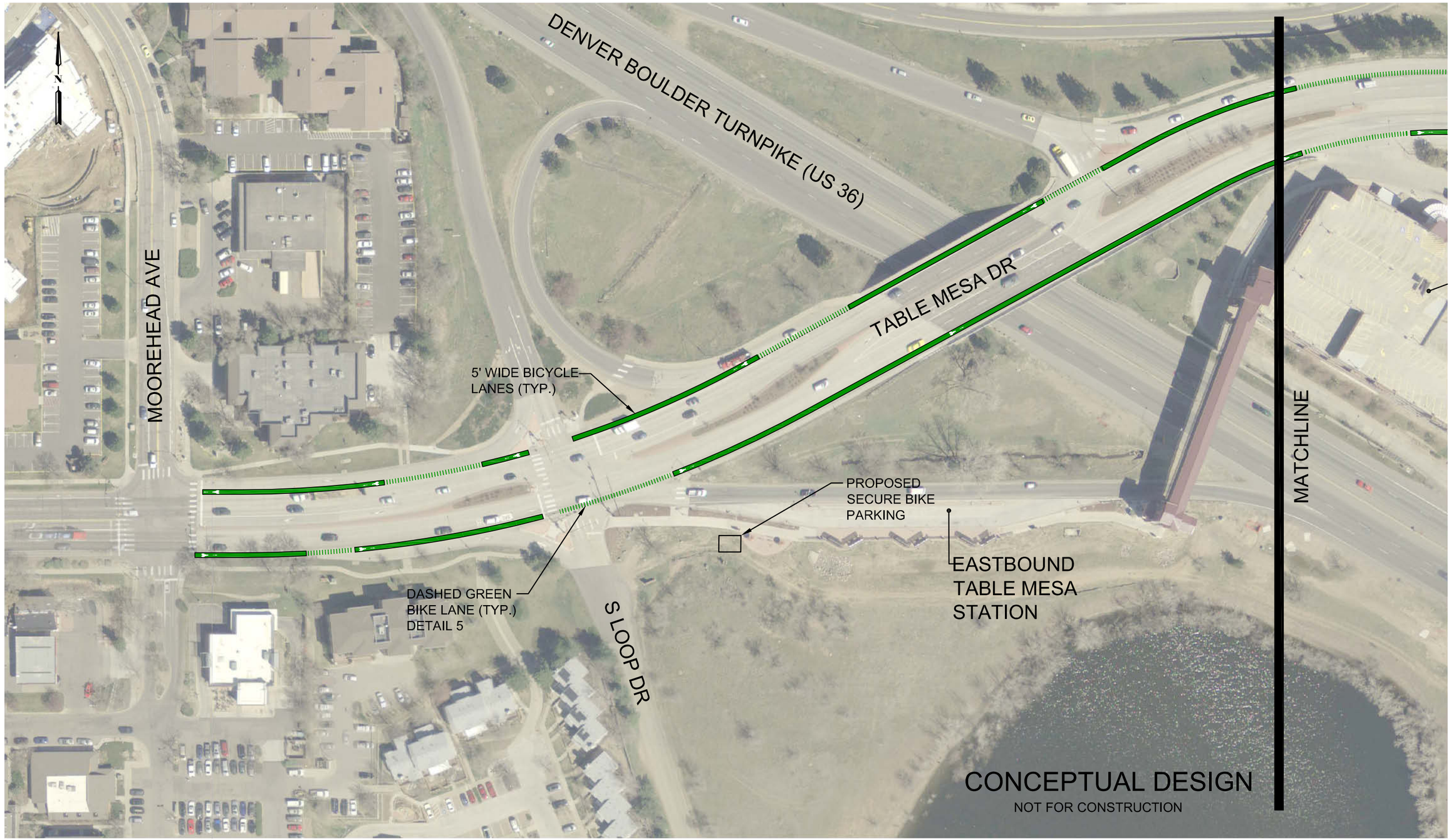
PEDESTRIAN AND BICYCLE CONNECTIVITY

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: DETAILS

SHEET NUMBER 04 OF 24



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NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY

PEDESTRIAN AND BICYCLE CONNECTIVITY

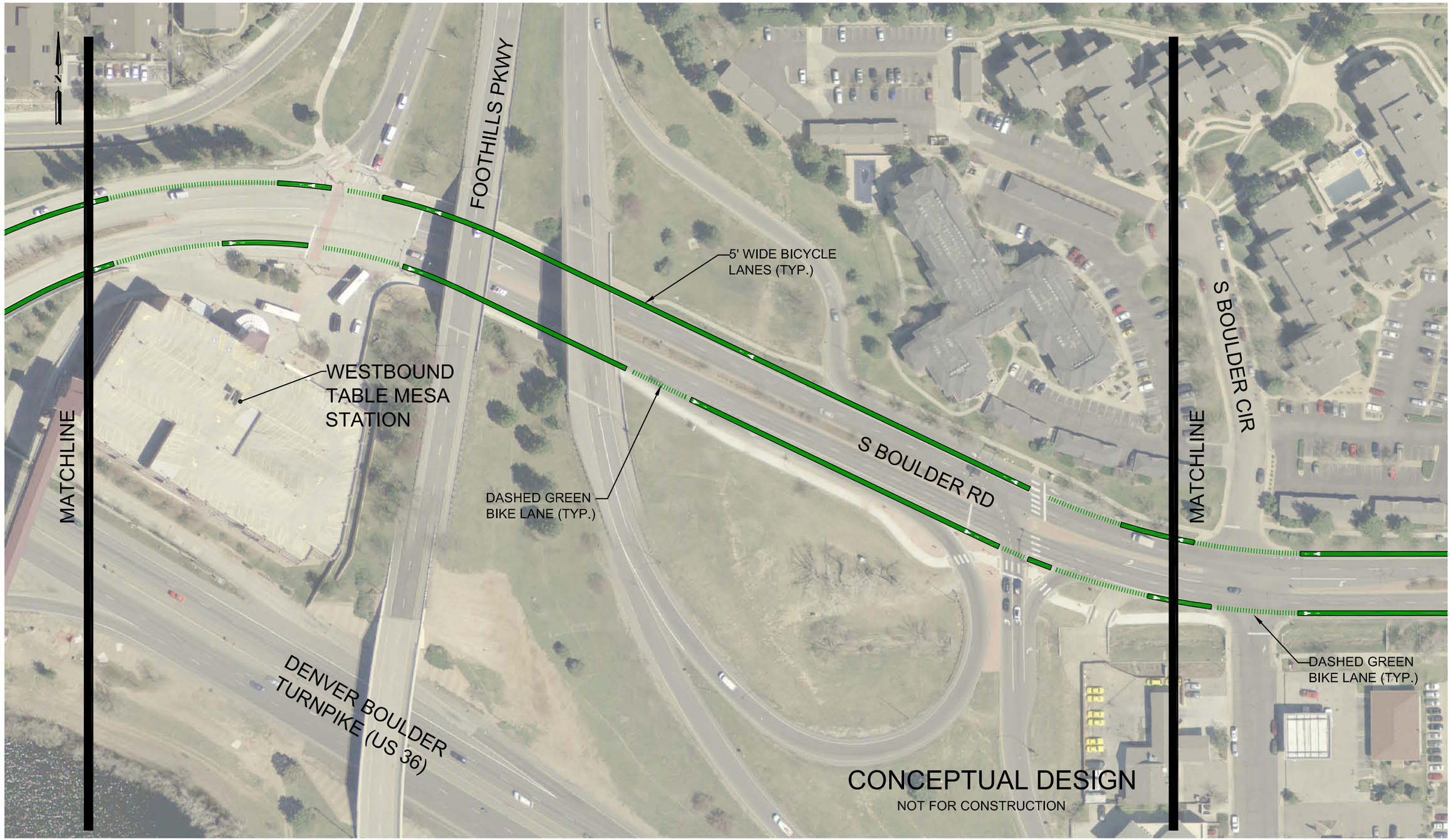
0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:

DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
TABLE MESA STATION
1 OF 3

SHEET NUMBER
05 OF 24



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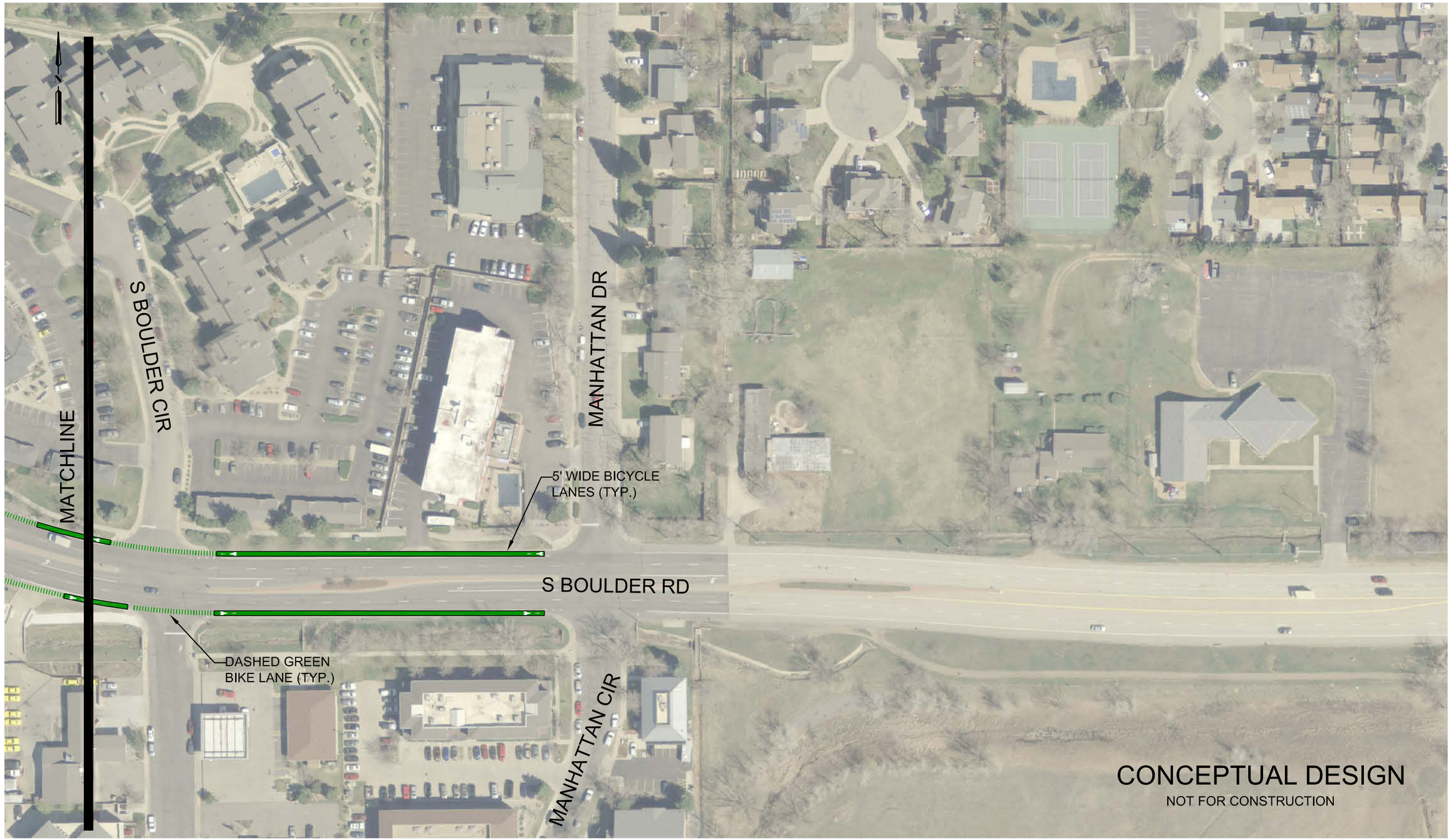
0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
TABLE MESA STATION
2 OF 3

SHEET NUMBER
06 OF 24



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NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY

PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:

DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
TABLE MESA STATION
3 OF 3

SHEET NUMBER
07 OF 24

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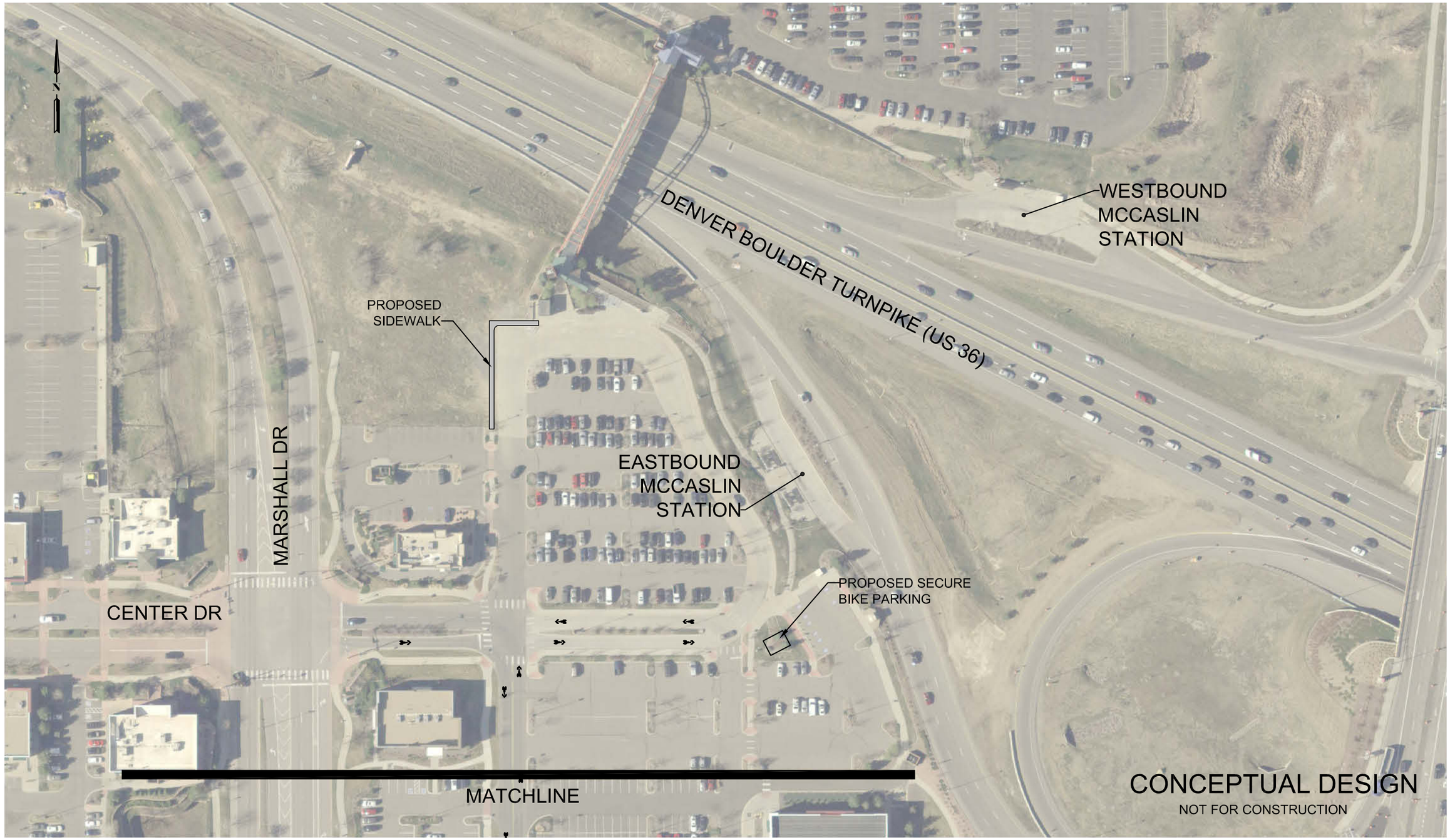
PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
US 36/MCCASLIN STATION
1 OF 2

SHEET NUMBER
08 OF 24



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PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
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REV. 3:
DESIGNED: JD
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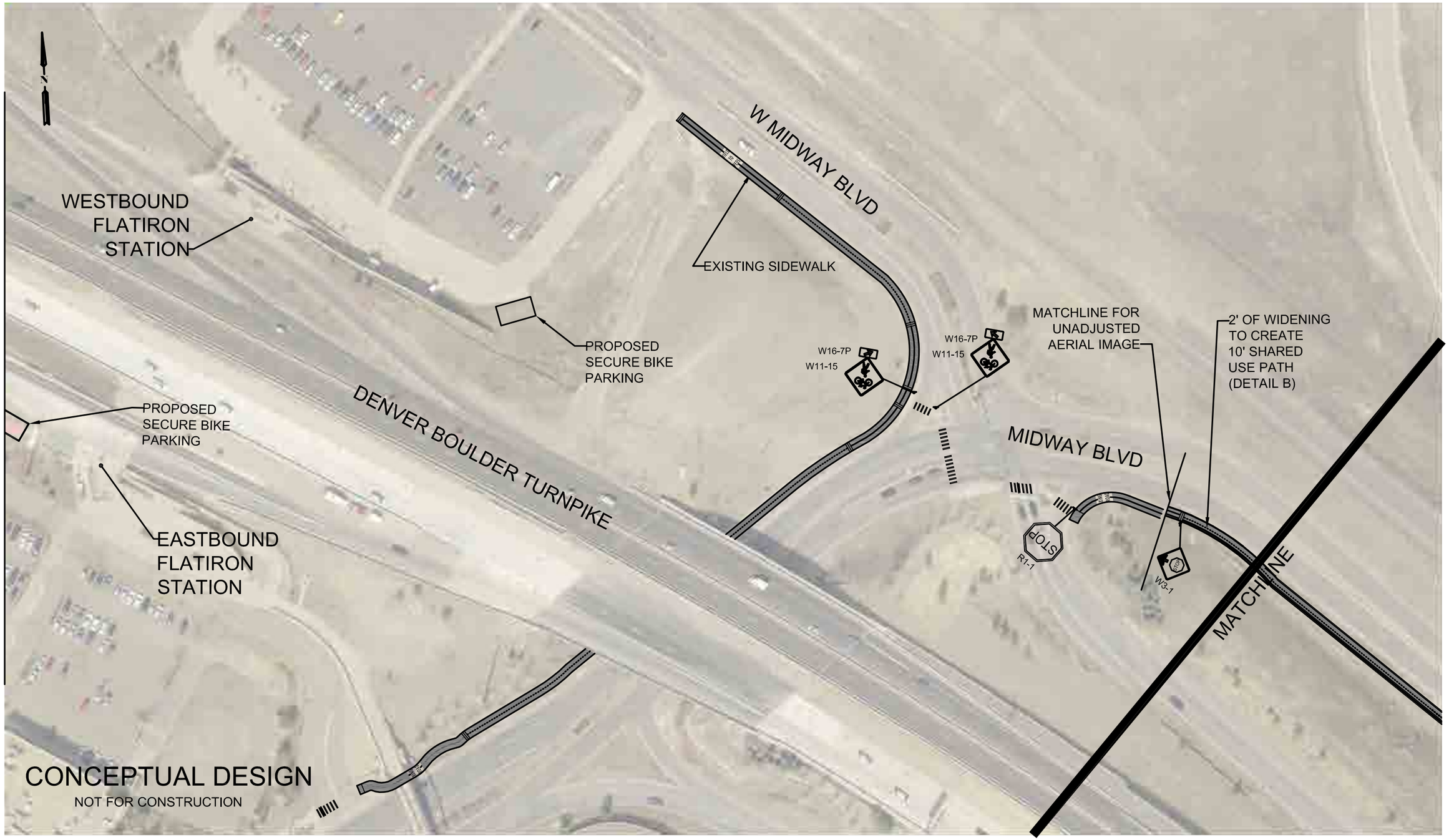
DATE: NOV 2014

SHEET NAME:
US 36/MCCASLIN STATION
2 OF 2

SHEET NUMBER
09 OF 24



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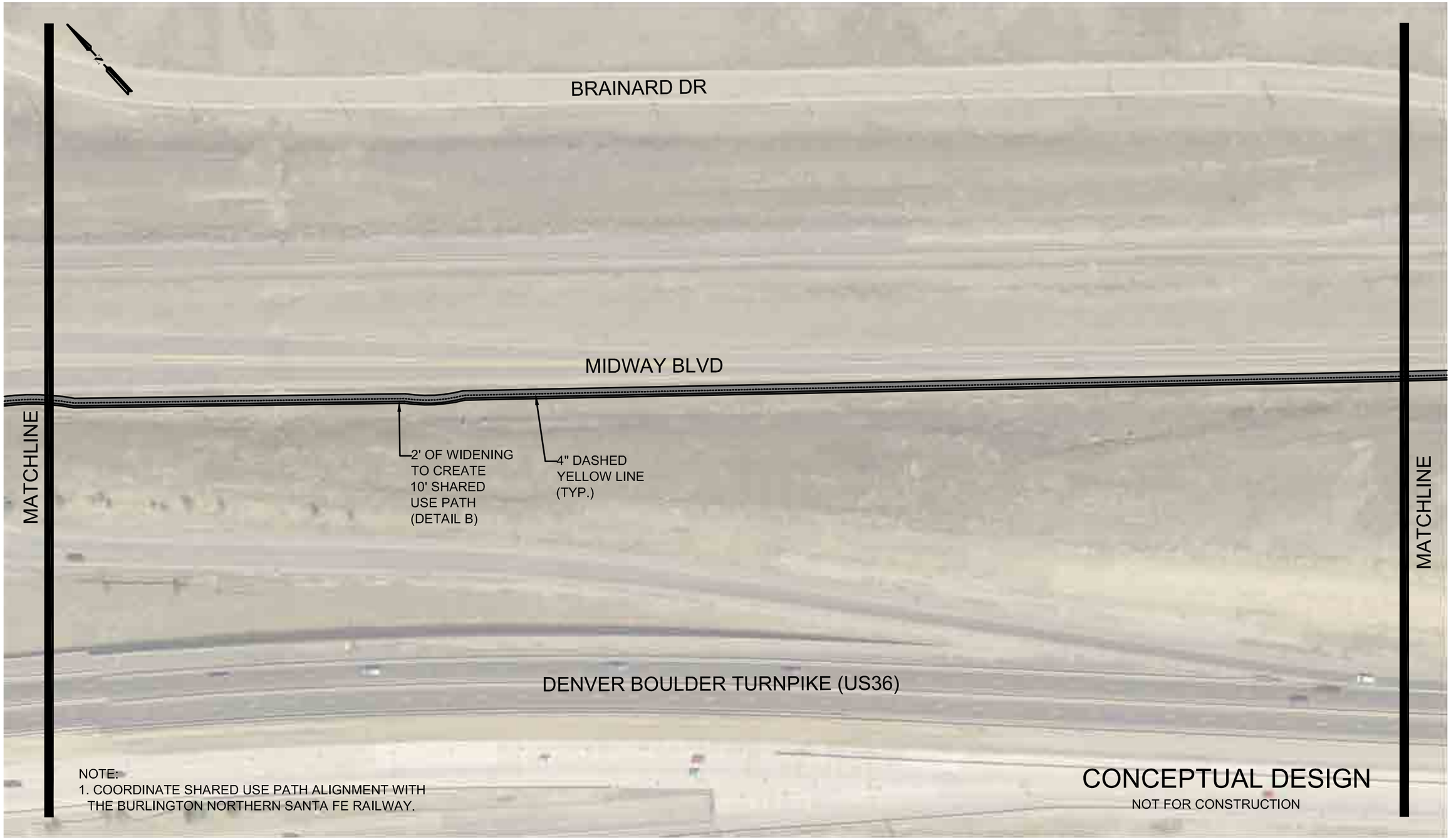
0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
US 36/FLATIRON STATION
1 OF 5

SHEET NUMBER
10 OF 24



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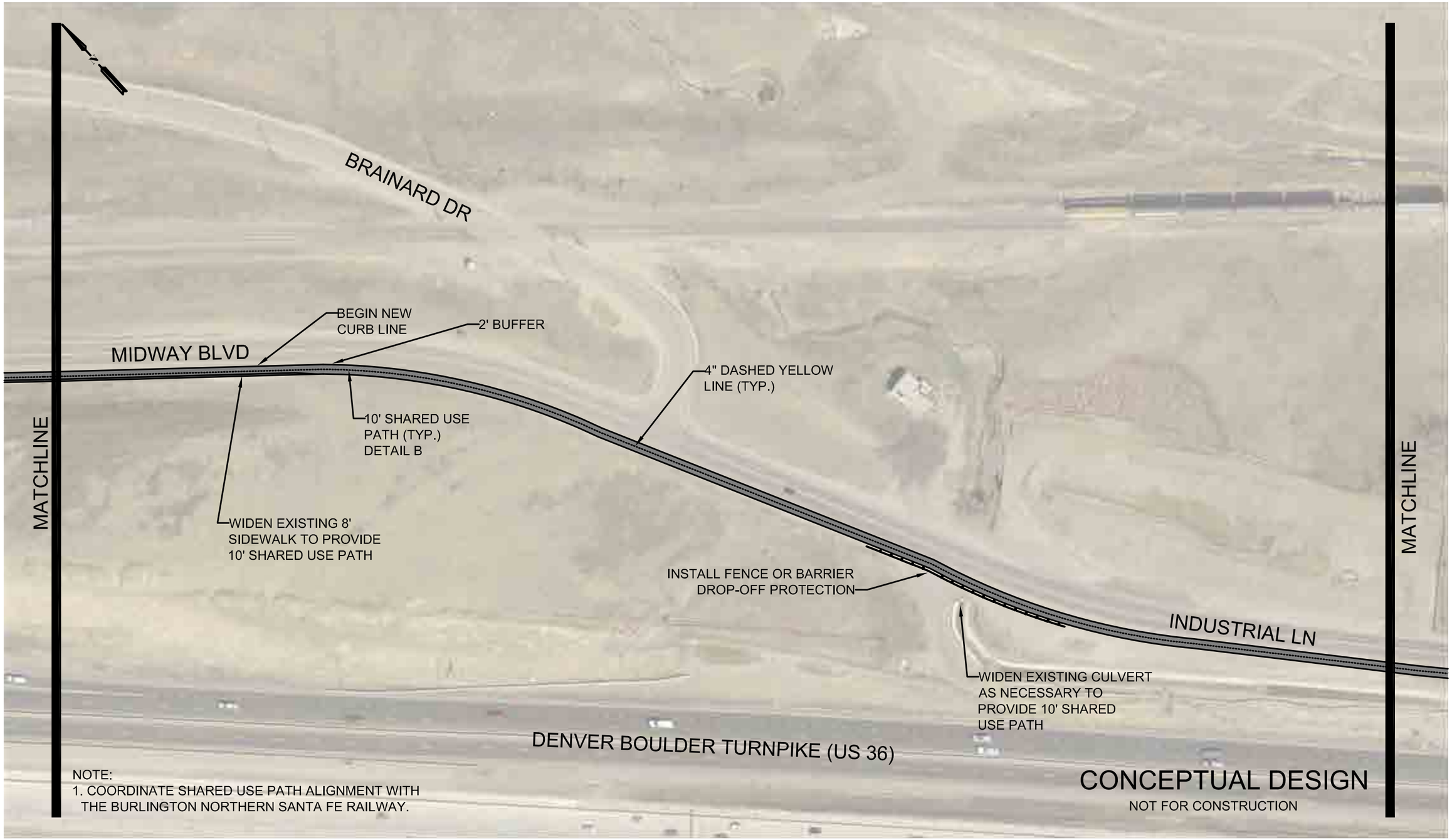
0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: US 36/FLATIRON STATION 2 OF 5

SHEET NUMBER
11 OF 24



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0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: US 36/FLATIRON STATION 3 OF 5

SHEET NUMBER
12 OF 24

NOTE:
1. COORDINATE SHARED USE PATH ALIGNMENT WITH THE BURLINGTON NORTHERN SANTA FE RAILWAY.

MATCHLINE

MATCHLINE

MATCHLINE FOR UNADJUSTED AERIAL IMAGE

2' BUFFER

4" DASHED YELLOW LINE (TYP.)

INDUSTRIAL LN

10' SHARED USE PATH (TYP.) DETAIL B

EXISTING FENCE TO REMAIN

CONCEPTUAL DESIGN

NOT FOR CONSTRUCTION

DENVER BOULDER TURNPIKE (US 36)

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PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
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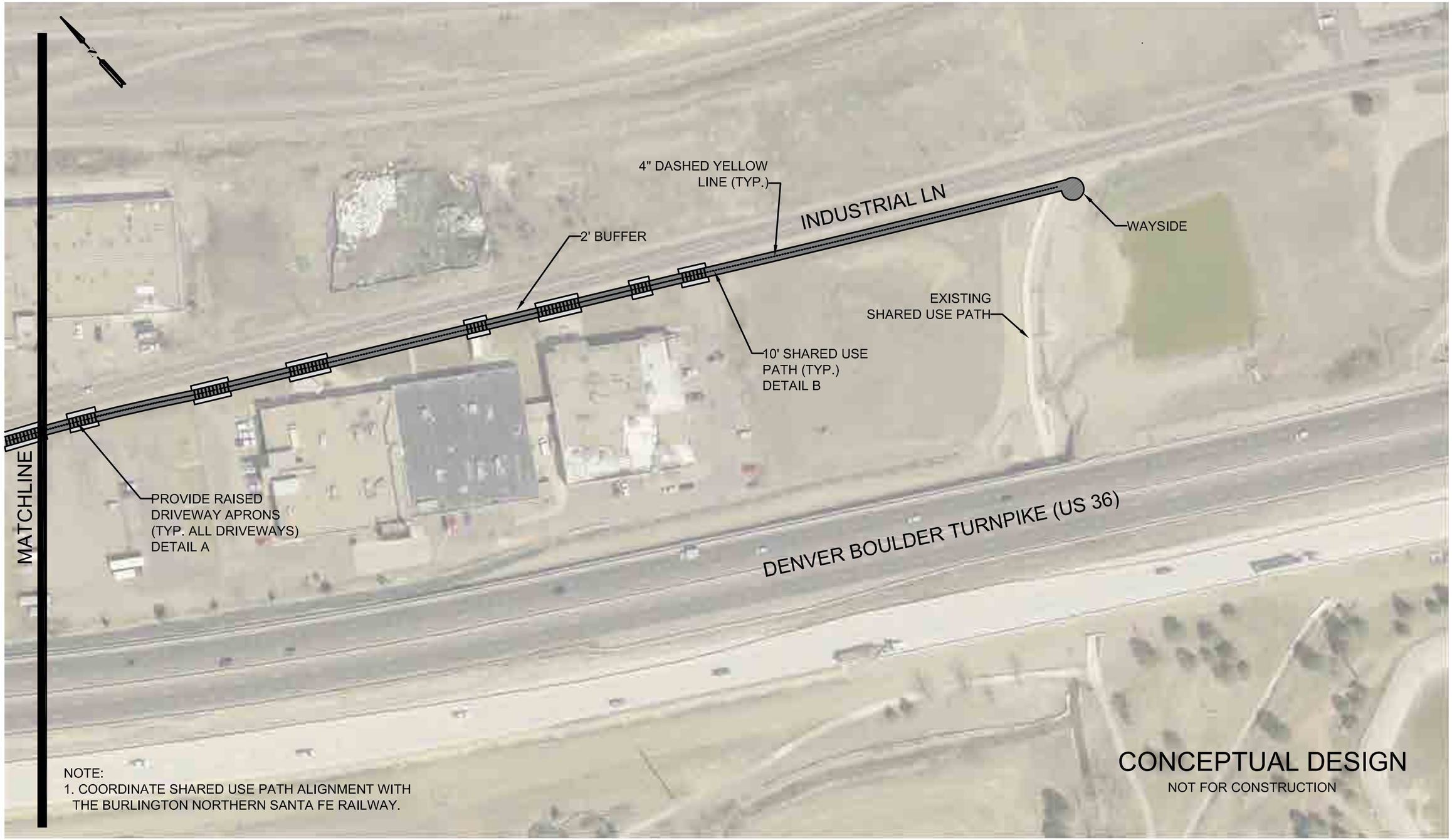
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: US 36/FLATIRON STATION 4 OF 5

SHEET NUMBER
13 OF 24



NOTE:
1. COORDINATE SHARED USE PATH ALIGNMENT WITH THE BURLINGTON NORTHERN SANTA FE RAILWAY.

CONCEPTUAL DESIGN
NOT FOR CONSTRUCTION

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PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
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REV. 3:
DESIGNED: JD
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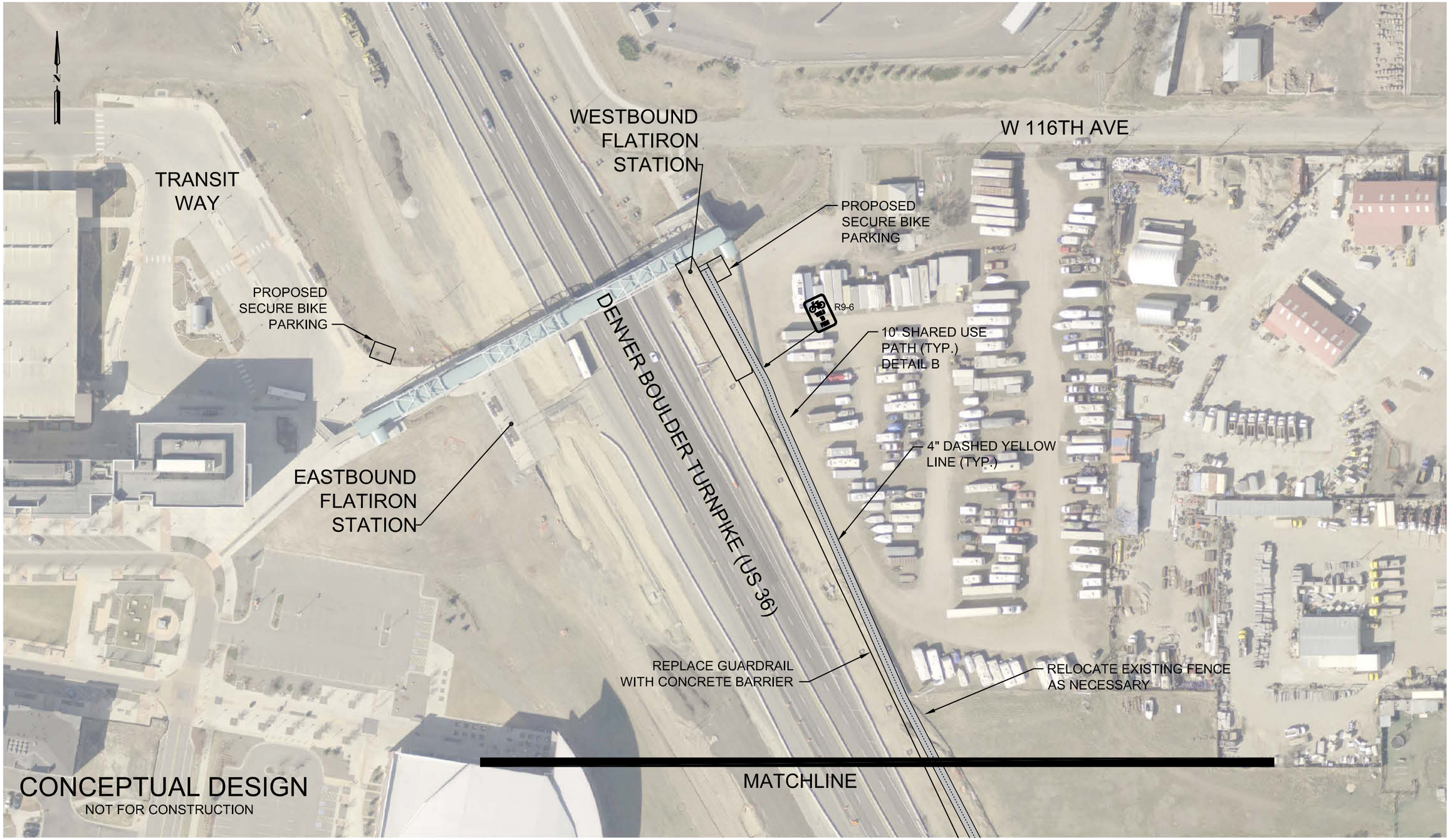
SHEET NAME:
US 36/FLATIRON STATION
5 OF 5

SHEET NUMBER
14 OF 24



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PEDESTRIAN AND BICYCLE CONNECTIVITY

0 100 200
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: US 36/BROOMFIELD STATION 1 OF 3

SHEET NUMBER
15 OF 24

MATCHLINE

N

REPLACE GUARDRAIL WITH CONCRETE BARRIER

INSTALL CONCRETE BARRIER AT EDGE OF PAVEMENT

INSTALL IMPACT ATTENUATOR

4" DASHED YELLOW LINE (TYP.)

RELOCATE EXISTING FENCE AS NECESSARY

HIGH-VISIBILITY CROSSWALK (TYP.)

R1-1 STOP

W16-7P

W11-15

R1-2 YIELD

DETAIL 2 (TYP.)

10' SHARED USE PATH (TYP.) DETAIL B

DENVER BOULDER TURNPIKE (US 36)

ACCESS ROAD

WADSWORTH BLVD

MATCHLINE

CONCEPTUAL DESIGN

NOT FOR CONSTRUCTION

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0 100 200

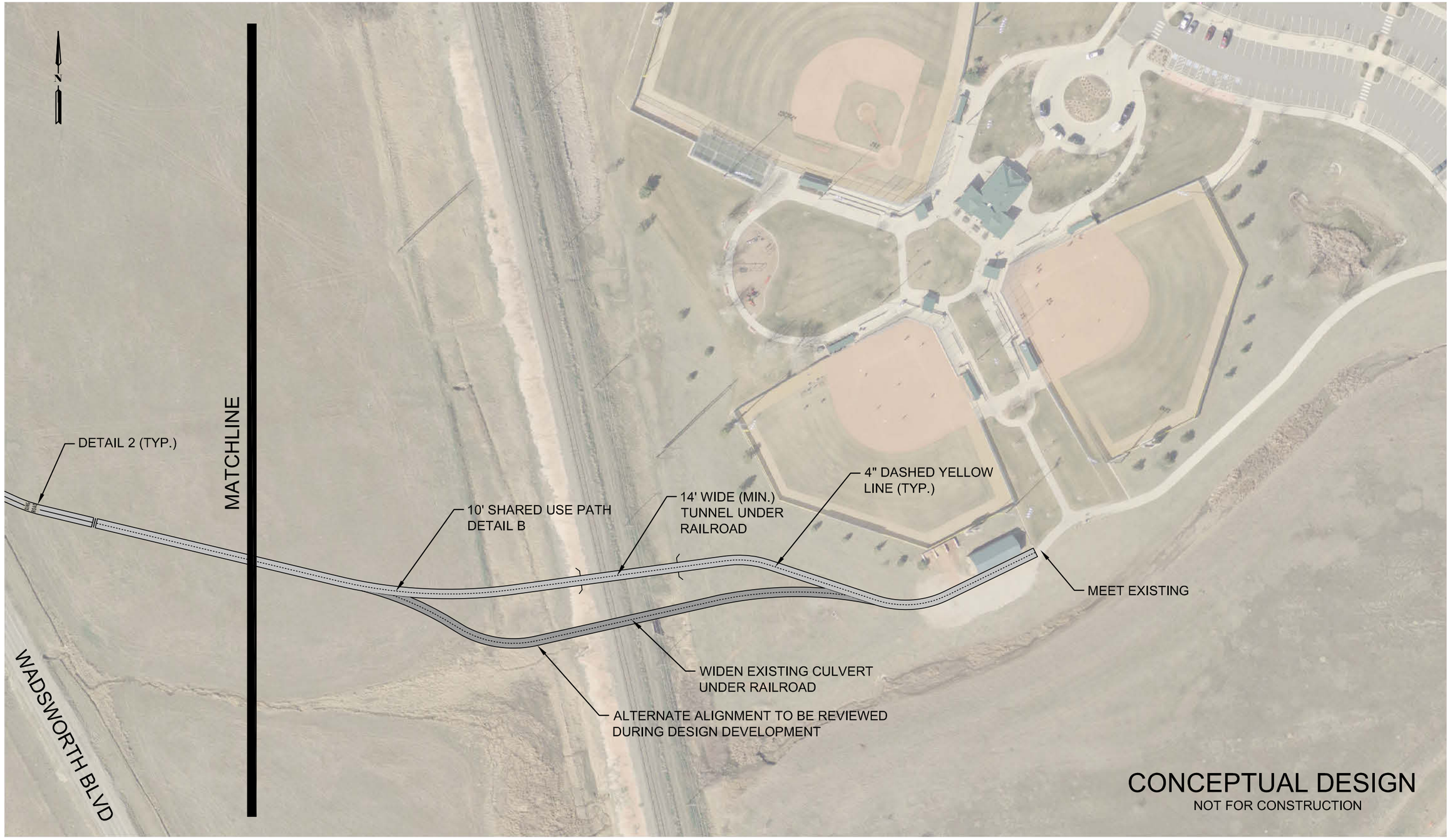
SCALE: 1"=100'

REV. 1:
REV. 2:
REV. 3:

DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: US 36/BROOMFIELD STATION 2 OF 3

SHEET NUMBER 16 OF 24



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NORTHWEST CORRIDOR BICYCLE/PEDESTRIAN ACCESSIBILITY STUDY

PEDESTRIAN AND BICYCLE CONNECTIVITY

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SCALE: 1"=100'

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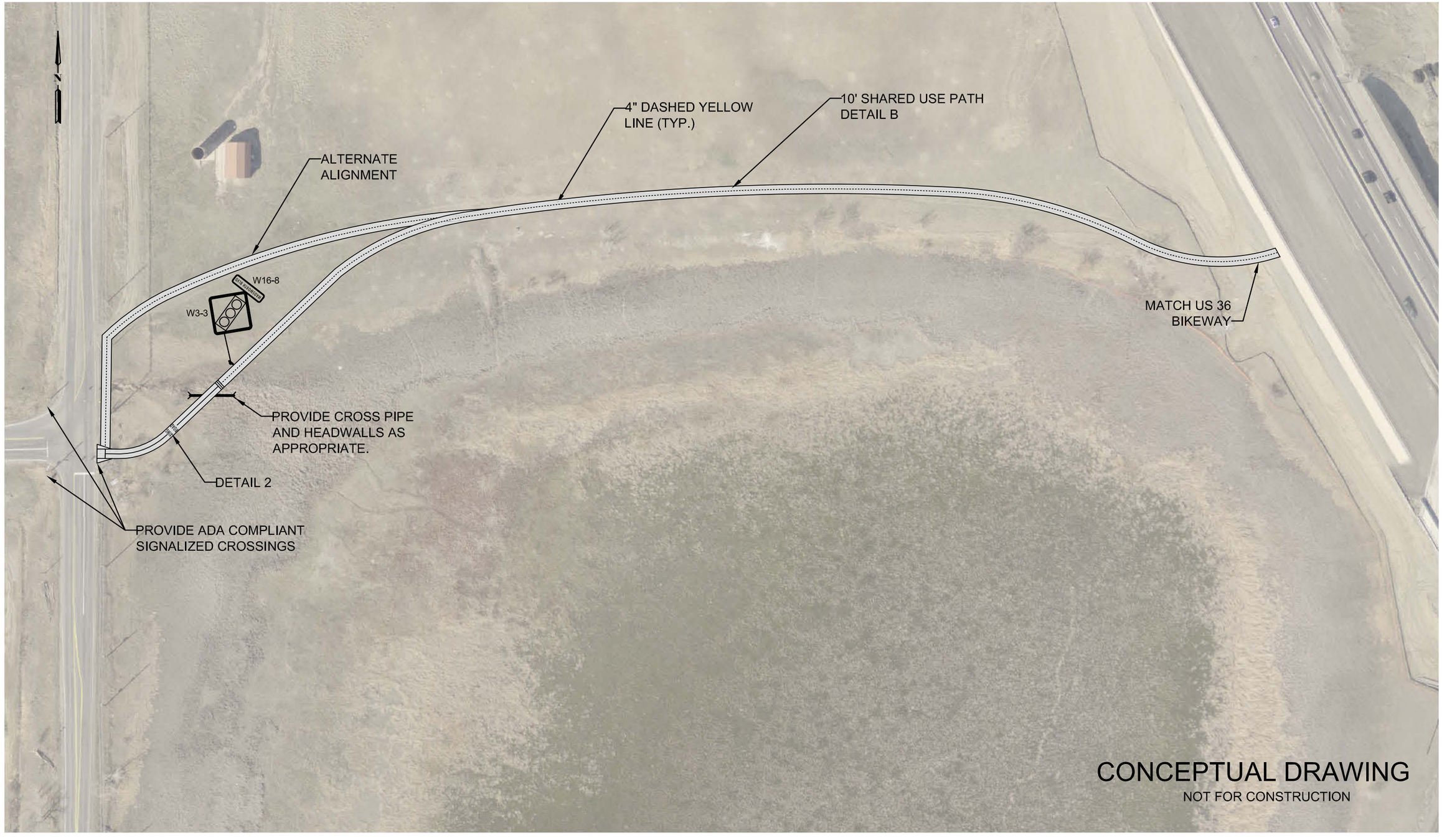
REV. 3:
DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME:
US 36/BROOMFIELD
STATION
3 OF 3

SHEET NUMBER
17 OF 24



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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DATE: NOV 2014

SHEET NAME:
US 36/CHURCH RANCH STATION
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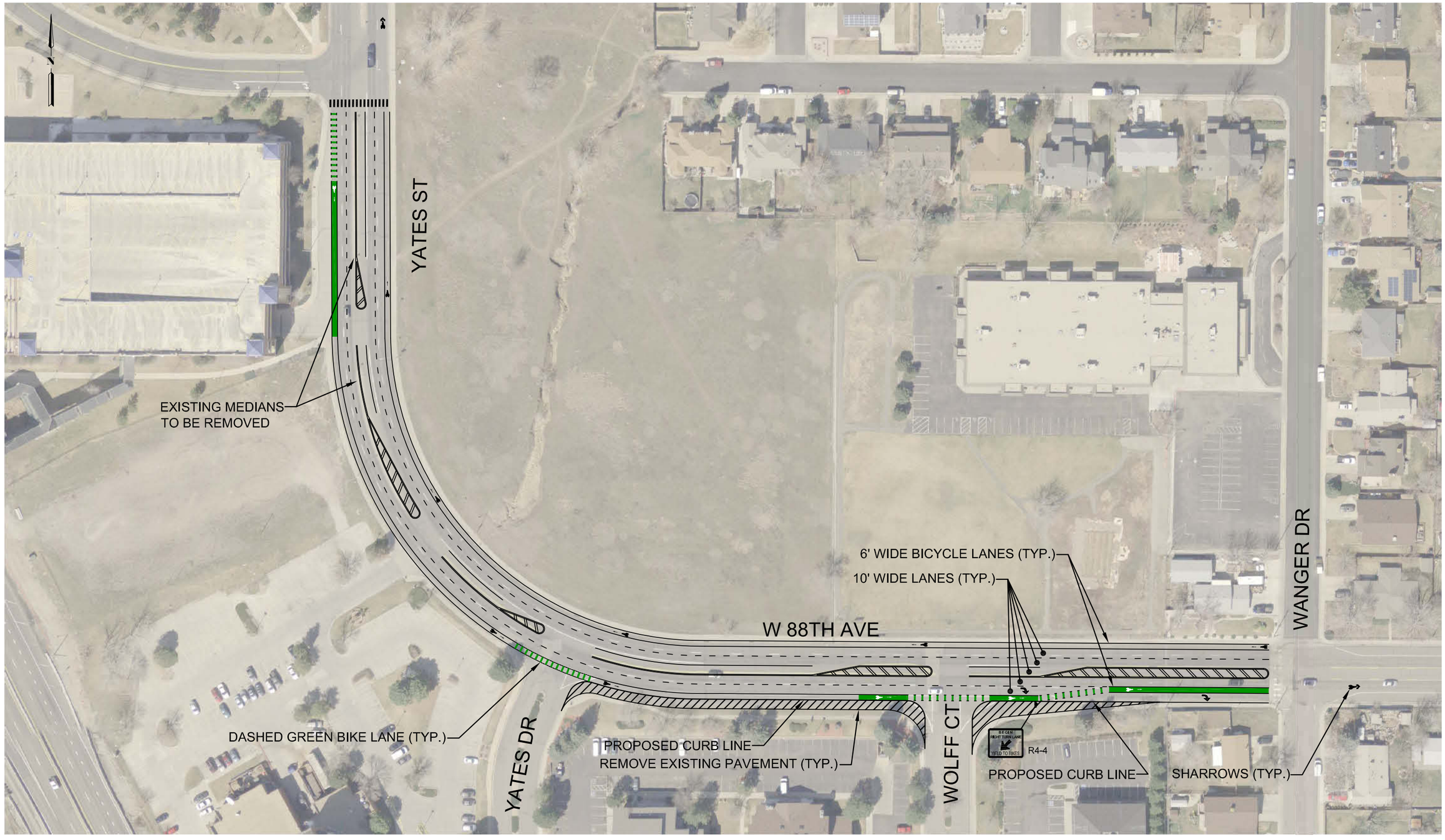
SHEET NUMBER
18 OF 24



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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DRAWN: AP
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DATE: NOV 2014

SHEET NAME:
US 36/WESTMINSTER CENTER STATION
1 OF 1

SHEET NUMBER
19 OF 24

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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DATE: NOV 2014

SHEET NAME:
WESTMINSTER RAIL STATION
1 OF 5

SHEET NUMBER
20 OF 24

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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: WESTMINSTER RAIL STATION 2 OF 5

SHEET NUMBER
21 OF 24

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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: WESTMINSTER RAIL STATION 3 OF 5

SHEET NUMBER
22 OF 24

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PEDESTRIAN AND BICYCLE CONNECTIVITY

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DESIGNED: JD
DRAWN: AP
CHECKED: JC
DATE: NOV 2014

SHEET NAME: WESTMINSTER RAIL STATION
4 OF 5

SHEET NUMBER
23 OF 24

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DESIGNED: JD
DRAWN: AP
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DATE: NOV 2014

SHEET NAME: WESTMINSTER RAIL STATION 5 OF 5

SHEET NUMBER
24 OF 24

Appendix C

Secure Bicycle Parking Technical Memorandum

TooleDesignGroup

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MEMORANDUM

Date: December 31, 2014

To: Denver Regional Council of Governments
Northwest Corridor Working Group

From: Toole Design Group

Project: Northwest Corridor Bicycle/Pedestrian Accessibility Study

Re: Secure Bicycle Parking Report and Conceptual Designs

Introduction

The state of Colorado and the Regional Transportation District (RTD), along with its local jurisdiction partners, have made significant transportation investments in the Northwest Corridor (the Corridor) in recent years. Along with the Colorado Department of Transportation (CDOT) US 36 Express Lanes Project, which includes the US 36 Bikeway, RTD is currently constructing two FasTracks projects in the corridor: the US 36 bus rapid transit (BRT) Line and a segment of the Northwest Rail Line (from Denver Union Station to Westminster Rail Station), both scheduled to open in 2016. Together, these transportation projects will improve multimodal mobility and access between Denver and Boulder and points in between.

In order to maximize investments that have been made in the Corridor, the Denver Regional Council of Governments (DRCOG), through its Sustainable Communities Initiative (SCI), hosts a partnership of Corridor public and private sector organizations whose goals include enhancing bicycle and pedestrian access and mobility within the first and last mile of new transit stations. The Northwest Corridor Bicycle/Pedestrian Accessibility Study (NW Corridor Study) is charged with the same goal. The project builds upon the 2013 US 36 First and Final Mile Study by 36 Commuting Solutions and advances the top priorities that were identified in that study.

This technical memorandum (memo) is a presentation of one of the six NW Corridor Study tasks: Secure Bicycle Parking. The memo includes a description of bicycle parking best practices, existing conditions, recommended site improvements, and implementation considerations. The memo also includes an attachment with conceptual design plans for each station location where secure bicycle parking is proposed.

Study Area

The study area for this project, shown in **Figure 1**, consists of the following seven transit stations:

- Table Mesa BRT Station
- McCaslin BRT Station
- Flatiron BRT Station
- Broomfield BRT Station
- Church Ranch BRT Station
- Westminster Center BRT Station
- Westminster Rail Station

These seven stations comprise the Northwest Corridor.

Scope of Work

The NW Corridor Study includes the conceptual design of secure bicycle parking at all Corridor stations. This memo, including the design package, provides recommendations for improvements that will offer access-controlled, high-capacity bicycle parking at the study area transit stations.

To complete this task, data was collected and analyzed from site visits and a stakeholder workshop. Additional data was provided by RTD, 36 Commuting Solutions, and Boulder County, including the following:

- DRCOG 2014 Web Mapping Service draft imagery
- Parcel data compiled from local City or County jurisdictions
- 2020 daily and AM peak boardings/alightings at US 36 BRT stations
- Preferred (previously-developed) site locations for secure bicycle parking facilities
- Electronic design drawings of existing Bus-Bike secure bicycle parking shelters
- Boulder County's Bus-Bike program design guidelines

The design for this task built upon the existing Bus-Bike secure bicycle parking shelters operated by Boulder County. During the data collection and information gathering phase, Boulder County was interviewed about their experience to date. The discussion focused on their overall design, layout, materials, and site locations.

The Project Team worked closely with local jurisdictions along the Corridor to identify the general design aesthetic for the proposed secure bicycle parking facilities. The key stakeholders and local jurisdictions included members of the Corridor Working Group (CWG): DRCOG, RTD, 36 Commuting Solutions, Adams County Housing Authority, City and County of Boulder, Town of Superior, City of Louisville, City and County of Broomfield, City of Westminster, and CDOT.

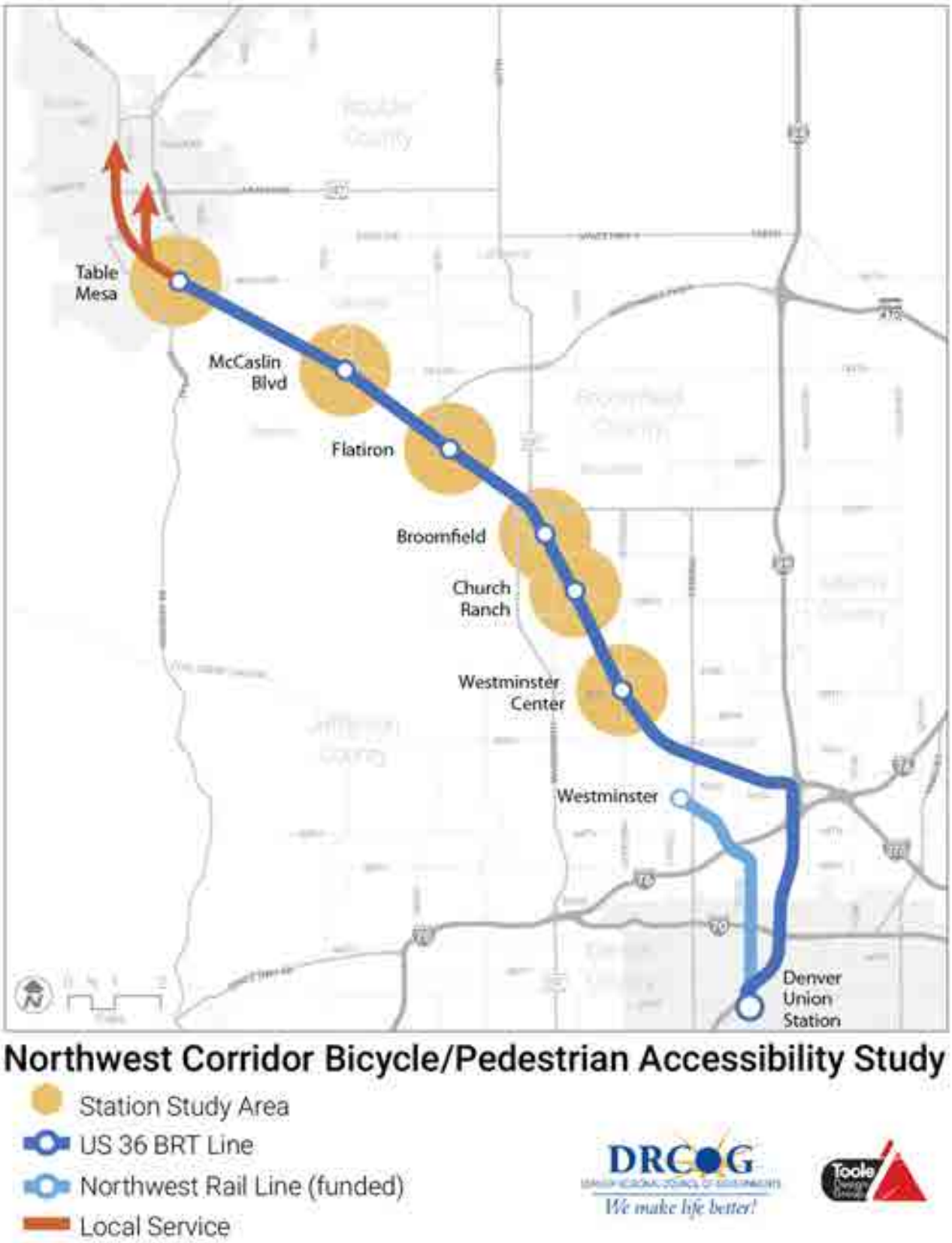

Figure 1: Location Map and Study Area

Summary of Bicycle Parking Best Practices

The Association of Pedestrian and Bicycle Professionals (APBP) published *Bicycle Parking Guidelines, 2nd Edition* in 2010. The document is only national guidelines for bicycle parking, and it includes guidance about quantities and siting considerations. The guidelines were used to inform the NW Corridor Study.

Principles

A bicycle parking space is an area where one bicycle can be safely stored and conveniently accessed while parked on a durable, stable, and slip-resistant surface.

Providing bicycle parking encourages people to bicycle for transportation, while providing additional site-specific benefits. Inadequate bicycle parking facilities and fear of theft are major deterrents to bicycle transportation; as such, users are more likely to use a bicycle for transportation purposes if they are confident that they will find convenient and secure bicycle parking at their destination.

From a site design perspective, allocating specific areas for high-capacity and secure bicycle parking provides an orderly appearance to a transit station. Providing designated bicycle parking areas will also deter bicyclists from locking their bicycles to various station amenities including benches, railings, or trees.

Secure Bicycle Parking

Around the country, bicyclists have expressed their desire for secure bicycle parking. A number of transit agencies, such as the Massachusetts Bay Transportation Authority (MBTA) and Bay Area Rapid Transit (BART), have added secure bicycle parking shelters to their menu of parking options.

The Denver region is no different. According to a recent RTD survey, 73 percent of respondents were either very or somewhat likely to use this type of bicycle parking. Secure bicycle parking provides a locked structure, safe from the elements, to store one's bicycle.

A 'Pedal & Park' access-controlled secure bicycle parking facility in Greater Boston, MA

Performance Criteria

The development of secure bicycle parking is only as good as the design, materials and effective implementation. The following performance criteria were used to develop designs for secure bicycle parking facilities for the study area locations:

- Aesthetics
- Capacity
- Cost
- Maintenance
- Materials
- Safety
- Security
- Space efficiency
- Usability

Facility Site Locations

Bicycle parking facilities should be located close to the route naturally taken by cyclists. The location should be visible, easily accessible, and a comfortable distance from the final destination. The recommended secure bicycle parking facility locations are shown in the conceptual site design plan set in **Attachment A**.

Summary of Existing Conditions

The communities along the Corridor include the City of Boulder, Town of Superior, City of Louisville, City and County of Broomfield, and City of Westminster. The BRT stations will be the future home of the Flatiron Flyer bus rapid transit service, providing 18 miles of BRT service from Boulder to Denver starting in 2016. Upon completion, the BRT system will provide express lane extensions, enhanced canopy shelters, ticket vending machines, programmable information displays, and real-time bus information.

The Westminster Rail Station is not located along US 36 or the BRT Line, but is included in the study area and formally part of the Northwest Corridor. When it opens in 2016, it will be the northern terminus of the Northwest Rail Line, a commuter rail line from Union Station in Downtown Denver. RTD plans to extend the line north from Westminster to Longmont in future years. The station will be located at approximately 71st Avenue and Hooker Street between Lowell Boulevard and Federal Boulevard in the City of Westminster.

The US 36 Bikeway, currently under construction, will provide access to and from US 36 BRT stations.

Existing Bicycle and Automobile Parking

Table 1 includes a summary of existing bicycle and automobile parking at each of the Corridor stations.

Table 1: Inventory of Existing Bicycle and Automobile Parking by Station

Station	Existing Bicycle Parking		Existing Vehicle Parking	
	Type	**Quantity**	**Type**	**Quantity**
Table Mesa	West side: U-racks, Bicycle trees East side: bicycle lockers, bicycle racks, bus-bike shelter	140	East side: structured	824
McCaslin	Inverted U-racks, bicycle lockers	48	Both sides: surface	466
Flatiron	Inverted U-racks	16	Both sides: surface	264
Broomfield	Inverted U-racks, bicycle lockers	24	West side: surface and structured	940
Church Ranch	Inverted U-racks, bicycle lockers	24	Both sides: surface	396
Westminster Center	Inverted U-racks, bicycle lockers	80	East side: structured West side: surface	1,310
Westminster Rail (under construction)	N/A	N/A	N/A	N/A

Table Mesa Station

The Table Mesa Station is located in the City of Boulder at the junction of US 36, Table Mesa Drive, and S Boulder Road. It is the northern terminus of the US 36 BRT project. A parking garage is located on the east side of US 36 and the RTD bus lane is located on the west side. A pedestrian bridge over US 36 connects the east and west sides. Currently, there are designated on-road bicycle facilities on Table Mesa Drive and an existing Bus-Bike secure bicycle parking facility on the east side.

The existing Bus-Bike access-controlled secure bicycle parking facility at Table Mesa WB BRT stop

McCaslin Station

The McCaslin Station is located in the City of Louisville to the east and Town of Superior to the west of US 36. A pedestrian bridge over US 36 connects the east- and west-side BRT stops. Existing surface parking lots provide parking for the station as well as adjacent commercial development. Currently, there are designated on-road bicycle facilities on McCaslin Boulevard.

Flatiron Station

The Flatiron Station is located in the City and County of Broomfield with BRT stops on both the east and west sides of US 36. A pedestrian tunnel under US 36 connects the east and west transit stops. Existing surface parking lots provide parking for the station, as well as to adjacent commercial development and the Flatiron Crossing Mall. Currently, there are designated on-road bicycle facilities on E Flatiron Crossing Drive and proposed on-road facilities for W Midway Boulevard.

Broomfield Station

The Broomfield Station is located in the City and County of Broomfield with BRT stops on the east and west sides of US 36. A pedestrian bridge over US 36 connects the east and west BRT stops. A combination of surface and garage parking is located on the west side including Arista, a mixed-use development, and the 1ST BANK Center, a multi-purpose arena. Parking on the east side is currently limited to one ADA accessible space and limited kiss-and-ride spaces. Currently, there are designated on-road bicycle facilities on Arista Place and Broomfield Lane, and planned on-road facilities for 116th Street and Commerce Street.

Church Ranch Station

The Church Ranch Station is located in the City of Westminster with BRT stops on the east and west sides of US 36. Promenade Drive and Promenade Drive S provide connections under US 36 to the east and west transit stops. Existing surface parking lots provide parking to access the station, as well as to adjacent commercial development. Currently, there are no designated on-road bicycle facilities to access the transit station.

Westminster Center Station

The Westminster Center Station is located in the City of Westminster with BRT stops on the east and west sides of US 36. A parking garage is located on the east side of US 36 and surface parking is provided on the west side. A pedestrian bridge over US 36 connects the east and west transit stops. Currently, there are no designated on-road bicycle facilities to access the transit station.

Westminster Rail Station

The Westminster Rail Station will be located in the City of Westminster and is currently under construction. The Westminster Rail Station will be located at approximately 71st Avenue and Hooker Street between Lowell Boulevard and Federal Boulevard in the City of Westminster. The vision for this station includes a vibrant, mixed-use district with a 40-acre community park for recreation activities and open space. A new street infrastructure network is planned to be phased in as growth dictates to provide circulation to the station platform and parking garage structure.

A proposed rendering of the future Westminster Rail Station
Source: City of Westminster

Recommended Site Improvements

Design Process

To kick-off the secure bicycle parking design process, a half-day workshop with the stakeholders was conducted. The purpose of the stakeholder workshop was to define the general aesthetic and regional consistencies for the secure bicycle parking facilities through a consensus-building and interactive process. The workshop established that the current Boulder County secure bicycle parking shelters will be the baseline for the design of the proposed facilities.

Stakeholder workshop to discuss the general design aesthetic and regional consistencies for secure bicycle parking

RTD and 36 Commuting Solutions provided their preliminary location study related to the site placement of the proposed secure bicycle parking facilities at each US 36 BRT station. This design memo, and the corresponding conceptual design package, is based on the recommendations of this previous effort. Deviations from the proposed locations are noted, where applicable.

The conceptual design for the NW Corridor Study was then based on high-resolution aerial photography from DRCOG (draft, dated 2014) and GIS data obtained from DRCOG and local jurisdictions.[1] The design process included:

- Site design and layout with regards to access and circulation, including guidance informed by the proposed BRT station platform design
- Recommended dimensions for the layout of bicycle rack elements and bicycle rack type
- A modular-sized bicycle shelter structure to demonstrate feasibility with conceptual designs evaluated from the manufacturers below:
    - DERO Bike Rack Company
    - Duo-Guard Industries Inc.
    - Urban Racks
    - Velodome Shelters

Attachment A includes conceptual plan drawings for each location, along with details for the proposed bicycle shelters.

[1] The City and County of Broomfield provided GIS data.

Bicycle Parking Industry Consultation

To gauge precedent for secure bicycle parking, consultation with leading manufacturers in the bicycle parking industry was conducted. A proof of concept for the initial secure bicycle parking structure was developed, discussed, and presented to manufacturers to demonstrate feasibility with the proposed design components. The analysis and discussions involved four manufacturers: Dero Bike Rack Company, Duo-Guard Industries Inc., Urban Racks, and Velodome Shelters.

The goals for secure bicycle parking were identified during the stakeholder workshop. These goals, along with performance criteria from the APBP *Bicycle Parking Guidelines, 2nd Edition, 2010*, were used to evaluate the various bicycle parking manufacturers consulted. The rating system shown in Table 2 is relative to the existing Boulder County Bus-Bike shelters. A 'better' rating meets or exceeds the desired performance criteria identified, relative to the Boulder County shelters. A 'worse' rating does not meet or is below the desired performance criteria identified, relative to the Boulder County shelters. **Table 2** shows a side-by-side comparison of the performance criteria identified and manufacturer proof of conceptual design. The criteria identified highlights the opportunities and barriers associated with each design concept as discussed in this report.

Table 2: Bicycle Parking Manufacturer Comparisons[2]

Manufacturer	Characteristics				
	Aesthetics	Capacity	Magnitude of Cost	Materials (Steel & Wire mesh)	Safety & Security
DERO Bike Rack Co.					
Duo-Guard Industries					
Urban Racks					
Velodome Shelters					

Better Worse

[2] Symbology for this table is represented in color.

The images below show sample aesthetics from each manufacturer.

Dero Bike Rack Company

Cycle Station
Source: Dero Bike Rack Company

Duo-Guard Industries

Sentry Shelter Model
Source: Duo-Guard Industries

Urban Racks

Parkiteer Shelter
Source: Urban Racks

Velodome Shelters

Guardian Shelter
Source: Velodome Shelters

Bicycle Parking Shelter Capacity

This section identifies the methodology used to determine the potential demand for secure bicycle parking at the stations. The demand numbers help determine the size of the shelters. Because the prefabricated shelters proposed are modular and can easily be added to over time, it is possible to respond to additional demand over time by expanding modular units or increasing the number of bicycle parking spaces with higher capacity bicycle rack elements. The following steps were taken to determine bicycle parking demand:

- Consultation with bicycle parking manufacturers confirming proof of concept regarding rack element layout and rack types
- RTD's anticipated 2020 daily and AM peak boardings/alightings for each station were reviewed and APBP *Bicycle Parking Guidelines, 2nd Edition* recommendations were applied[3]
- The APBP recommendations were compared to existing bicycle parking quantities, and the larger of the two numbers was used to categorize stations
- The recommended bicycle shelter sizes were then categorized into three sizes:
    - Low bike parking capacity (two rows of inverted-U racks) – 38 bike capacity
    - Standard bike parking capacity (one row of inverted-U racks and one row of double tier style racks) – 50 bike capacity
    - High bike parking capacity (two rows of double tier style racks) – 62 bike capacity

Based on this methodology, **Table 3** summarizes the initial recommendations for each station.

Table 3: Recommended Secure Bicycle Parking Capacity

Station	Recommended Shelter Capacity
Table Mesa	High
McCaslin	Standard
Flatiron	Low
Broomfield	Standard
Church Ranch	Low
Westminster Center	High
Westminster Rail	Standard

[3] The Guidelines recommend using a 5 percent bicycle parking rate for rail/bus terminals and stations/airports in areas with standard (not urbanized) density or areas with a between one and five percent commute mode share. Because the Corridor service area covers a mix of urbanized and suburban development intensities, and the Denver region's bicycle commute mode share was 2 percent in 2013, this approach was taken.

Conceptual Design Site Locations

The conceptual site plans are based on the DRCOG MapMart Cloud web mapping service (WMS) 2014 aerial imagery. The aerial imagery is not final and a current field survey was not completed as part of this project. The final secure bicycle parking shelter site locations shall be coordinated and approved by RTD or the identified property owner.

Table Mesa Station

With an existing Bus-Bike shelter on the westbound (WB) side of the Table Mesa BRT station, shelter design work focused on providing a shelter at the eastbound (EB) BRT stop. The following factors drove the preferred site location:

- Locating the shelter on RTD property
- Identifying a space that does not conflict with existing stormwater facilities adjacent to the existing concrete pad with bicycle parking
- Utilize the existing concrete pad to install the facility (if appropriate)
- A location that does not block the existing pathway or future US 36 Bikeway[4]
- Opportunities to relocate existing bicycle racks and bicycle tree parking
- A location close to the pedestrian bridge to serve east and WB BRT stops without transporting bicycles over the bridge
- A highly visible location

Preliminary Table Mesa EB secure bicycle parking facility photo simulation

The recommended site is located on existing concrete, which would require relocating or removing the western half of the existing bicycle parking (one row of inverted-U racks and one bicycle tree). The proposed site aligns with the previously recommended location.

McCaslin Station

The focus of the conceptual design was the EB BRT stop. The following factors drove the preferred site location:

- Locating the shelter on RTD property
- A highly visible location
- Minimal disturbance for the structural concrete pad installation
- Relocating landscape materials as needed
- Maintain existing Xcel Energy easement
- Providing connectivity to the future US 36 Bikeway

[4] At the time of this report, the US 36 Bikeway was under construction with an anticipated opening date as soon as 2015.

- Protecting existing above and below ground utilities

The recommended site is located in the landscaped median in between Center Drive and the accessible parking spaces. The previous recommended site was located where there are three existing automobile parking spaces. The revised proposed site aligns with the revised recommended location and maintains the existing Xcel Energy easement.

Preliminary McCaslin EB secure bicycle parking facility photo simulation

Westbound Side

When developing designs for this project, it was understood that a shelter at the WB BRT stop was already funded and being implemented by others, and part of a current construction project. As this project was being finalized, however, we learned that this shelter is in fact not included in the current construction project. The next step for this secure bicycle parking shelter requires further site analysis and evaluation to determine an adequate location.

Flatiron Station

Secure bicycle parking facilities are proposed for the stops on both sides of the station. With an accessible tunnel to reach both platforms without dismounting from a bicycle, it was assumed that users will park their bicycle at the closest facility to their departure platform. The following anticipated impacts and design considerations were considered for the preferred site locations:

Eastbound Side

- Locating the shelter on CDOT or City and County of Broomfield property
- A highly visible location (maximized sight lines of bicyclists using the US 36 Bikeway, and pedestrians)
- Minimal disturbance for the structural concrete pad installation (locating concrete pad immediately adjacent to new pad for platform)
- Relocating landscape materials (if appropriate)
- Providing connectivity to the future US 36 Bikeway
- Protecting existing above and below ground utilities

Preliminary Flatiron EB secure bicycle parking facility photo simulation

- Locating the shelter as to not conflict with the new layout of BRT platforms
- Minimize potential drainage impacts from bicycle shelter roof
- Locating the bicycle shelter outside heavy shade such that ice build-up would not impact adjacent US 36 Bikeway or pedestrian walkways

Westbound Side

- Locating the shelter on RTD property
- A highly visible location (maximized sight lines of bicyclists using the US 36 Bikeway, and pedestrians)
- Minimal disturbance for the structural concrete pad installation
- No disturbance of the existing retaining wall
- Protecting existing above and below ground utilities
- Locating the shelter as to not conflict with the new layout of BRT platforms
- Minimize potential drainage impacts from bicycle shelter roof
- Locating the bicycle shelter outside heavy shade such that ice build-up would not impact adjacent US 36 Bikeway or pedestrian walkways

Preliminary Flatiron WB secure bicycle parking facility photo simulation

The recommended site at the EB BRT stop is located in the existing landscaped area, northwest of the platform. The recommended site at the WB BRT stop is in the grass area at the termination of the existing sidewalk to the southeast of the existing parking lot. The proposed location was not previously identified as a recommended site; however, subsequent coordination with RTD and the City and County of Broomfield found that the proposed location met the site selection criteria.

Broomfield Station

Secure bicycle parking facilities are proposed for each BRT stop at this station. With an accessible bridge to reach both platforms and on-street bicycle facilities on both sides, it is assumed users will park their bicycle at the closest facility to their arrival BRT stop. The following anticipated impacts and design considerations were considered for the preferred site locations:

Eastbound Side

- Locating the shelter on RTD property
- A highly visible location (maximized sight lines of bicyclists using the US 36 Bikeway, and pedestrians)
- Minimal disturbance for the structural concrete pad installation
- Providing connectivity to the future US 36 Bikeway, Broomfield Lane and Arista Place on-street bicycle facilities

- Protecting existing above and below ground utilities
- Locating the shelter as to not conflict with the new layout of BRT platforms
- Maintain pedestrian circulation to/from local and regional bus service
- Maximize access to bicycle shelter from bicycle route
- Minimize potential drainage impacts from bicycle shelter roof
- Locating the bicycle shelter outside heavy shade such that ice build-up would not impact adjacent US 36 Bikeway or pedestrian walkways

Preliminary Broomfield EB secure bicycle parking facility photo simulation

Westbound Side

- Locating the shelter on RTD property
- A highly visible location
- Minimal disturbance for the structural concrete pad installation
- Providing connectivity to the future US 36 Bikeway, 116th Avenue and Commerce Street on-street bicycle facilities
- Maintaining access to the existing pedestrian bridge
- Limiting drainage and wetland impacts
- Protecting existing above and below ground utilities
- Locating the shelter as to not conflict with the new layout of BRT platforms
- Minimize potential drainage impacts from bicycle shelter roof
- Locating the bicycle shelter outside heavy shade such that ice build-up would not impact adjacent US 36 Bikeway or pedestrian walkways

Several locations were identified during the preliminary siting by others. The EB stop proposed site is located in the landscape area just north of the plaza space adjacent to the RTD bus way. The proposed location was not previously identified as a recommended site; however the proposed location meets the identified site selection criteria and is the result of coordination with RTD and the City and County of Broomfield.

The WB stop proposed site is in the location adjacent to the elevator and south of the pedestrian bridge. The previously recommended site location was located in the green space adjacent to the parking spaces; this site location may impact existing open drainage systems. Coordination with the City and County of

Preliminary Broomfield WB secure bicycle parking facility photo simulation

Broomfield and RTD has indicated that the proposed location meets the site selection criteria and could be less impactful than the previously recommended site at this BRT stop.

Preliminary Church Ranch EB secure bicycle parking facility photo simulation

Church Ranch Station

Secure bicycle parking facilities are proposed for each BRT stop at this station. The construction of the EB BRT stop is funded from CDOT Funding Advancements for Surface Transportation and Economic Recovery (FASTER) funds and the platform is being shifted from its originally planned location. The WB BRT stop is not affected by FASTER funding. The following anticipated impacts and design considerations were considered for the preferred site locations:

Eastbound Side

- Locating the shelter on CDOT property
- Platform relocation (further west)
- A highly visible location
- Minimal disturbance for the structural concrete pad installation
- Providing connectivity to the future US 36 Bikeway and relocated platform
- Protecting existing above and below ground utilities

Westbound Side

- Locating the shelter on CDOT property
- A highly visible location with adequate sight lines
- Limiting disturbance to platform for structural concrete pad installation
- Identifying a location off of the existing platform given the physical limitations of the platform
- Protecting existing above and below ground utilities

Preliminary Church Ranch WB secure bicycle parking facility photo simulation

Several locations were identified during the preliminary siting by others and no recommended location was identified. The EB station preferred site, developed during this project, is located adjacent to the proposed US 36 Bikeway west of the station

platform. The proposed location meets the identified site selection criteria. The WB station preferred site, developed during this project and finalized based on construction activities, is located at the intersection of Promenade Drive and Promenade Drive South, between the RTD bus way and existing sidewalk. The WB proposed location may need additional grading and retaining structures for implementation. The proposed location meets the identified site selection criteria.

Westminster Center Station

Secure bicycle parking facilities are proposed for each BRT stop at this station. With an accessible bridge to reach both platforms and access to bicycle facilities on both sides, it is assumed users will park their bicycle at the closest facility to their platform. The following anticipated impacts and design considerations were considered for the preferred site locations:

Preliminary Westminster Center EB secure bicycle parking facility photo simulation

Eastbound Side

- Locating the shelter on RTD property
- A highly visible location
- Relocating two accessible parking space (if necessary)
- Site location would require security approval from RTD
- Protecting existing above and below ground utilities

Westbound Side

- Locating the shelter on RTD property
- A highly visible location
- Maintain access to existing bicycle lockers and racks
- Maintain access to existing accessible walkway
- Limit disturbance for the structural concrete pad installation
- Relocating or removal of existing vegetation
- Protecting existing above and below ground utilities

The EB BRT stop recommended site is located where there are existing accessible automobile parking spaces. Additional bollards may be needed to provide increased protection from vehicles circulating in the adjacent parking lot. The WB BRT stop recommended site is located south of the existing bicycle lockers and racks.

Preliminary Westminster Center WB secure bicycle parking facility photo simulation

Both proposed sites align with the previously recommended locations.

Westminster Rail Station

Secure bicycle parking facilities are proposed for this future station. With anticipated transit-oriented development and access across the railway, it is assumed that a bicyclist will park in close proximity to the platform. A photo simulation of the proposed secure bicycle parking shelter was not developed as the majority of the Westminster Rail Station is under construction. The following anticipated impacts and design considerations were considered for the preferred site locations:

- Locating the shelter on RTD property
- A highly visible location
- Maintain access to existing accessible walkways
- Limit disturbance for the structural concrete pad installation
- Relocating or removal of existing vegetation
- Protecting existing above and below ground utilities

The Westminster Rail Station is currently under construction and no recommended location was previously identified. The proposed site is located adjacent to the North Plaza space in between the walkway and 69th Avenue.

Implementation Considerations

Bicycle Parking Prioritization

As a first step in developing a prioritization and phasing strategy, the demand for bicycle parking was estimated for each station, as previously discussed. The seven stations were grouped into three categories: those with a low parking demand, those with a standard demand, and those with a high demand. Other factors taken into consideration were ease of construction and related/concurrent projects. **Table 4** summarizes the recommended prioritization by station.

The construction phasing of the proposed shelter installations could be applied based on these categories. Other considerations that might make a location a higher priority would include available funding, public or political support, or a connection to a related project, such as bicycle improvements or transit-oriented development.

Table 4: Proposed Bicycle Shelter Prioritization

Station	Recommended Priority	Phasing Considerations
Table Mesa: EB side	High	Could be implemented within Boulder County system; existing on one WB side of Table Mesa. Relatively few impacts associated with construction.
Westminster Center: EB side	High	EB side is projected to have more boardings and alightings than WB side. Relatively few impacts associated with construction.
Westminster Center: WB side	High	Relatively few impacts may be associated with construction.
Westminster Rail	High	Could be constructed as part of existing station project. Relatively few impacts associated with construction.
Broomfield: EB side	Medium	EB side is projected to have more boardings and alightings than WB side.
Broomfield: WB side	Medium	Location has a number of site variables that could make construction difficult.
McCaslin: EB side	Medium	Explore potential for City funding similar to WB site location.
Flatiron: WB side	Medium-Low	WB side is projected to have more boardings and alightings than EB side.
Flatiron: EB side	Medium-Low	Relatively moderate impacts may be associated with construction.
Church Ranch: WB side	Low	WB side is projected to have more boardings and alightings than EB side. Location has a number of variables that could make construction difficult.
Church Ranch: EB side	Low	Location has a number of variables that could make construction difficult.

Opinion of Probable Costs

Based on the recommended 19'x26' secure bicycle shelter structures, the industry budget range for this size is approximately $35,500 to $90,000 per shelter.[5] The lower end of this budget range would satisfy the desired look, feel, and functionality of the secure bicycle parking facilities identified for the Corridor. The higher end would allow for higher-quality materials, such as stainless steel. This budget accounts for facility warranty, engineered stamped drawings, a steel enclosed structure with wire mesh and secure doors, bicycle rack components and the construction fee to install the shelter. This budget range does not cover the shipping, structural concrete pad, electrical requirements, geotechnical/technical survey, extended warranty or ongoing maintenance, delivery, or an access-control system. A further detailed cost estimate has been developed in Table 5 to reflect the costs associated with the proposed secure bicycle parking shelters.

A similar facility considered a benchmark in the region is the Boulder County Bus-Bike shelters. The existing Bus-Bike facilities were approximately $36,500 per shelter structure in 2012.[6] In 2014, a further inquiry and investigation into a similar secure bicycle parking facility by the CWG revealed an approximate increase in cost to $66,500 per shelter structure. The estimated cost was provided by a bicycle parking manufacturer.

Additional administrative or internal costs associated with the proposed bicycle parking facilities would include: key card access-controlled software; end user support maintenance/repair; and server hardware. These lifecycle costs could be upwards of approximately $40,000 for initial system-wide start-up. Additional annual maintenance costs per year should also be factored in; they may include utilities, cleaning, and miscellaneous repairs totaling approximately $2,000 per year. These numbers are based on information from Boulder County as well as industry standards.

Based on costs received from parking manufactures, cost estimates for the various Corridor bicycle shelter sizes are shown in **Table 5**.

[5] Based on an average range of costs received from bicycle parking manufacturers.

[6] The cost for the Boulder County shelters is higher than the current cost estimates. This could be due to a number of factors including a discount associated with installing/constructing many shelters at once.

Table 5: Proposed Bicycle Shelter Approximate Costs

Secure Bicycle Shelter: Low Capacity			
Item Description	**Quantity**	**Unit Cost**	**Cost**
Bicycle Shelter Structure	1	$35,500	$35,500
Structural Concrete Pad	1	$15,000	$15,000
Geotechnical/Technical Survey	1	$1,500	$1,500
Bicycle Rack Components			
Inverted-U rack	18	$90	$1,620
Bicycle repair station	1	$1,400	$1,400
Oversized parking area	1	$90	$90
Signage materials	1	$2,500	$2,500
Lighting LED	4	$250	$1,000
System communications network	1	$2,000	$2,000
Installation and Shipping	1	$3,500	$3,500
Subtotal			$65,000
15% Contingency			$9,800
		Total Cost:	$74,800
Secure Bicycle Shelter: Standard Capacity			
Item Description	**Quantity**	**Unit Cost**	**Cost**
Bicycle Shelter Structure	1	$35,500	$35,500
Structural Concrete Pad	1	$15,000	$15,000
Geotechnical/Technical Survey	1	$1,500	$1,500
Bicycle Rack Components			
Static double-tier rack	3	$1,200	$3,600
Inverted-U rack	18	$90	$1,620
Bicycle repair station	1	$1,400	$1,400
Oversized parking area	1	$90	$90
Signage materials	1	$2,500	$2,500
Lighting LED	4	$250	$1,000
System communications network	1	$2,000	$2,000
Installation and Shipping	1	$3,500	$3,500
Subtotal			$68,000
15% Contingency			$10,200
		Total Cost:	$78,200

Secure Bicycle Shelter: High Capacity			
Item Description	**Quantity**	**Unit Cost**	**Cost**
Bicycle Shelter Structure	1	$35,500	$35,500
Structural Concrete Pad	1	$15,000	$15,000
Geotechnical/Technical Survey	1	$1,500	$1,500
Bicycle Rack Components			
Static double-tier rack	6	$1,200	$7,200
Bicycle repair station	1	$1,400	$1,400
Oversized parking area	1	$90	$90
Signage materials	1	$2,500	$2,500
Lighting LED	4	$250	$1,000
System communications network	1	$2,000	$2,000
Installation and Shipping	1	$3,500	$3,500
Subtotal			$70,000
15% Contingency			$11,000
		Total Cost:	$81,000

The probable costs serve as a guideline that can be refined based on the final site locations, desired bicycle parking spaces, and structural and geotechnical engineering for each shelter.

Branding and Wayfinding Strategies

The use of consistent and notable branding and the installation of wayfinding signing will help to maximize non-motorized access between the transit stations and surrounding destinations. The branding and wayfinding for the secure bicycle parking facilities should provide station orientation, identification, and information for the users.

Currently, the Boulder County shelters have a distinct look and name. While this branding appears to be effective, the CWG is interested in branding specific to the Corridor. To that end, a separate task of this project focused on developing Corridor branding and recommendations for wayfinding signage. A summary of the proposed treatments for secure bicycle parking shelters have been provided in this memo.

A branding image developed for the existing Bus-Bike shelters
Source: Boulder County

Branding integrated into the secure bicycle parking facilities should include:

- Specific colors for each secure bicycle parking facility
- Specific typeface or fonts
- Specific icons and shapes

The wayfinding recommendations integrated into the secure bicycle parking facilities should be developed to assist the user with:

- Guiding users between BRT stations and surrounding community destinations
- Identifying routes to existing bicycle infrastructure

Recommended Branding

During this project process, the CWG recommended the branding depicted below for use at the Corridor stations, within the station areas, and along the US 36 Bikeway. The branding could be applied to the secure bicycle parking shelters and at other bicycle parking facilities, as shown below. Wayfinding components of the secure bicycle parking facilities should include a parking beacon (illuminated, if possible), bicycle parking access information, and a pedestrian/bicycle area map delineating key area destinations and bicycle routes.

Preliminary branding schematic design for secure bicycle parking shelter
Source: Cloud Gehshan Associates
Note: image for illustration purposes only. Details of the Bike-n-Ride branding can be found in Appendix A of the Northwest Corridor Bicycle and Pedestrian Accessibility Study Summary Report.

Naming

During the project process, the CWG recommended that the name used for the secure bicycle parking shelters should be Bike-n-Ride. For example, the McCaslin Bike-n-Ride would be located at the McCaslin BRT Station. This naming convention was desired due to its alignment with other RTD transit terminology (Park-n-Ride, Call-n-Ride, etc.), its clarity, and its applicability to various types of transit (as opposed to the existing Boulder Bus-Bike naming).

Maintenance and Operations Strategies

Maintenance

The need for maintenance is predicated on the shelter conditions throughout its useful life; in other words, the shelters should never be in a state of disrepair. The secure bicycle parking facility must function and look appealing to enhance the overall use and performance of the facility.

A structured maintenance approach must be implemented to ensure proper functioning of the bicycle parking facility. These maintenance techniques should include:

- Cleaning - The facility should be swept for debris with a layout conducive for this. Trash receptacles should also be placed in close proximity to the facility to reduce the amount of debris at the shelter. Power-washing or other methods of cleaning the shelter and racks should also be considered to remove debris, chain oil, etc.
- Prevention - Areas not designated for bicycle parking should be signed as such to curtail illegal bicycle parking. In addition, educational signage as to how to use the secure bicycle parking facility may in preventative maintenance as well.
- Removal of abandoned bicycles - Stickers or other notices can be attached to parked bicycles that appear to be abandoned. These notices can indicate a date when the bicycle will be removed by the facility operator if not removed by the owner.

Operations

A number of operational considerations must be addressed as the design and implementation of the shelters advances. At the conceptual design stage, operations are typically not addressed in detail; however, it is good practice to begin planning for these elements as soon as possible. The main considerations include:

- Customer service - The interface that customers experience while creating an account or getting information about the shelters is critical to their success.[7] 36 Commuting Solutions has expressed an interest in potentially providing or managing this role for the Corridor. More discussion about this role is recommended.
- Information technology - the technology used to operate the shelters, including how customers access the shelters, should be considered as early as possible. Ideally, access to the shelters would be provided by a smart card. Conversations with RTD and other Corridor partners need to occur to advance this decision.

[7] Two examples include: https://www.mbta.com/riding_the_t/bikes/register/Default.asp and http://www.bouldercounty.org/roads/transit/pages/finalmileproject.aspx

To assist with associated costs of maintenance and operations, alternate financing could be considered. Financial models may include:

- Membership fees - A nominal monthly or annual fee could be considered for users.
- Sponsorships - Partnering with corporate sponsors for naming rights, similar to many bicycle share stations around the country.
- Advertising - Partner with advertising companies for the right to install displays or other advertising on, in, or around the shelter, similar to bus shelters.

Advertising

RTD currently has a transit advertising policy which includes available advertising for bus interiors, bus exteriors, light rail interiors, fully wrapped buses or light rail trains, 16th Street Mall Shuttle exteriors, and signature ads. The RTD policy could potentially be revised to include the Bike-n-Ride structures. Secure bicycle parking facilities provide a public good and as such are not typically financially self-sustaining and require lifecycle costs. Consideration should be given to permit advertising or sponsorship on the proposed secure bike parking shelters or bus shelters to enhance the long-term viability of the secure bicycle parking facilities.

An example of a bicycle parking facility that includes advertising is the McDonald's Cycle Center in Chicago, IL. Managed by the Chicago Department of Transportation, this indoor bike station provides lockers, showers, a snack bar with patron seating, bicycle repair, bicycle rentals and bicycle parking spaces. The final design construction cost totaled approximately $3 million and was funded through federal grants from the Federal Highway Administration and Federal Transit Administration. The original name of the facility was Millennium Park Bike Station, however the Chicago Department of Transportation received a $5 million grant from McDonald's to underwrite the operations of the McDonald's Cycle Station for a term of 50 years.

Next Steps

As a short-term next step, the organizations with property or other jurisdictional controls over the station sites, such as RTD, local jurisdictions, and 36 Commuting Solutions, should engage in a conversation about roles and responsibilities associated with the bicycle shelters operations and maintenance. The end result could be an intergovernmental agreement about these aspects of the shelters.

Attachment A

Conceptual Design Plans

Appendix C

Attachment A: Secure Bicycle Parking

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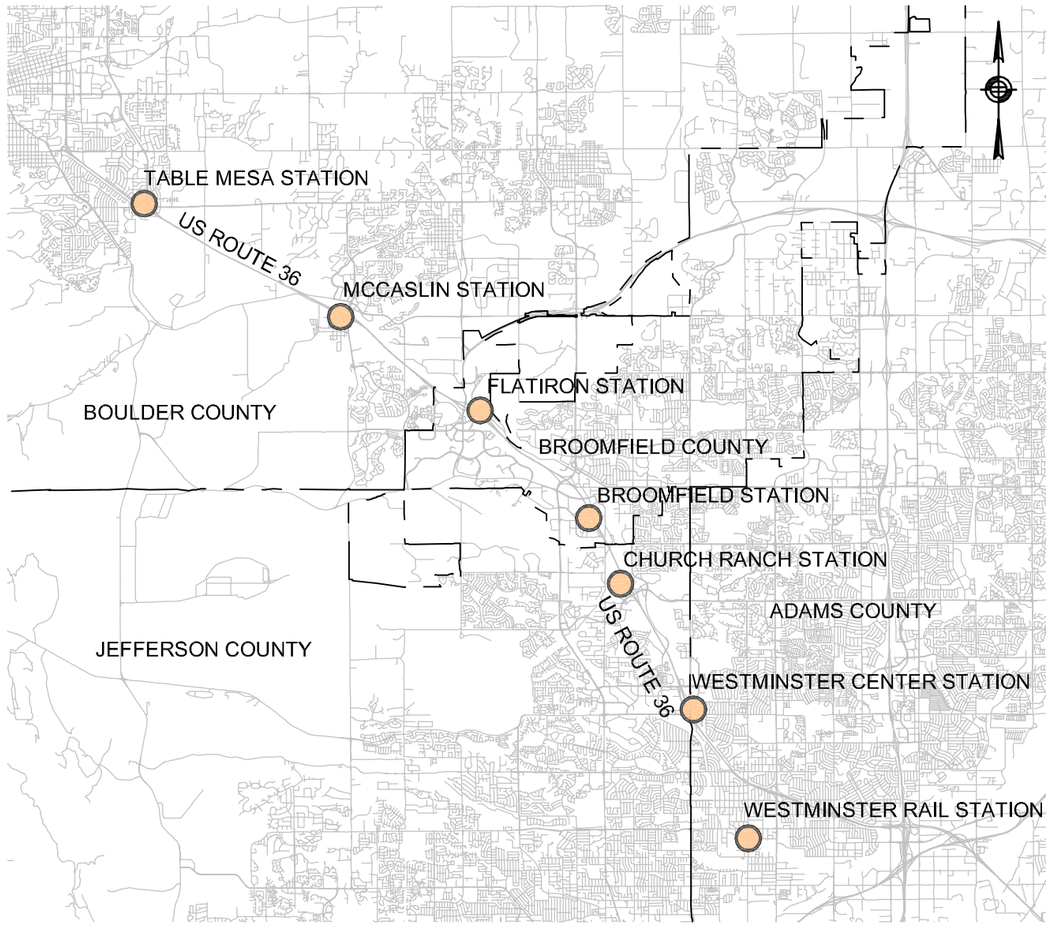
NORTHWEST CORRIDOR BICYCLE AND PEDESTRIAN ACCESSIBILITY STUDY
SECURE BICYCLE PARKING

INDEX



LOCATION MAP
N.T.S

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NORTHWEST CORRIDOR BICYCLE AND PEDESTRIAN STUDY
SECURE BICYCLE PARKING CONCEPTUAL DESIGNS

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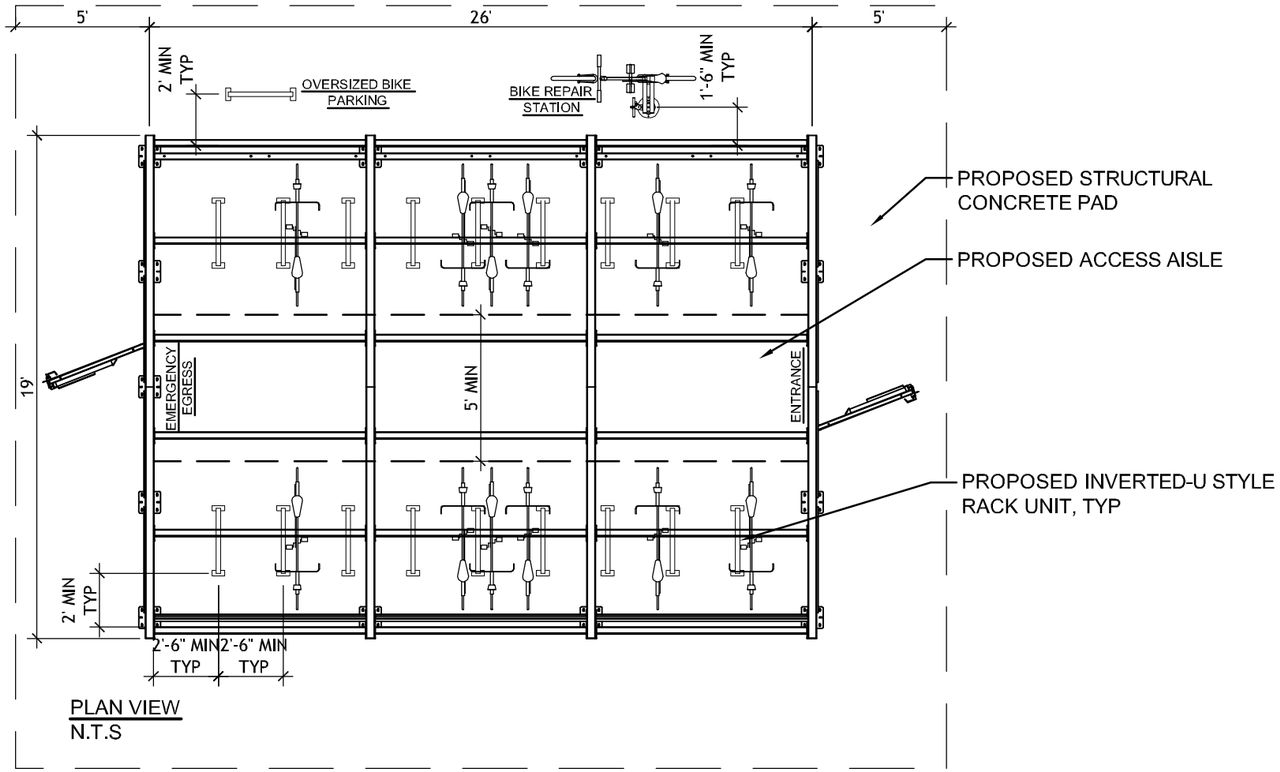

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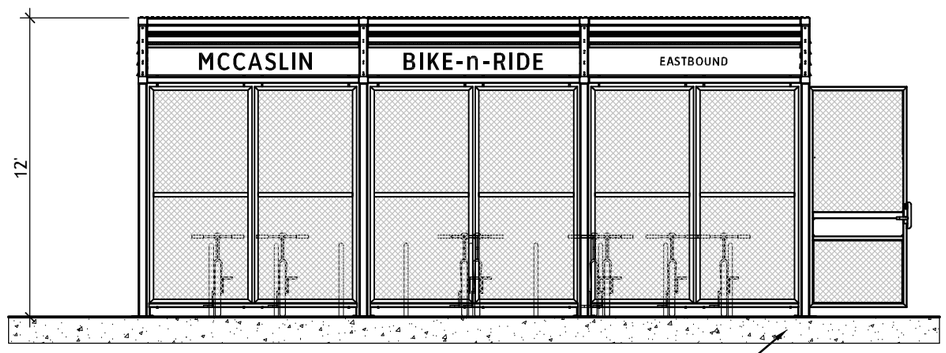

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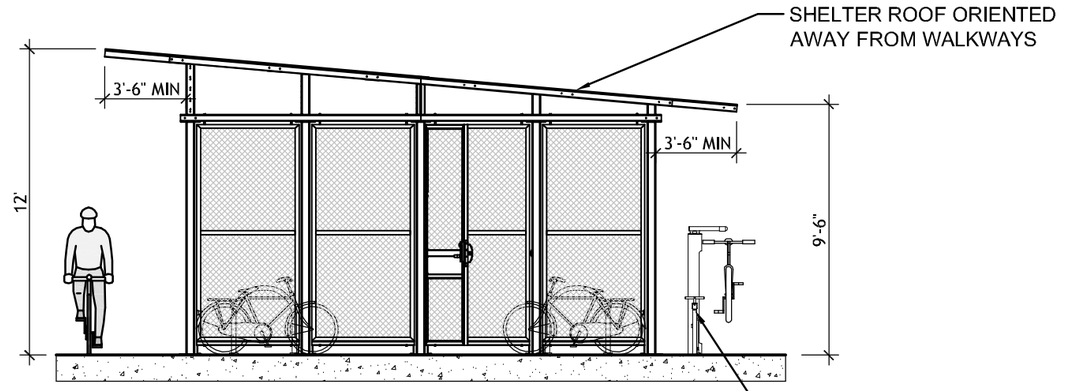

SIDE ELEVATION
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SECURE BIKE SHELTER- LOW CAPACITY:

- Bike Shelter
- Inverted-U style racks
- Oversized bike parking area
- Bike repair station

Inverted-U style racks: 18 units
Bicycle Capacity: 2 spaces per rack unit, 36 total spaces

Bike Repair Station: 1 unit
Oversized Parking: 1 unit, 2 total spaces

Cost per Bike shelter: $35,500
Cost per Inverted-U rack: $90
Cost per Bike Repair Station: $1,400
Cost per Oversized Parking: $90

Total Bicycle Capacity: 38
Total Estimated Cost: $39,000

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NORTHWEST CORRIDOR BICYCLE AND PEDESTRIAN STUDY
SECURE BICYCLE PARKING CONCEPTUAL DESIGNS

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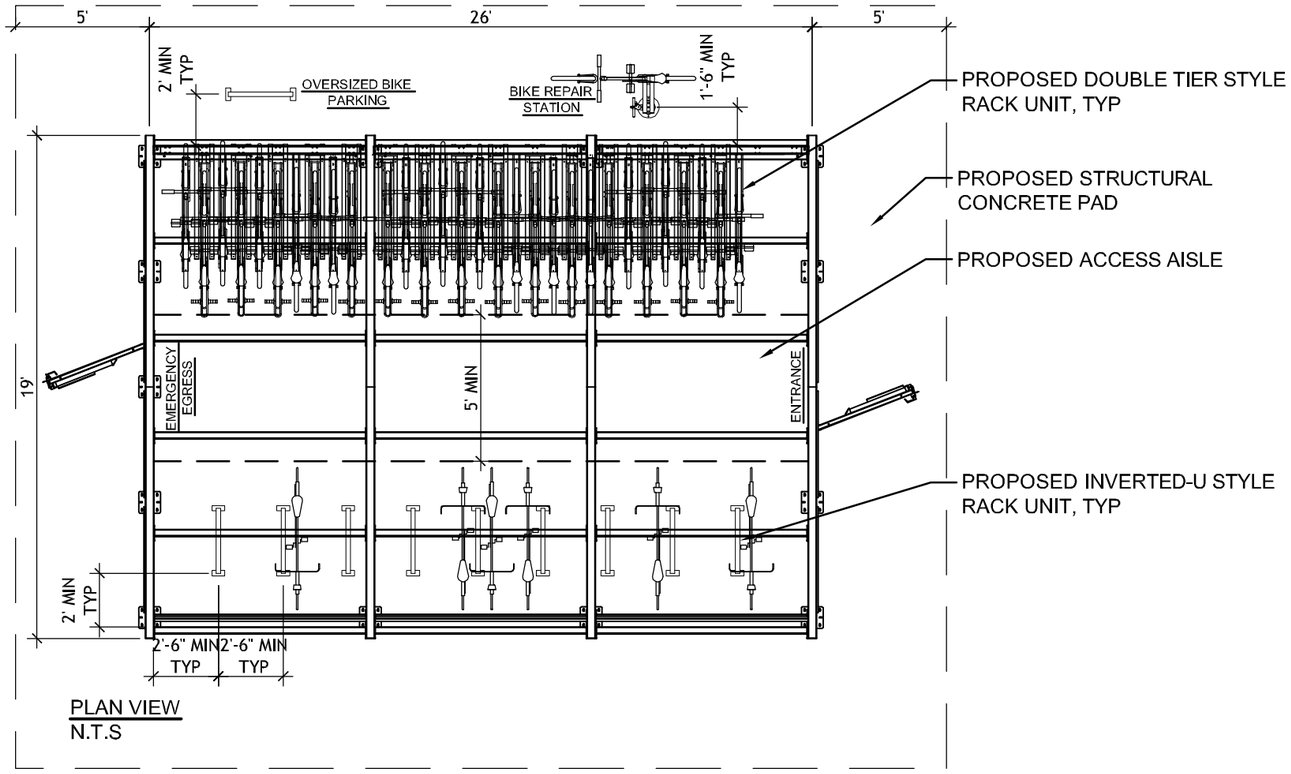


PLAN VIEW
N.T.S

SECURE BIKE SHELTER- STANDARD CAPACITY:

- Bike shelter
- Static double-decker style racks
- Inverted-U style racks
- Oversized bike parking area
- Bike repair station

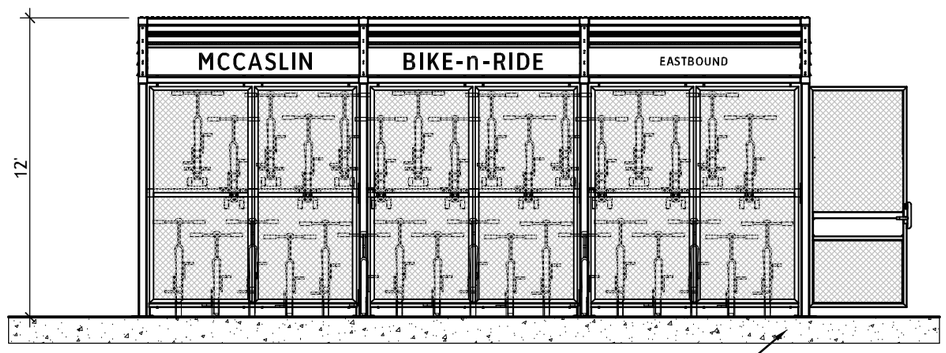
Double-decker style racks: 3 units
Bicycle Capacity: 30 spaces

Inverted-U style racks: 9 units
Bicycle Capacity: 2 spaces per rack unit, 18 total spaces

Bike Repair Station: 1 unit
Oversized Parking: 1 unit, 2 total spaces

Cost per Bike shelter: $35,500
Cost per static double tier style rack: $1,200
Cost per Inverted-U rack: $90
Cost per Bike Repair Station: $1,400
Cost per Oversized Parking: $90

Total Bicycle Capacity: 50
Total Approximate Cost: $42,000



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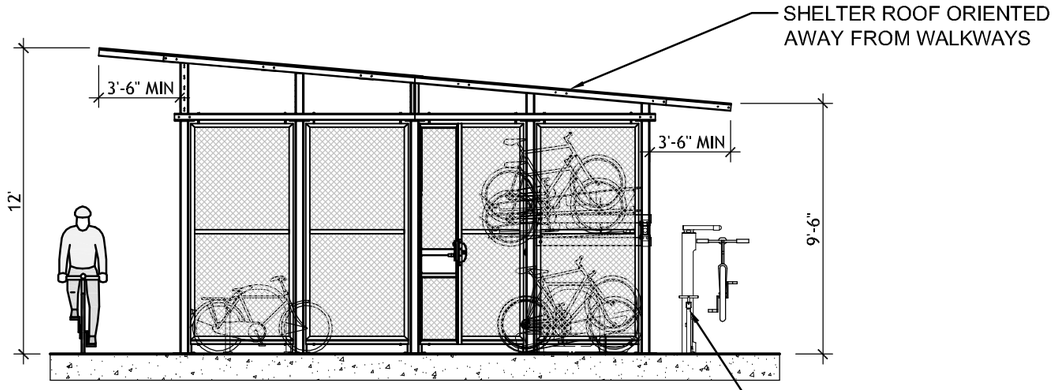

SIDE ELEVATION
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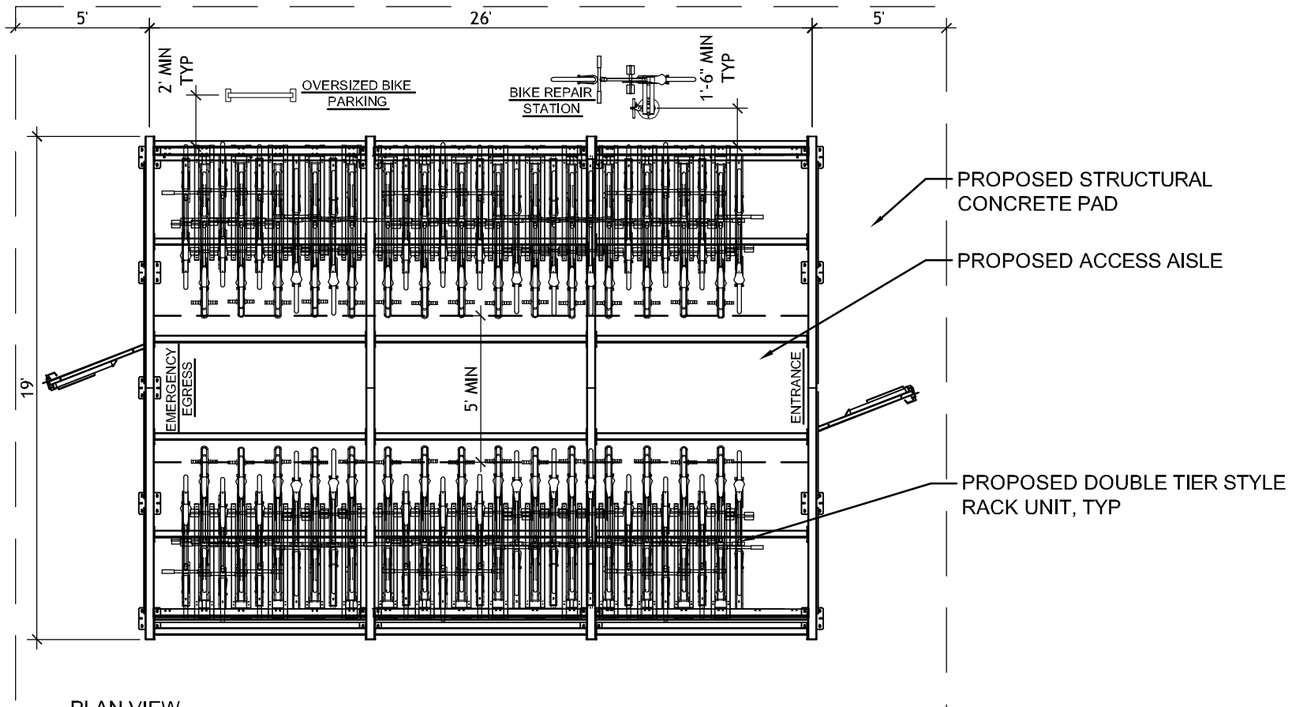

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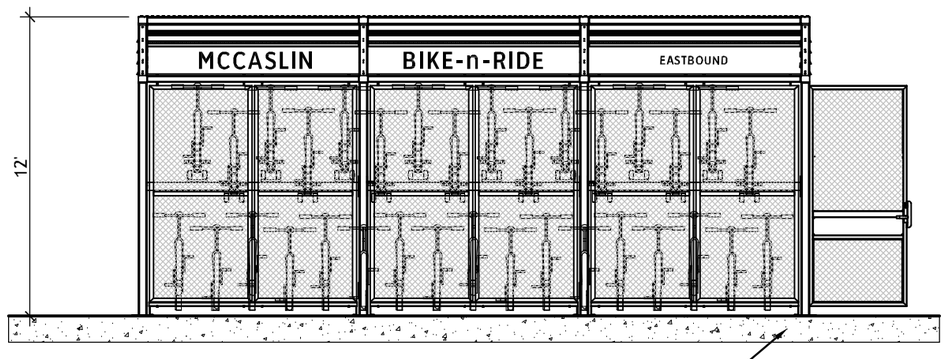

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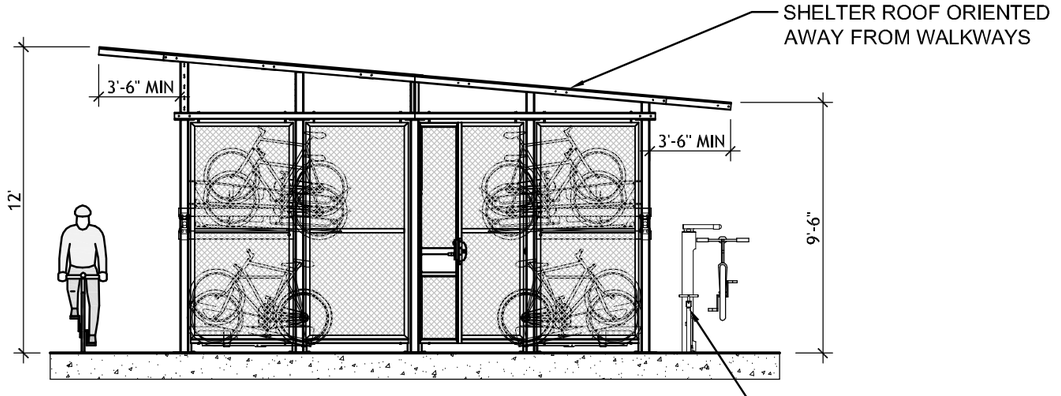

SIDE ELEVATION
N.T.S

SECURE BIKE SHELTER- HIGH CAPACITY:

- Bike shelter
- Static double-decker style racks
- Oversized bike parking area
- Bike repair station

Double-decker style racks: 6 units
Bicycle Capacity: 60 spaces

Bike Repair Station: 1 unit
Oversized Parking: 1 unit, 2 total spaces

Cost per Bike shelter: $35,500
Cost per static double tier style rack: $1,200
Cost per Inverted-U rack: $90
Cost per Bike Repair Station: $1,400
Cost per Oversized Parking: $90

Total Bicycle Capacity: 62
Total Approximate Cost: $46,000

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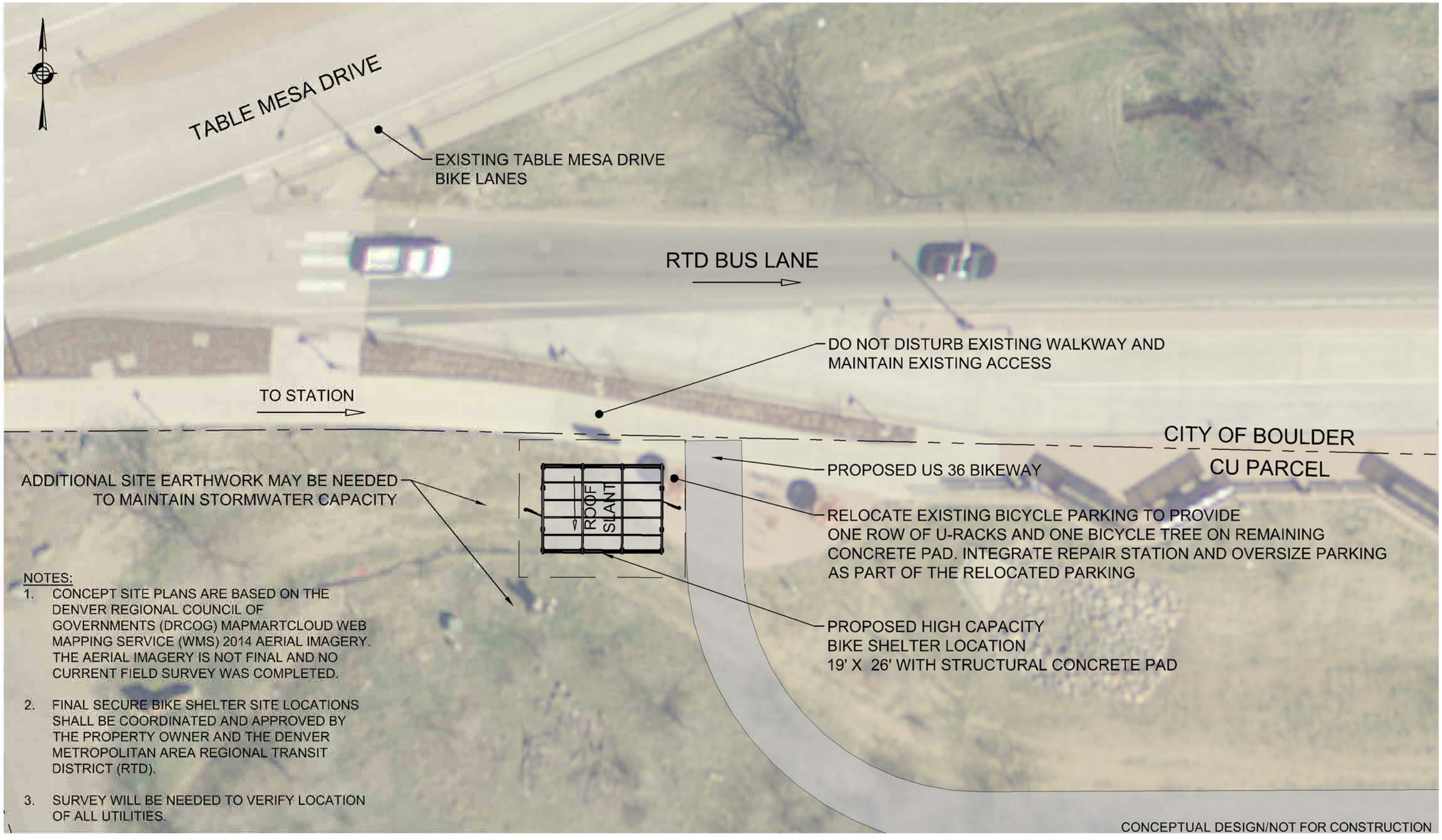

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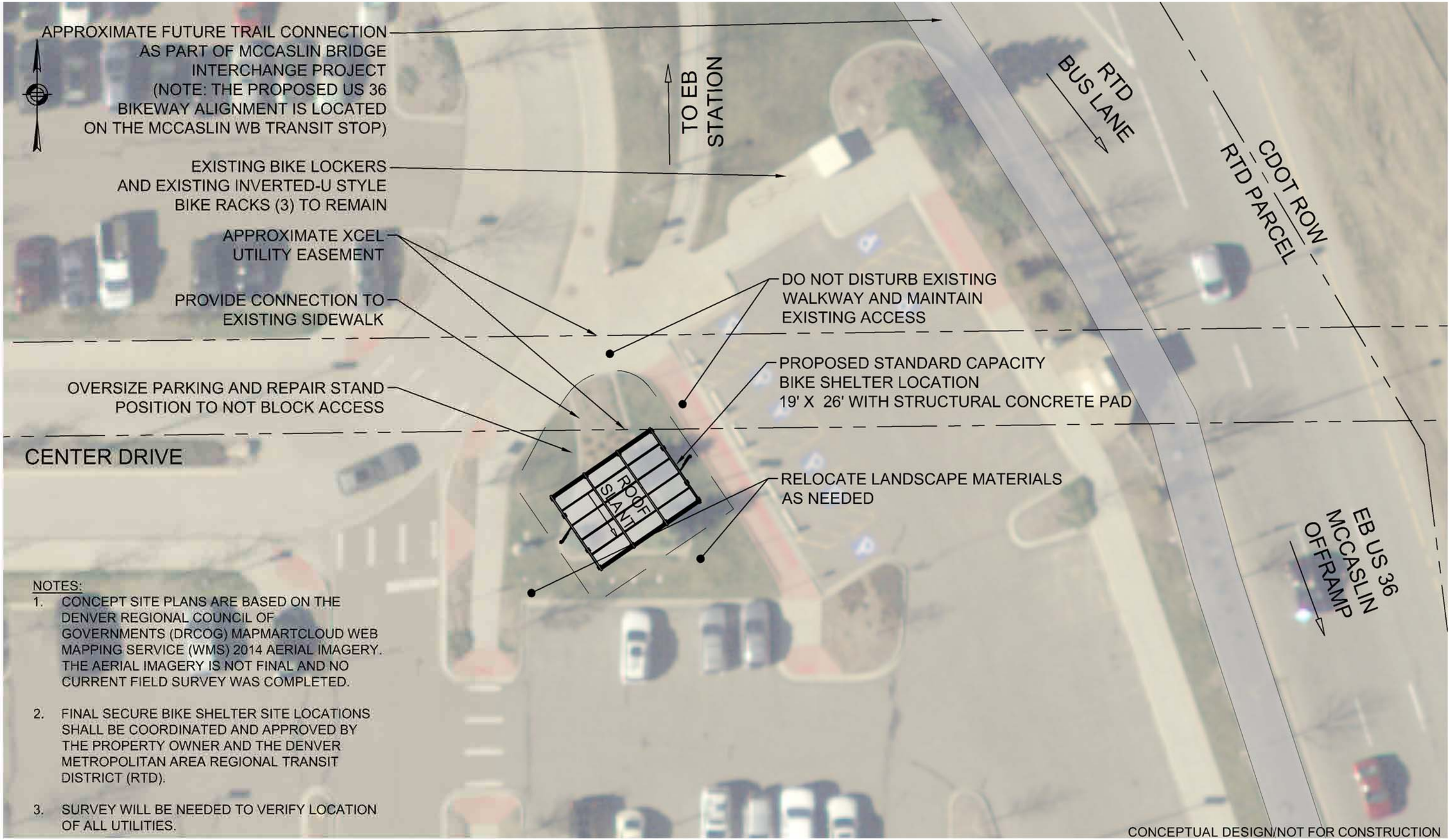

NOTES:

1. CONCEPT SITE PLANS ARE BASED ON THE DENVER REGIONAL COUNCIL OF GOVERNMENTS (DRCOG) MAPMARTCLOUD WEB MAPPING SERVICE (WMS) 2014 AERIAL IMAGERY. THE AERIAL IMAGERY IS NOT FINAL AND NO CURRENT FIELD SURVEY WAS COMPLETED.
2. FINAL SECURE BIKE SHELTER SITE LOCATIONS SHALL BE COORDINATED AND APPROVED BY THE PROPERTY OWNER AND THE DENVER METROPOLITAN AREA REGIONAL TRANSIT DISTRICT (RTD).
3. SURVEY WILL BE NEEDED TO VERIFY LOCATION OF ALL UTILITIES.

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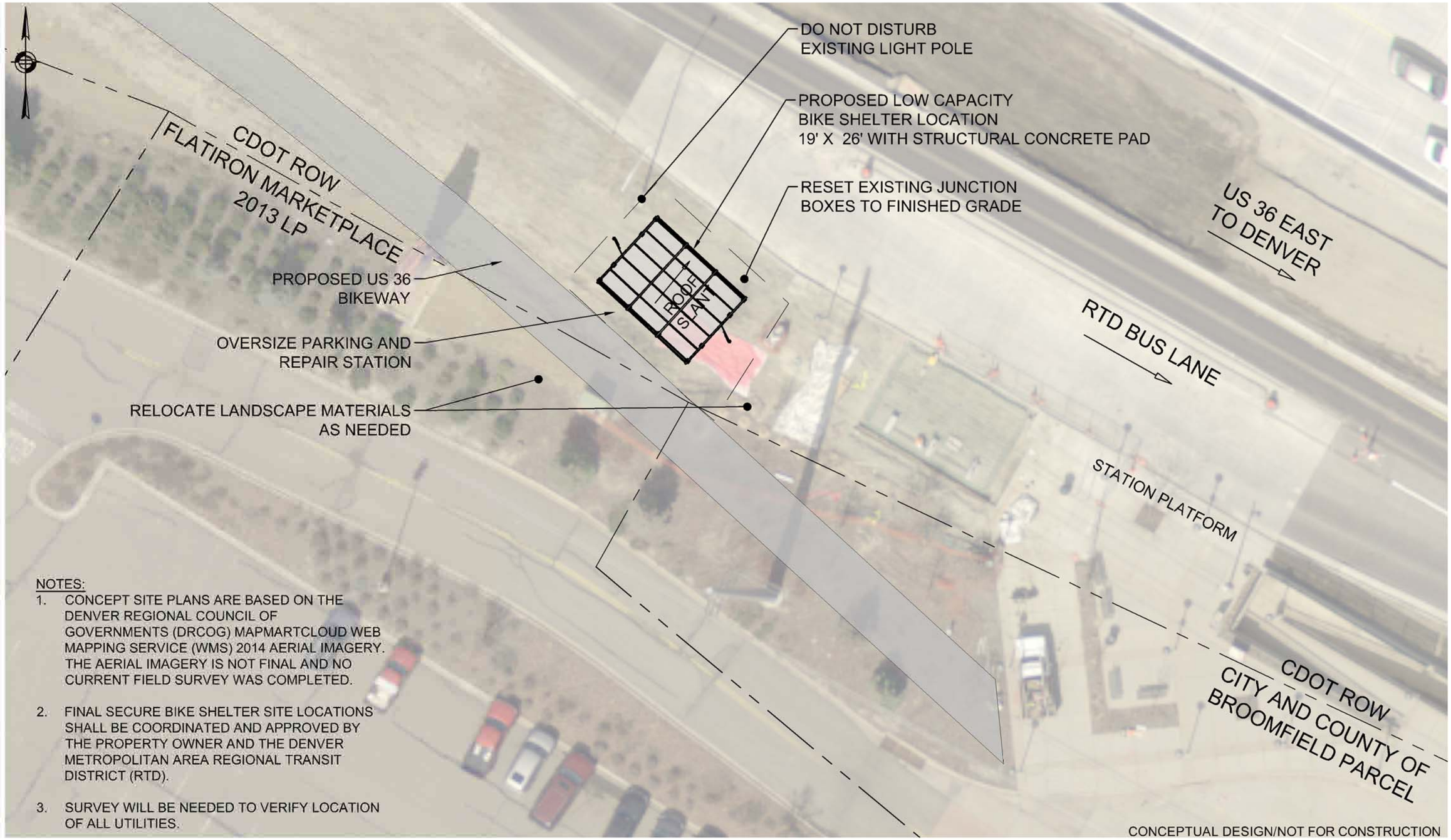

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3. SURVEY WILL BE NEEDED TO VERIFY LOCATION OF ALL UTILITIES.

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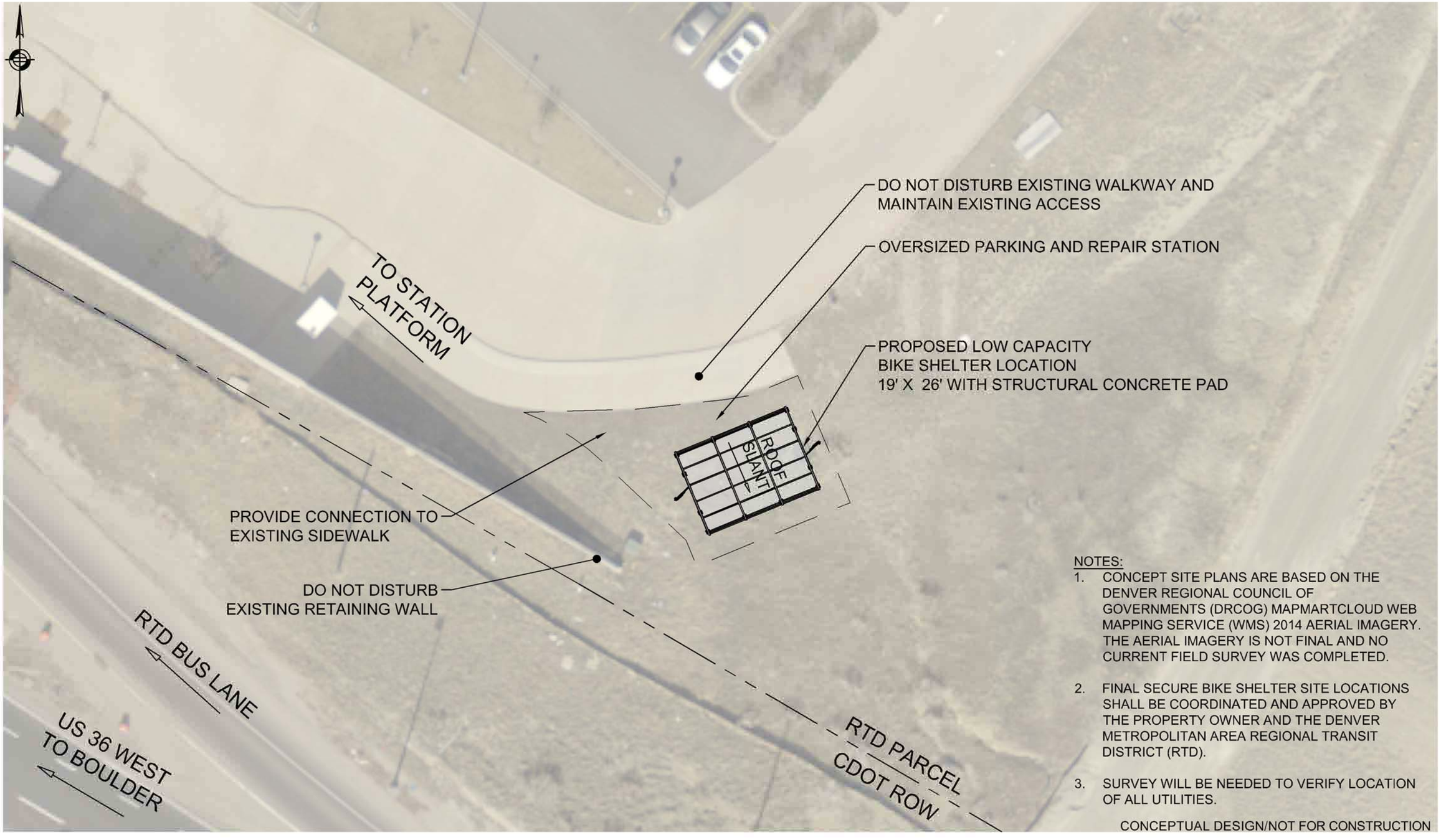

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3. SURVEY WILL BE NEEDED TO VERIFY LOCATION OF ALL UTILITIES.

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NORTHWEST CORRIDOR BICYCLE AND PEDESTRIAN STUDY
SECURE BICYCLE PARKING CONCEPTUAL DESIGNS

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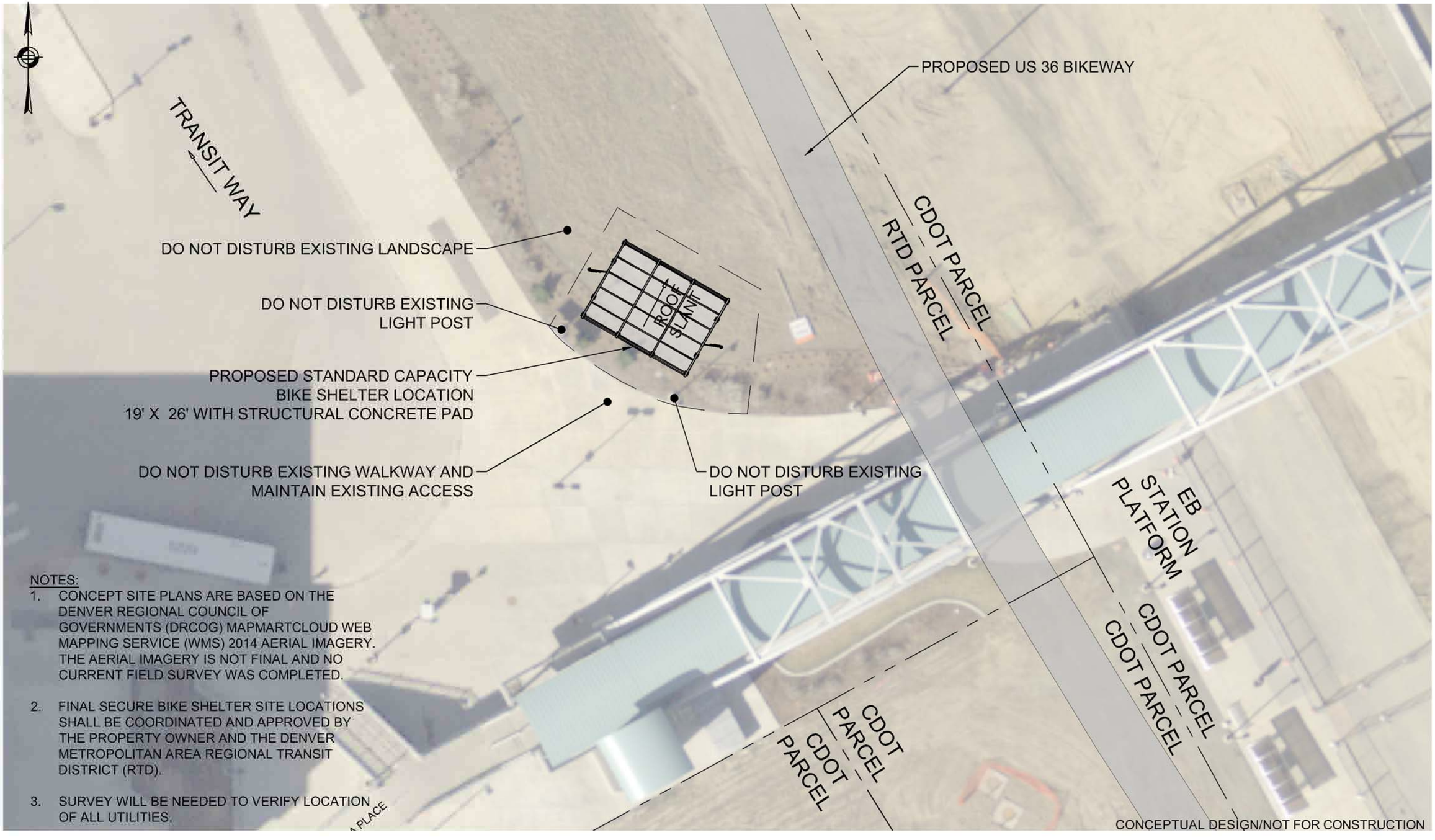

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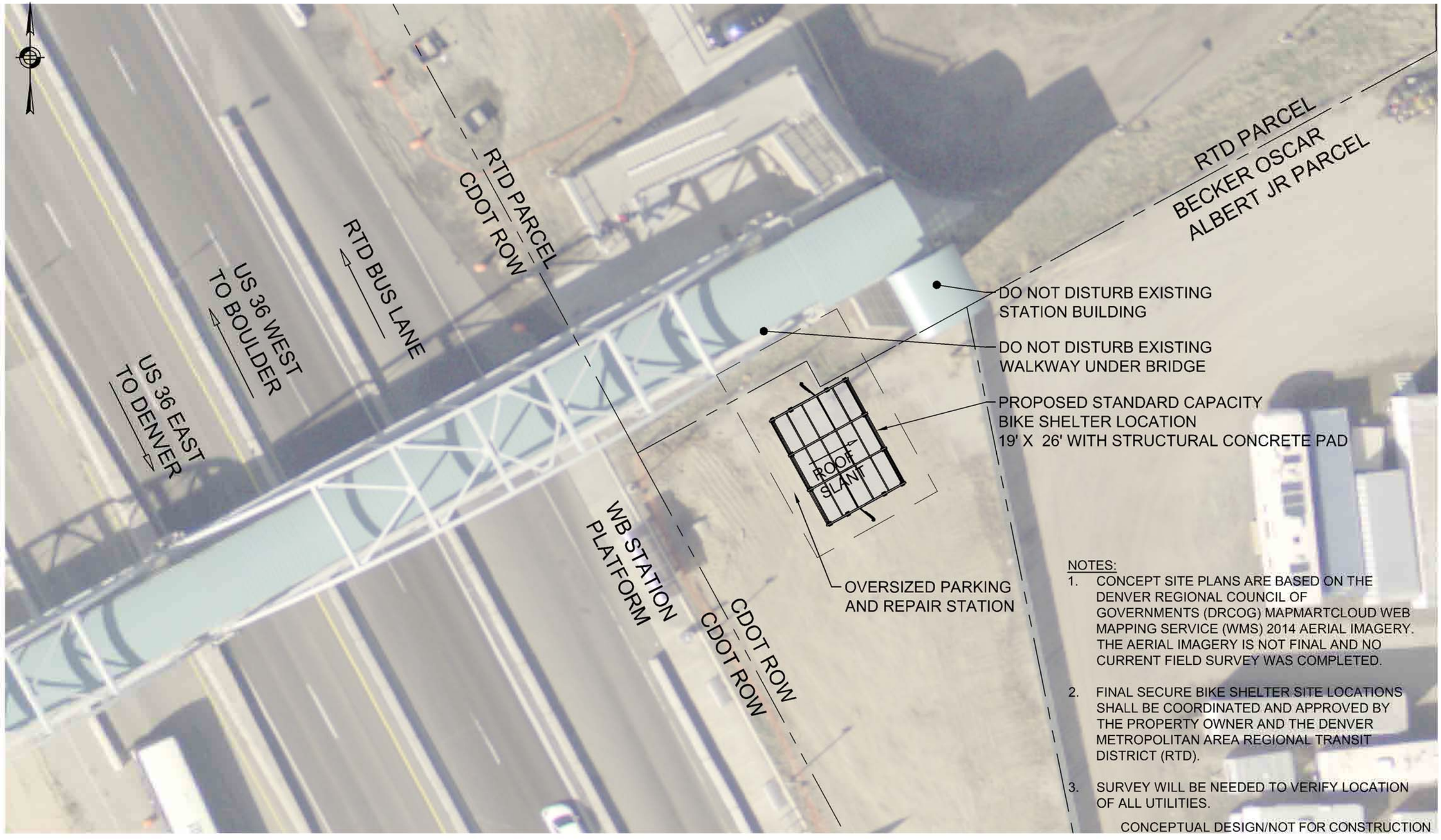

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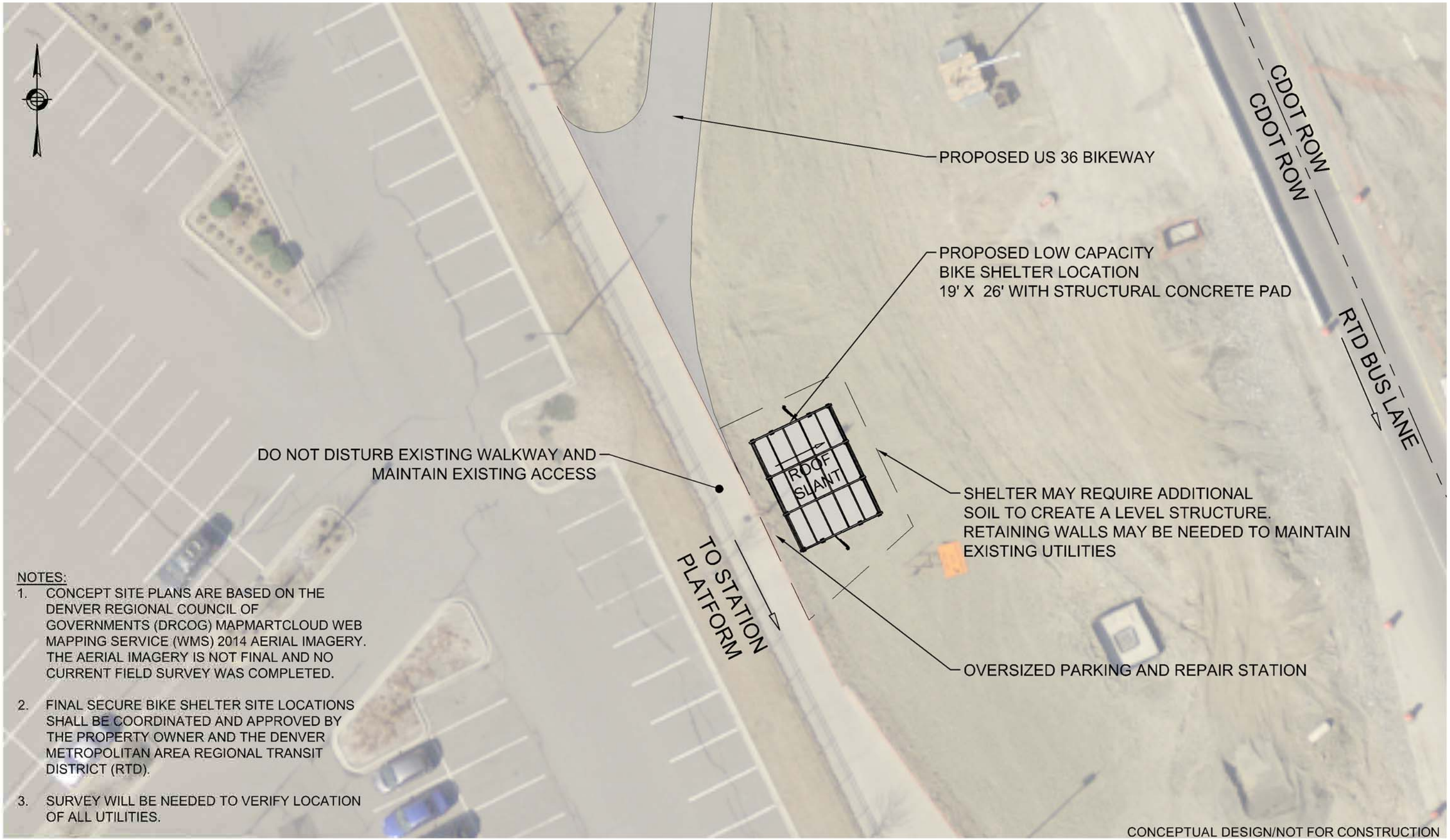

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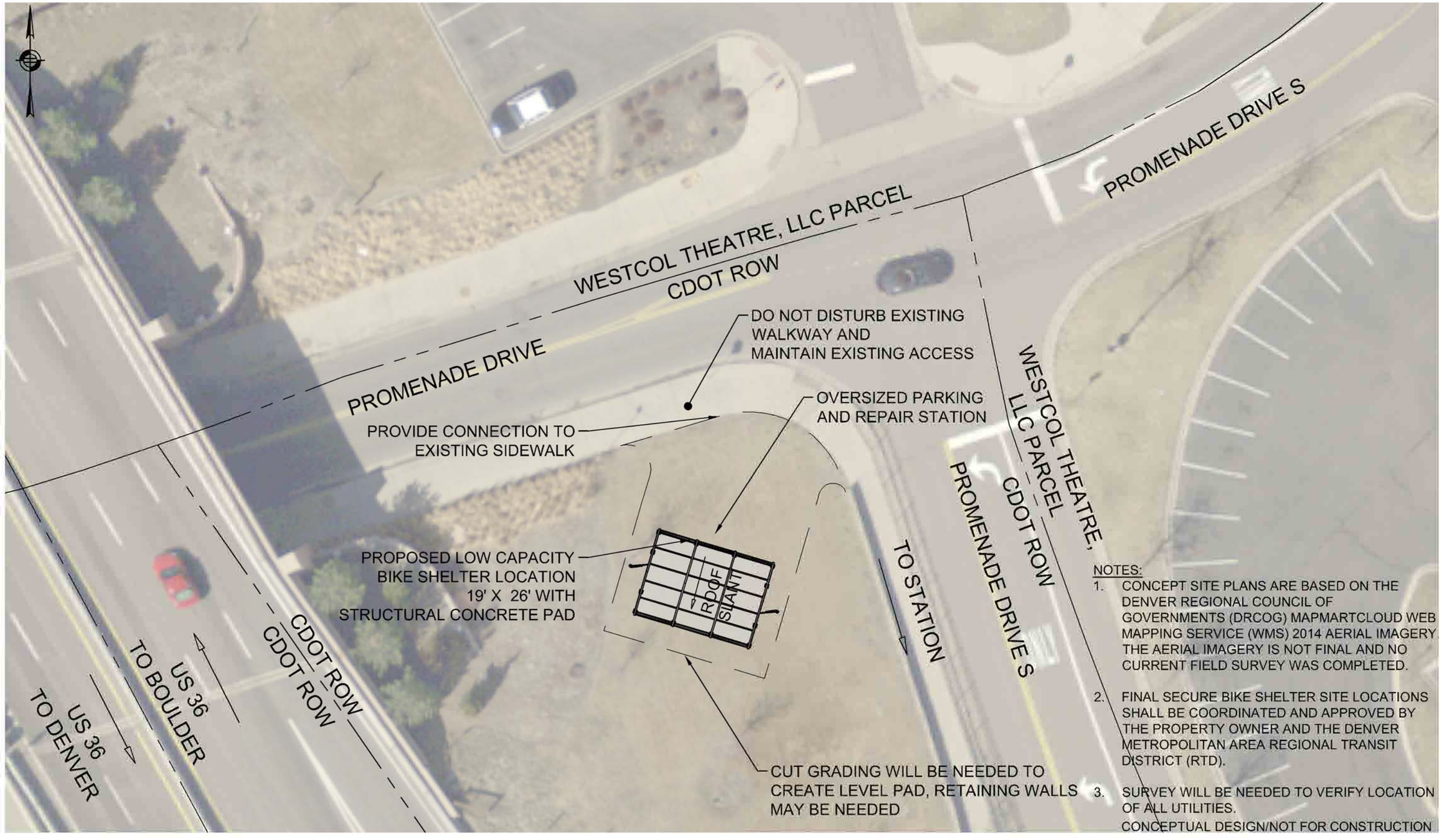

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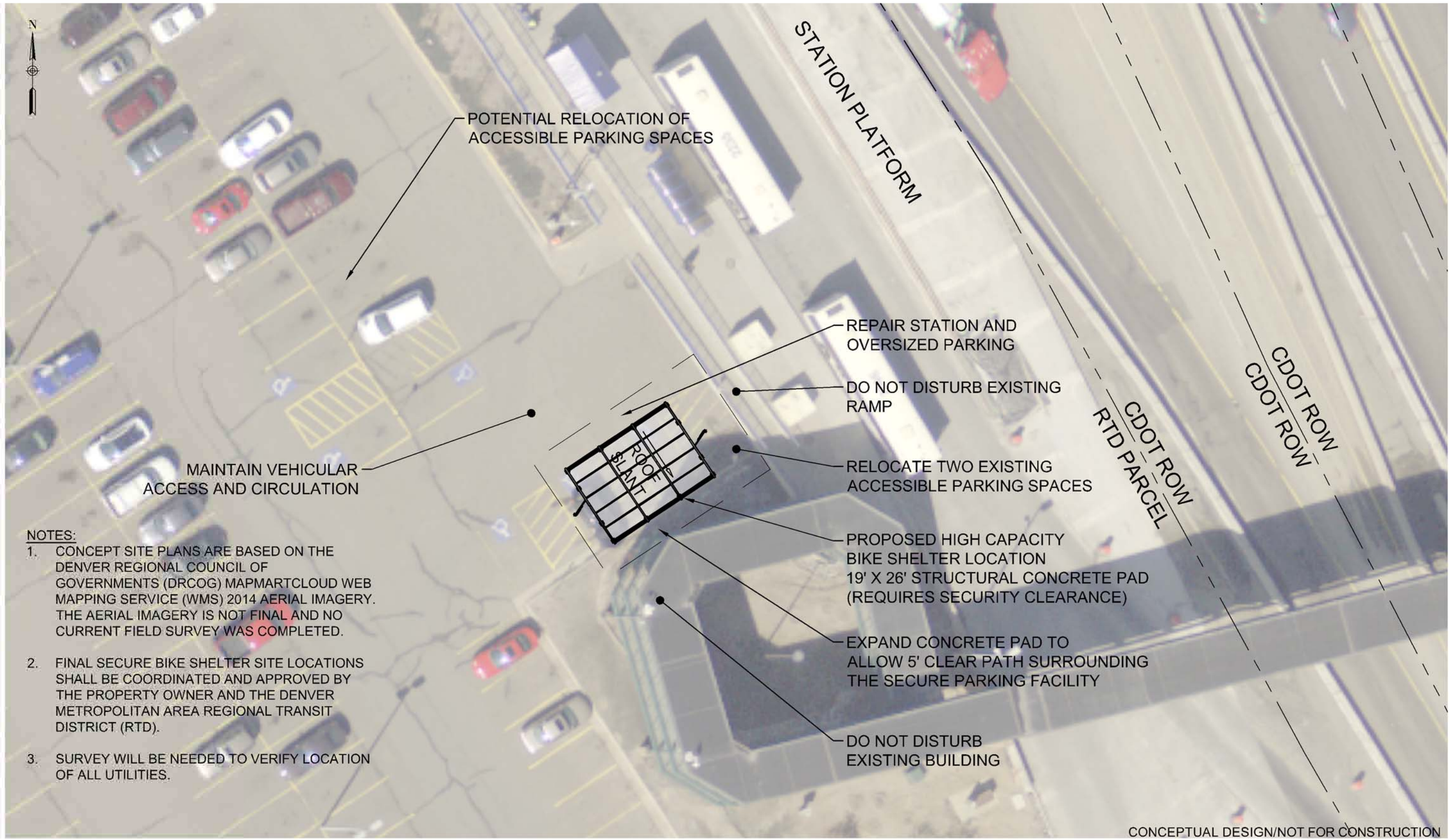

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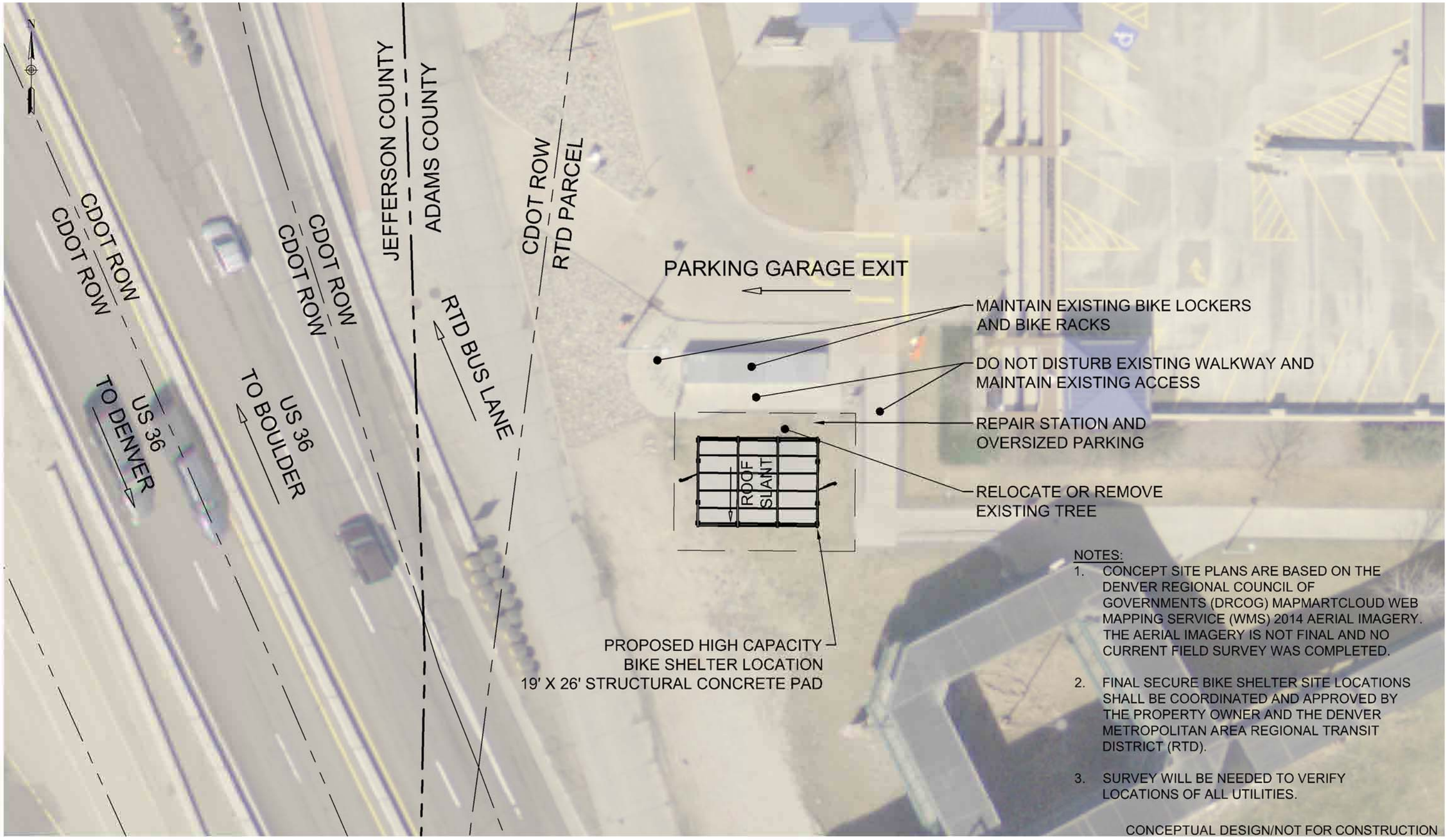

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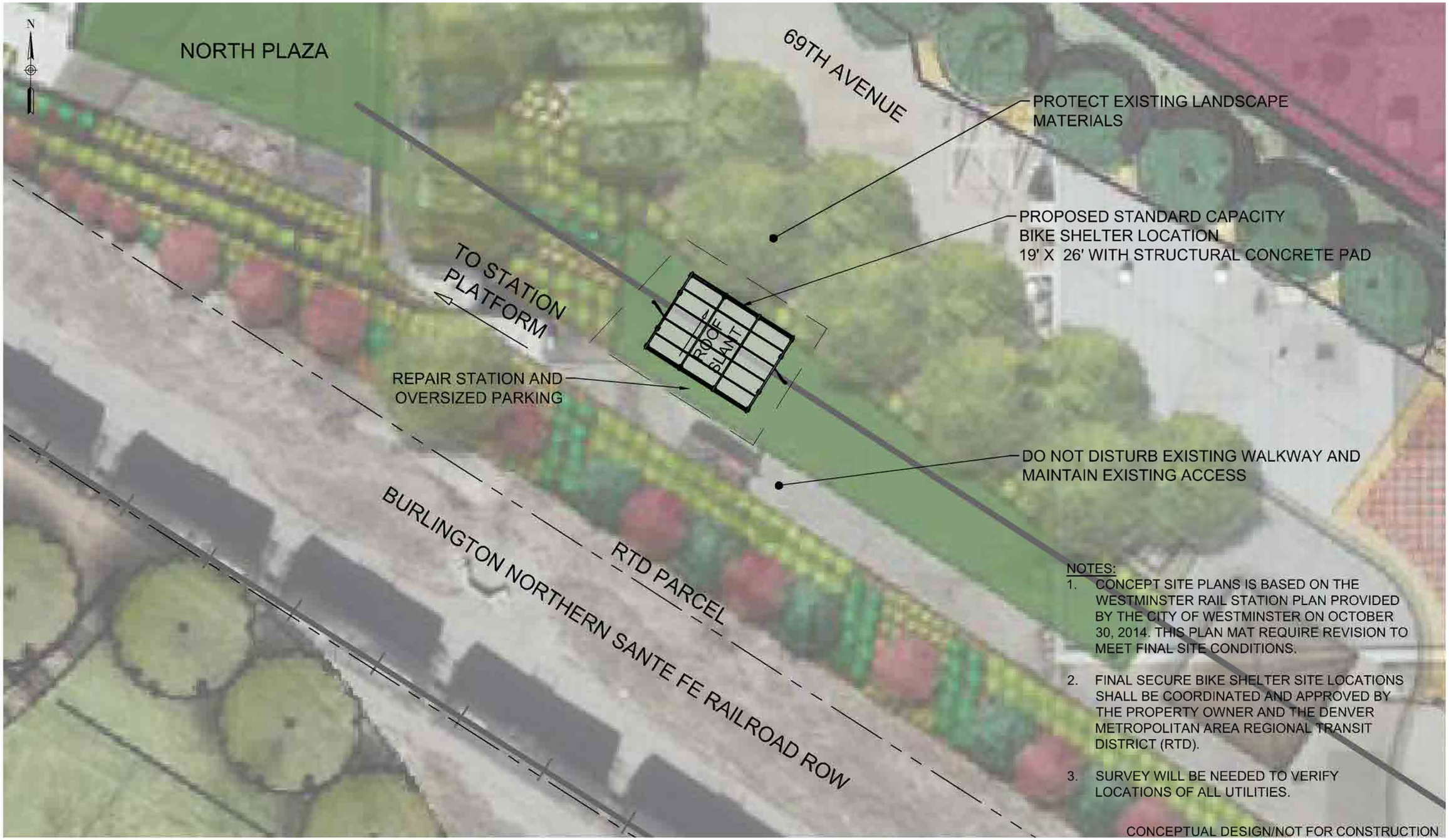

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Appendix D
Bicycle Share Feasibility Study

BICYCLE SHARE FEASIBILITY STUDY

DECEMBER 2014

Northwest Corridor
Bicycle/Pedestrian Accessibility Study

Toole Design Group

DRCOG
DENVER REGIONAL COUNCIL OF GOVERNMENTS
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Contents

Introduction

The state of Colorado and the Regional Transportation District (RTD), along with its local jurisdiction partners, have made significant transportation investments in the Northwest Corridor (the Corridor) in recent years. Along with the Colorado Department of Transportation (CDOT) US 36 Express Lanes Project, which includes the US 36 Bikeway, RTD is currently constructing two FasTracks projects in the corridor: the US 36 bus rapid transit (BRT) Line and a segment of the Northwest Rail Line (from Denver Union Station to Westminster Rail Station), both scheduled to open in 2016. Together, these transportation projects will improve multimodal mobility and access between Denver and Boulder and points in between.

In order to maximize investments that have been made in the Corridor, the Denver Regional Council of Governments (DRCOG), through its Sustainable Communities Initiative (SCI), hosts a partnership of Corridor public and private sector organizations whose goals include enhancing bicycle and pedestrian access and mobility within the first and last mile of new transit stations. The Northwest Corridor Bicycle/Pedestrian Accessibility Study (NW Corridor Study) is charged with the same goal. The project builds upon the 2013 US 36 First and Final Mile (FFM) Study by 36 Commuting Solutions and advances the top priorities identified in that study.

This report is a presentation of one of six NW Corridor Study tasks: a Bicycle Share Feasibility Study. The report includes a description of different bicycle share technologies, inter-system compatibilities, and station area analyses. This memo includes recommended bicycle share technologies for each station area and other implementation considerations.

Study Area

The study area for this project, shown in **Figure 1**, consists of the following seven transit stations that comprise the Corridor:

- Table Mesa BRT Station
- McCaslin BRT Station
- Flatiron BRT Station
- Broomfield BRT Station
- Church Ranch BRT Station
- Westminster Center BRT Station
- Westminster Rail Station

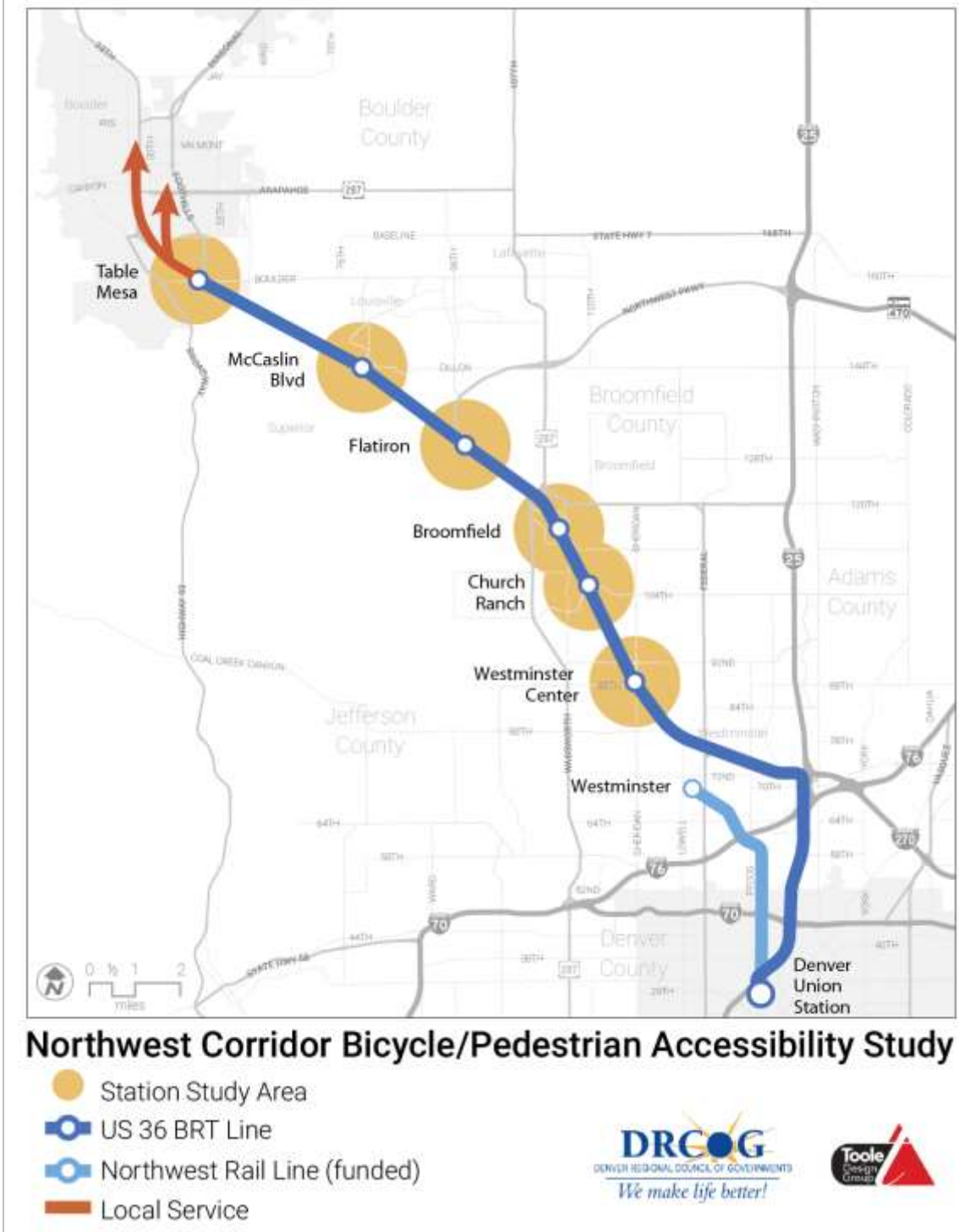

Figure 1 Location Map and Study Area

Background

This report builds upon the previous planning work completed by 36 Commuting Solutions for the US 36 Corridor.

US 36 BRT

US 36 BRT service is part of RTD's FasTracks voter-approved, multi-year comprehensive plan to expand rapid transit service in the Denver metro region. The US 36 BRT Line includes 18 miles of BRT service that connects Denver's Union Station to Boulder, passing through Westminster, Broomfield, Superior and Louisville. The US 36 BRT Line includes six stations: Westminster Center, Church Ranch, Broomfield, East Flatiron Circle, McCaslin, and Table Mesa. The US 36 BRT project is a joint partnership between RTD and CDOT. The RTD FasTracks program includes two phases of BRT implementation.

Phase 1

Phase 1 included $19 million in improvements, such as adding bus slip ramps and access improvements to RTD Park-and-Rides at US 36 and McCaslin, US 36 Church Ranch, and US 36 and Broomfield. These projects are complete.

Phase 2

Phase 2 includes $141.5 million in RTD funds for the implementation of BRT on US 36. The US 36 RTD FasTracks program calls for adding BRT elements such as: shared use of the new US 36 Express Lanes, branded vehicles, high frequency service, pre-paid fare collection via kiosks, Programmable Information Displays (PIDs) to provide riders with real-time bus arrival information, station design enhancements, and a BRT service identity. Phase 2 will also include the extension of the US 36 Bikeway.

First and Final Mile Study

The "first and final mile" refers to the part of a transit trip at the start and/or end of the journey – the part of the trip that connects a transit user to/from the station and their origin or destination. The US 36 Corridor exhibits suburban land use patterns such as single land uses connected by larger arterial roadways, which are designed and built primarily for people traveling in cars. This land use pattern can make it difficult, intimidating, and sometimes unsafe to travel between the transit stations and nearby origins/destinations by walking or bicycling. To address this, the First and Final Mile Study[1] identified suitable options to better connect transit riders to and from the US 36 BRT stations to the surrounding activity centers.

[1] US 36 First and Final Mile Study. 36 Commuting Solutions. February 2013. Please note that the study did not include the Westminster Rail Station.

The study identified the following eleven strategies to address first and final mile connections at the six BRT stations between Westminster and Table Mesa:

1. Secure overnight bicycle parking.
2. A mobile app to plan multimodal trips.
3. Transit supportive land use policies.
4. Branded wayfinding and signage.
5. Bicycle share.
6. Private car share (e.g., eGO, ZIP Car, Occasional Car, electric vehicle car share, etc.).
7. US 36 real-time transit tracker.
8. B-cycle membership cards (valid in Denver and Boulder currently).
9. EcoPasses.
10. Peer-to-peer car share.
11. Commuting buddy system (e.g., Bicycle Buddy, Transit Buddy, etc.).

The study prioritized these strategies in terms of their ability to increase the convenience of public transit and reduce Single Occupant Vehicle (SOV) travel to each BRT station. Bicycle share was not highly recommended due to the challenges of implementing a seamless system across a large geographic area, but further study was recommended.

Scope of Work

This report introduces the concept of bicycle share and provides bicycle share recommendations for each transit station in the corridor. To complete this task, data was collected and analyzed from site visits and a stakeholder workshop conducted by the project team in October 2014. Additional data was provided by RTD, 36 Commuting Solutions, and the U.S. Census. The project team worked closely with local jurisdictions along the corridor to identify the key activity centers, goals for bicycle share, and recommended technologies for each station area. The key stakeholders and local jurisdictions included members of the Corridor Working Group: DRCOG, RTD, 36 Commuting Solutions, Adams County Housing Authority, City and County of Boulder, Town of Superior, City of Louisville, City and County of Broomfield, City of Westminster, and CDOT.

Bicycle Share

Bicycle share is a service in which bicycles are made available for shared use on a short-term basis. For automated bicycle share systems in other U.S. cities, these short-term, point-to-point trips typically last between 15 to 20 minutes and are one to three miles long.[2] Generally, the system is accessed through low-cost subscriptions ranging from a few dollars for a one day membership to between $50 and $100 for an annual membership. Bicycle share systems have been implemented in numerous cities across the country including the Colorado cities of Denver, Boulder, and Aspen. Other cities are planning bicycle share systems and are looking to tap into the benefits of providing expanded mobility options, a means to rapidly increase participation in bicycling, and a way to expand the reach of transit.

Why Are Cities Embracing Bicycle Share?

Bicycle share systems are becoming more popular in the U.S., with over 40 systems now operating, 13 of which were added in 2013 alone.[3] Bicycle share is a high profile, fast, and relatively inexpensive way to enhance a city's transportation infrastructure and to offer an effective first- and final- mile solution to support large-scale transit investments. Compared to other major transportation investments, bicycle share offers a high return on investment. For example, $10 million could purchase:

- 0.02 miles of heavy rail/subway;
- 0.1 miles of light rail;
- 0.5 miles of streetcar;
- 1 mile of road; or
- A 2,000 bicycle/200 station bicycle share system that could be implemented in 12-18 months (note: this would be larger than the entire Minneapolis-St. Paul system, which has 170 stations).[4]

Cities are choosing to implement bicycle share due to its short implementation time frame and low costs, but also because of its ability to:

- Increase mobility options;
- Complement transit, walking, driving, and other modes;
- Spur spontaneous bicycle trips (bicycle share is a fast way to increase riders on the bicycle network);
- Reduce traffic and parking congestion; and
- Encourage environmental, social, economic and health benefits.

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[2] *Bicycle Sharing in the United States: State of the Practice and Guide to Implementation*. Federal Highway Administration. United States Department of Transportation. September 2012.
[3] Malouff, Dan. "Here are America's largest bicycle sharing systems in 2013." Greater Greater Washington, 6 Jan 2014. Web. 9 October 2014. http://greatergreaterwashington.org/post/21260/here-are-americas-largest-bicyclesharing-systems-in-2013/
[4] "Our Story." Nice Ride Minneapolis. Web. 9 October 2014. https://www.niceridemn.org/about/

Goals for Bicycle Share along the US 36 Corridor

At a stakeholder workshop held in Westminster on October 20, 2014, the project team presented four main bicycle share technologies, draft goals for bicycle share along the corridor, and key markets at each station (see Attachment A for a workshop summary). The workshop was followed by an online survey that asked stakeholders for their opinions on the advantages and disadvantages of each technology and the following key questions:

- If bicycle share were to be implemented along US 36, what would you like it to achieve?
- Is one coordinated bicycle share solution needed for the corridor?
- For what trips would bicycle share be used within the US 36 Corridor?

Stakeholders were also asked to identify the five top destinations and activity centers that might be good candidates for bicycle share near each transit station.

Using feedback from the meeting and the follow-up survey, the project team determined that bicycle share along the US 36 Corridor should first and foremost complement and extend transit and support commuting trips. Other, lower priority goals were also identified. The following list ranks the top seven goals as identified from stakeholder input:

1. **Complement and extend the reach of transit.**
2. **Support commuting trips.**
3. **Grow bicycling in the corridor.**
4. **Support economic development.**
5. **Ensure accessibility for all socioeconomic groups.**
6. **Support casual and recreational trips (non-commuting).**
7. **Attract tourists and visitors to the corridor.**

These goals were considered in deciding what types of bicycle share systems may be appropriate at each station.

Stakeholders identified that, in general, a single bicycle share technology is not necessarily required for the entire system. However, they acknowledged that there are some advantages to providing one coordinated bicycle share technology solution, such as a consistent user experience, inter-operability between areas, and simplified operations. Stakeholders expressed interest in smart bike systems for their flexibility, relative low-cost, and ability to serve a wide-range of users.

Stakeholders also stated a desire for coordinated management of bicycle share systems, especially due to the overlapping jurisdictions between station areas.

Bicycle Share Technologies

Four primary categories of bicycle share technology were considered for the US 36 Corridor: bicycle libraries, employer-owned bicycle fleets, smart bike, and smart dock systems. **Table 1** provides a high-level overview of each technology type and a brief summary of the advantages and disadvantages of each. Detailed descriptions and case studies of these systems follow **Table 1**.

Table 1 Summary of Bicycle Share Technologies

Type	Characteristics	Advantages	Disadvantages	Examples
Bicycle Library	•Low-technology systems, often using refurbished bicycles that require staff to check bicycles in and out •Bicycles can be rented by anyone	•Inexpensive bicycle share option •Maintenance costs are generally low •Allows for longer term rentals •Allows for a variety of bicycle types •Interaction with staff provides person-to-person communications and an opportunity for other messaging	•Limited, fixed locations •Requires staff (either unpaid volunteers or paid workers) to check out bicycles •More difficult to provide extensive geographic coverage •Rentals limited to the time period the library is open	•City of Fort Collins Bicycle Library •Northeastern University
Employer-provided Bicycle Fleet	•Low-technology (like bicycle libraries) or high-technology (like smart bike or smart dock systems) bicycle fleets made available to employees	•Relatively inexpensive to set up depending on the level of technology •Private setting maintains control and accountability	•Not available for public use •May require staff to administer the program	•Nike •Google •Facebook •Mozilla
Automated "Smart Bike" System	•A fleet of bicycles with automated payment, locking, and other features built onto the bicycle allowing any user to check out a bicycle and drop it off anywhere in the service area	•Less expensive than smart dock bicycle share •Offers more flexibility for where bicycles can be locked •Utilizes existing bicycle parking infrastructure such as bicycle racks •Automated system available any time	•Relies on cell phone and internet to access the system •Locating bicycles is less reliable without fixed stations •Technology is still largely untested •Less visible than smart dock systems •Fewer sponsorship opportunities	•Phoenix (planned) •State University of New York at Buffalo •Yale Bicycle share Program
Automated "Smart Dock" System	•A fleet of bicycles docked at stations that feature automated check-out •Bicycles can be checked out by anyone and returned to any station in the system	•Easy to find locations • Electric or in-person access at the stations •Scalable and can be financed (partly) through sponsorship •Stations are made up of interconnected docks that are modular, solar powered, and make use of wireless communications •Automated system available any time	•Most expensive system type ($40-$50K per station) •Requires extensive coordination with City or jurisdiction to implement stations	•Denver B-cycle. •Nice Ride Minnesota (Minneapolis and St. Paul, MN) •Capital Bikeshare (Washington, DC) •Divvy (Chicago, IL)

Bicycle Libraries

Bicycle libraries are central locations where a fleet of bicycles is made available for check-out. Bicycle libraries typically use refurbished bicycles and are staffed by people who manage bicycle rentals and repairs.

Advantages

One of the biggest advantages of bicycle libraries is their accessibility. Bicycle libraries are open to anyone and do not require credit cards, cell phones, or other technology to check out a bicycle. Additionally, bicycle libraries tend to have flexible rental lengths (half day, full day, etc.), which allows for libraries to be tailored to a specific rental market.

Bicycle libraries tend to get the most use from visitors or transient populations (such as students that may not have a bicycle when they move to campus). For this reason, bicycle libraries have had the greatest success in tourist areas where visitors benefit from the one-on-one experience of talking to a staff member about the best routes and destinations or university campus settings where students can check out a bicycle for the semester.

Disadvantages

Bicycle libraries are centrally located and must be staffed (either through unpaid volunteers or paid workers) which limits where and when bicycles can be checked out. These systems do not as easily serve spontaneous or one-way trip-making and serve more as a rental service than a transportation system.

Cost

Bicycle libraries are a low cost bicycle share option. The main costs include the bicycles themselves, a physical space for the bicycle library, and staff to refurbish, maintain, and manage the library. Many bicycle libraries reduce their overhead costs by using refurbished or donated bicycles, utilizing donated or reduced-rent space, and using volunteers (at least partially) to operate the library.

The Fort Collins Bicycle Library operates a fleet of approximately 200 bicycles at five locations with donated physical space, refurbished bicycles, a paid director, and volunteer staff at a cost of approximately $80,000 per year.

Case Study: Fort Collins Bicycle Library

The Fort Collins Bicycle Library is one of the most successful bicycle libraries in the U.S. Since April 2008, the program has grown from 50 to 200 bicycles and has recorded over 23,000 bicycle check-outs by over 18,000 riders.[5]

The Bicycle Library is open between April and mid-December and allows residents and visitors to check out a bicycle from any of their five locations and return them at any of the six drop-off locations.[6] The bicycles are usually refurbished and do not have consistent branding (like a color or sticker) which keeps costs low.

To rent a bicycle, one can walk up to a library location or make a reservation online, complete a waiver form either online or in person, and put down a $150 deposit. It costs $10 per day to rent a bicycle, however, if the bicycle is returned before closing to the same location from which it was rented, the rental fee is waived. The library is staffed by employees and volunteers who provide safety information, helmets, maps, and locks along with bicycle check-outs.

The program is managed by the City and operated by Bicycle Fort Collins, a 501(c)(3) non-profit. Since 2008 the program has been funded by two Congestion Mitigation and Air Quality (CMAQ) grants as well as in-kind donations from the Downtown Development Authority (DDA), the City, and other community partners.

Figure 2 Fort Collins Bicycle Library

Source: Fort Collins Bicycle Library

[5] Annual check-outs increased from approximately 1,500 in 2008 to 4,600 in 2013.

[6] Locations, accessed online, October 9, 2014. http://www.fcbicyclelibrary.org/locations.php

Employer-Provided Bicycle Fleets

Employer-provided bicycle share systems are private fleets of bicycles available to employees to use. There are varying levels of system sophistication within this category of bicycle share. For example, an employer-provided bicycle fleet can function as a low-technology bicycle library for employees or it can provide fully automated bicycle check-out similar to smart bike or smart dock systems (see below). The commonality is that the bicycle fleets are generally housed on a private campus and are for private use only.

Advantages

Employer-provided bicycle fleets allow for flexibility of bicycle system choice. For example, employer-provided bicycle share can be regular bicycles provided in a manner similar to a bicycle library where a staff member is assigned to check bicycles out, or employees may sign up for the program and be given access to the program (e.g., provided a PIN code to unlock the bicycles or a bicycle room, or could be fully automated, but available only to employees). The bicycle fleet may also be branded, such as the Firefox bicycle fleet pictured in **Figure 3**.

Figure 3 Mozilla Bikes *Source: Bikes Make Life Better*

An advantage of employer-provided bicycle fleets is that they are directly provided to employees within an organization and can be promoted through existing health and wellness and other corporate programs. These programs are often subsidized by the employer such that it is free for employees to use the system.

Disadvantages

Employer-provided bicycle fleets are not publicly available which limits their impact on the number and variety of riders they would each along the corridor. Some employer-provided bicycle fleets are less flexible than other bicycle share options because all bicycles must be returned to the worksite and need a separate lock to lock the bicycle at a different destination. These systems can also be limited in the type of trips they can serve, i.e., they serve an employee when they are at work, but unless that employer provides a station of bicycles at a transit station, fleets cannot be used to make the trip from the station to and from work.

Cost

The cost varies greatly depending on the type of system implemented. For example, fleets that entail refurbished bicycles stored in a secure area are the least expensive to develop while a high-technology system would be significantly more expensive to implement. 36 Commuting

Solutions provides a guide to employers for how to set up an employer-provided bicycle share system that includes a simple cost estimating tool.[7] Depending on the options selected, this could range anywhere from $250 to $1,000 per bicycle. Automated options, such as the system offered by Zagster, cost between $100 and $150 per bicycle per month. Under this model, Zagster supplies the bicycles, works with local bicycle shops to maintain them, and provides the software to manage the fleet. [8, 9]

Case Study: Google

The Google Bikes program began in 2007 when the company purchased 100 blue bicycles as an experiment at their headquarters in Mountain View, California. The bicycles were popular, and Google has since expanded their fleet to 1,300 multi-colored bicycles that are each ridden approximately 1,000 miles each year (see **Figure 4**).[10]

Bicycles are available for employees to travel between buildings and within campus but may be taken off campus, as well. Brendon Harrington, Google's transportation operations manager, says "We just want to make it as easy as possible to get between buildings. We don't want to have to swipe a badge or sign a waiver." For this reason, bicycles are scattered throughout the campus and are not locked. This accessibility, coupled with the Google Campus' low traffic volumes and bicycle infrastructure, contributes to the system's success.

A staff of seven people operates the system and maintains the bicycles.

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[7] http://36commutingsolutions.org/us36/wp-content/uploads/Employer-Bike-Sharing-Program-Toolkit.pdf

[8] Weese, Evan. "Easton partners with Zagster for bicycle-sharing program." *Columbus Business First*. 24 June 2014. Web. 13 October 2014. http://www.bizjournals.com/columbus/news/2014/06/24/easton-partners-with-zagster-for-bicycle-sharing.html?page=all

[8] Minimum fleet size unknown.

[9] Garthwaite, Josie. "A New Model: Cycle Hire, for Hire." New York Times. October 18, 2012. Accessed 11 November 2014 at http://green.blogs.nytimes.com/2012/10/18/a-new-model-cycle-hire-for-hire/?_r=0

[10] McMillan, Robert. "Inside the Cycleplex: The Weird, Wild World of Google Bikes." 25 April 2013. Accessed 4 October 2014. http://www.wired.com/2013/04/google-bikes/all/

Figure 4 Google Bikes

Source: Business Insider

Case Study: Zagster at General Motors

General Motors' (GM) Warren Technical Center in Warren, Michigan has a small fleet of 50 smart bikes to enable its 19,000 employees, tenants, and guests to bicycle between buildings on the main campus and to off-campus sites.[11] The bicycles are available at seven stations on the campus with six more stations under consideration.[12]

To use a Zagster bicycle, members must do the following (see **Figure 5)**:

- Register for the system
- Locate an available bicycle using the smartphone app
- Use the provided PIN code to open the attached lockbox (with a key inside),
- Use the key to unlock the bicycle.

Using the bicycle lock and lockbox, the user may make multiple stops while they have the bicycle checked out, however, the bicycle must be returned to one of the seven stations on campus.

[11] Higgins, Tim. "GM Turns to Employee Bicycle share Program to Get Around Campus." *Bloomberg*. 26 August 2014. Web. 14 October 2014. http://www.bloomberg.com/news/2014-08-26/gm-turns-to-employee-bicycle-share-program-to-get-around-campus.html

[12] Ibid.

Figure 5 How Zagster Works *Source: https://account.zagster.com/howitworks*

Automated Smart Bike Systems

Automated smart bike systems include a fleet of bicycles with independent locks and other technology fitted to the bicycle so that it can be picked up and dropped off anywhere within the service area. The model is similar to the Car2Go car share service and allows more flexibility for providing bicycle share in areas that traditional citywide bicycle share systems could not reach.

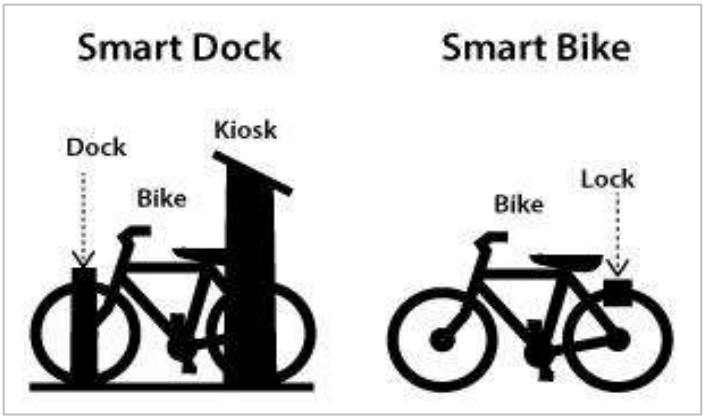

Figure 6: Smart Dock and Smart bike Systems
Source: Inventropolis.com

Smart bike technology is different from the more traditional smart dock technology because the technology is housed on the bicycle itself (rather than at a station). Smart bikes still require regular maintenance and management. To make bicycle maintenance easier for the company, there is often a financial incentive provided to return bicycles to a "station area" (or a specific bicycle rack).

Informal station areas can be created using "geofenced" hubs where users are encouraged to return their bicycles. This informality of creating station areas lend itself to high adaptability of the system (e.g. station areas can be modified with new developments or other land use changes). Choosing smart bike station areas should be completed with the implementation of the smart bike systems.

Advantages

Automated smart bike systems provide flexibility by having an independent lock on the bicycle. Smart bikes can be rented from and returned to anywhere within a service area and are not limited to docking stations.

Disadvantages

Smart bikes are a relatively new bicycle share option that has yet to be implemented in a large-scale metropolitan setting. For this reason, there are a number of uncertainties about the performance of these systems and the maintenance and operations costs involved for these types of programs.

Smart bike systems provide greater flexibility but less reliability than smart dock systems due to the user certainty about available bicycles at docking stations. Because smart bike systems lack traditional station areas, they offer less visibility than smart dock systems. They also have fewer branding and sponsorship opportunities (which can potentially affect the system's financial viability).

Smart bikes may be more challenging to rebalance and service because each bicycle has to be found and loaded for service individually (although this is facilitated with GPS technology), which is more time consuming than locating station-docked bicycles.

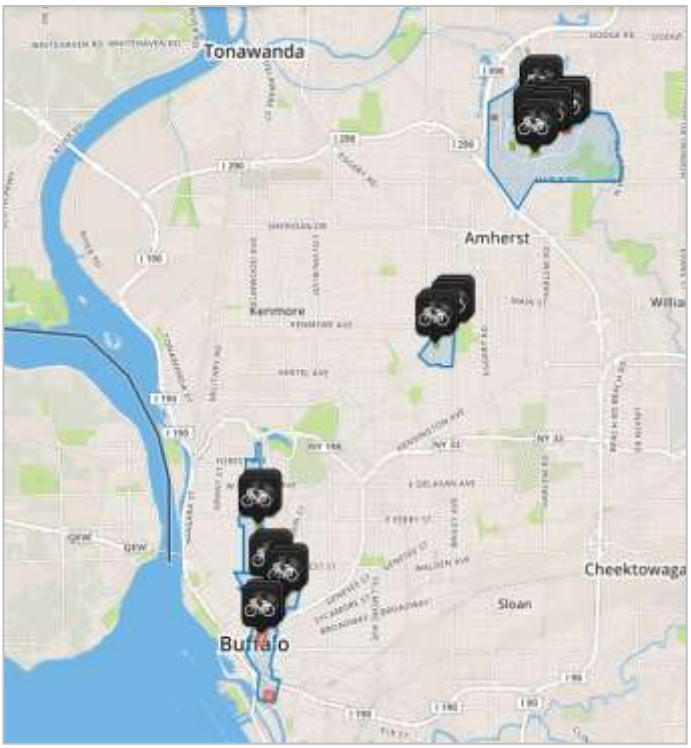

Figure 7: Bicycle Availability in Buffalo, NY

Source: http://buffalo.socialbicycles.com/

Cost

Smart bike systems are less costly than smart dock systems with recent estimates suggesting a capital cost of approximately $2,000 per bicycle. It is uncertain how much these systems cost to operate.

Case Study: State University of New York at Buffalo

Buffalo BikeShare is a 65-bicycle smart bike system that includes Downtown Buffalo and the State University of New York campus in Buffalo, New York. When the program started in 2013, it was only available only to students. However, now membership is available to off-campus subscribers, as well.

Members pay an annual enrollment fee and are provided with up to 60

minutes of free riding time each day. Beyond the initial free hour, it costs $3 per additional hour. Riders can lock the bicycles anywhere in the system, however, to encourage users to return bicycles to common locations, the bicycles are fitted with a GPS unit and the system set up with 16 "geofenced" hubs that act as stations where it is encouraged users return the bicycles. There is a $5 fee each time a bicycle is locked outside of a hub area.

Bicycles can be reserved on a mobile app, website, or the keypad of the bicycle. Each user is given a four-digit PIN to unlock the bicycle. To end a trip, a user simply locks the bicycle to a rack using the provided lock. To date, over 350 users have signed up for the program and taken over 8,000 rides.[13]

Automated Smart Dock Systems

Automated smart dock systems are the most popular type of bicycle share system in the U.S. These systems provide a network of stations and a fleet of bicycles for short-term use. The locking mechanism and other technology is housed at the station or docking point, not on the bicycle.

Advantages

Automated smart dock systems offer high-visibility stations that make it easier for users to reliably find a bicycle which encourages spontaneous trips. Mobile apps and real-time websites for smart dock systems allow users to see available bicycles and open docking points.

Additionally, both stations and bicycles provide a visible presence that helps to promote the program and provide branding and sponsorship opportunities. Smart dock systems are ideal for areas with fixed destinations, e.g., at major transit stations, or in areas where there is a mixture of land uses to generate users throughout the day.

Figure 8 Denver B-cycle Rider

Disadvantages

Smart dock systems offer less flexibility than smart bike systems in that users are limited to a set number of stations provided at specific locations. As such, smart dock systems serve a smaller number of destinations. Access to the system is gained via the internet or at the stations themselves, but requires a credit card. Smart dock systems are more expensive and require more time to implement (due to siting, permitting, and construction) than other bicycle share options.

[13] Buffalo BikeShare website. Accessed November 10, 2014 at http://buffalo.socialbicycles.com/#memberships

Cost

Smart dock systems cost approximately $40,000 to $45,000 per station, which typically include 10 bicycles and 17 docking points. Operating costs vary between systems depending on whether they are operated privately or by a non-profit.

Case Study: Denver B-cycle

Denver B-cycle was the first large-scale municipal bicycle share system in the U.S. that opened in 2010.[14] The system is operated by Denver Bike Sharing, a 501(c)(3) non-profit. Their system includes 700 bicycles and 84 stations distributed throughout central Denver, including at locations geared toward daily users (such as in residential areas) as well as areas frequented by tourists (such as the Convention Center, REI store, and Denver Union Station).

Denver B-cycle's 24-hour memberships cost $8 each while annual passes cost $80 each. All rides over 30 minutes incur charges, regardless of the membership type. In 2013 there were 51,100 24-hour memberships and just over 4,000 annual memberships purchased.[15] The B-cycle system costs approximately $1.96 million to operate each year.[16]

Technology Compatibilities

As noted earlier in the report, cities along the US 36 Corridor are not limited to one bicycle share system. There is an opportunity to implement different bicycle share technologies at each station area along the Corridor. For example, a city could provide a smart dock bicycle share system to serve commuter trips but also offer a bicycle library to check out bicycles to visitors. While multiple bicycle share systems may be implemented, thoughtful planning will be required to avoid confusion or conflicts among users.

Generally, bicycle share technologies work well together, however there are a few exceptions, as shown in **Table 2**.

[14] What is Denver B-cycle? https://denver.bcycle.com/WhatisDenverBcycle.aspx

[15] Denver Bike Sharing. 2013 Annual Report. http://denverbikesharing.org/AnnualReports/DBS_2013_Annual_Report.pdf

[16] Ibid.

Table 2 Technology Compatibility Matrix

	Bicycle Library	Employer-Provided Bicycle Fleet	Automated "Smart Bike" System	Automated "Smart Dock" System
Bicycle Library	✓	✓	✓	✓
Employer-Provided Bicycle Fleet	✓	✗	✓	✓
Automated "Smart Bike" System	✓	✓	✓	✗
Automated "Smart Dock" System	✓	✓	✗	✓

As shown above:

- Smart bike and smart dock technologies are not compatible due to the proprietary nature of the technology.
- Employer-provided bicycle fleets are generally not compatible with other employer-provided fleets because each system is provided for private employee use only.[17]

[17] Ibid.

Transit Integration

There are varying levels of bicycle share-transit integration that may be as simple as physically locating bicycle share stations near transit stations or as complicated as providing a single fare card for use on both systems. **Figure 9** shows levels of bicycle share integration.

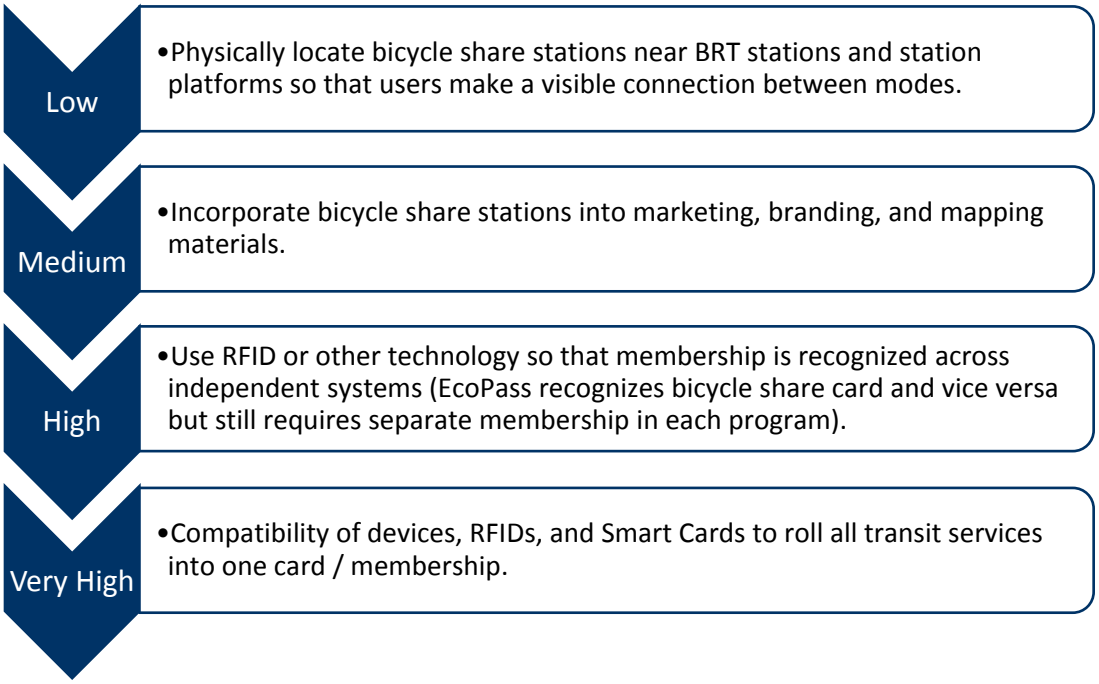

Figure 9 Bicycle Share Integration

The first two levels (Low and Medium) of integration are relatively simple to implement, however, no bicycle share systems in the U.S. currently provide integrated ticketing or membership (High and Very High). A model system in Guangzhou, China has successfully integrated bicycle share into its BRT service and allows passengers to use a single card to pay for both systems.[18]

Barriers to more detailed bicycle share-transit integration are often technological (such as sharing proprietary information, compatibility of technology and software platforms, etc.) or institutional (such as leadership for the process, revenue sharing, prioritization, etc.). Membership or payment integration would require institutional collaboration between bicycle share equipment vendors and system operators, between the local and regional jurisdictions, and between operators and RTD.

[18] US DOT. "Frequently asked Questions and Answers concerning Bike Sharing Relative to the United States Department of Transportation" June 14 2014. Accessed October 4, 2014. http://www.fta.dot.gov/documents/Informal_Q_and_As_Final_6-14-12.pdf

System Planning

Each station area was analyzed to understand its characteristics, nearby destinations, and activity centers as to determine what bicycle share technologies would be appropriate at each location. Stakeholder feedback gathered at the October 2014 workshop and through an online survey indicated that a single coordinated bicycle share system is not needed for the corridor due to each station area's unique characteristics and the Corridor's large geographical area.

The following analysis provides key characteristics, activity centers, and recommended bicycle share technologies for each station area.

Westminster Center BRT Station/Westminster Rail Station

Key Characteristics

- The Westminster Center BRT Station is located at the intersection of Sheridan Boulevard and US 36. It is directly adjacent to a concentration of commercial land uses surrounded by residential land uses. There are a number of multi-family apartment complexes within approximately 1 mile of the station but is otherwise dominated by single-family residential uses.
- Roughly 1 mile northwest of the station is the Farmers High Line Canal Trail which provides off-street access to open spaces and residences north of Westminster Center BRT Station.
- The future Westminster Rail Station will be located at the southeast corner of the intersection of 71st Avenue and Irving Street and is approximately 2.5 miles southeast of the Westminster Center BRT Station.

Westminster Center BRT Major Activity Centers

- The Westminster City Hall campus, Police Department, and Center Park are located approximately ½ mile northeast of the station.
- The Westminster Mall site is a former shopping mall undergoing redevelopment. The 105-acre site will offer mixed-use, high-density spaces to live, work, and play, including retail shopping, offices, hotels, residential and parks/gathering places. This development will The Westfield Shopping Center, which includes mostly large retailers such as Whole Foods Market, Walmart, and Sports Authority, is approximately ½ mile north.
- Several apartment complexes, such as the Toscana, Sunset Ridge, Sandpiper, Castlegate, Wadsworth, and Vance Apartments, are located in a ½ to 1 mile arc south, southwest, and west of the station (see the "Multi-family Residential Density").
- St. Anthony's Hospital, one of the City of Westminster's largest employers is located approximately 3 miles southeast of the station.

Westminster Rail Major Activity Centers

- The Westminster Plaza Shopping Center is located approximately ½ mile north of the Westminster Rail Station and includes a Safeway, Banfield Pet Hospital, and other commercial uses.
- The Hidden Lake Open Space, just south of the rail station, provides outdoor recreation opportunities.

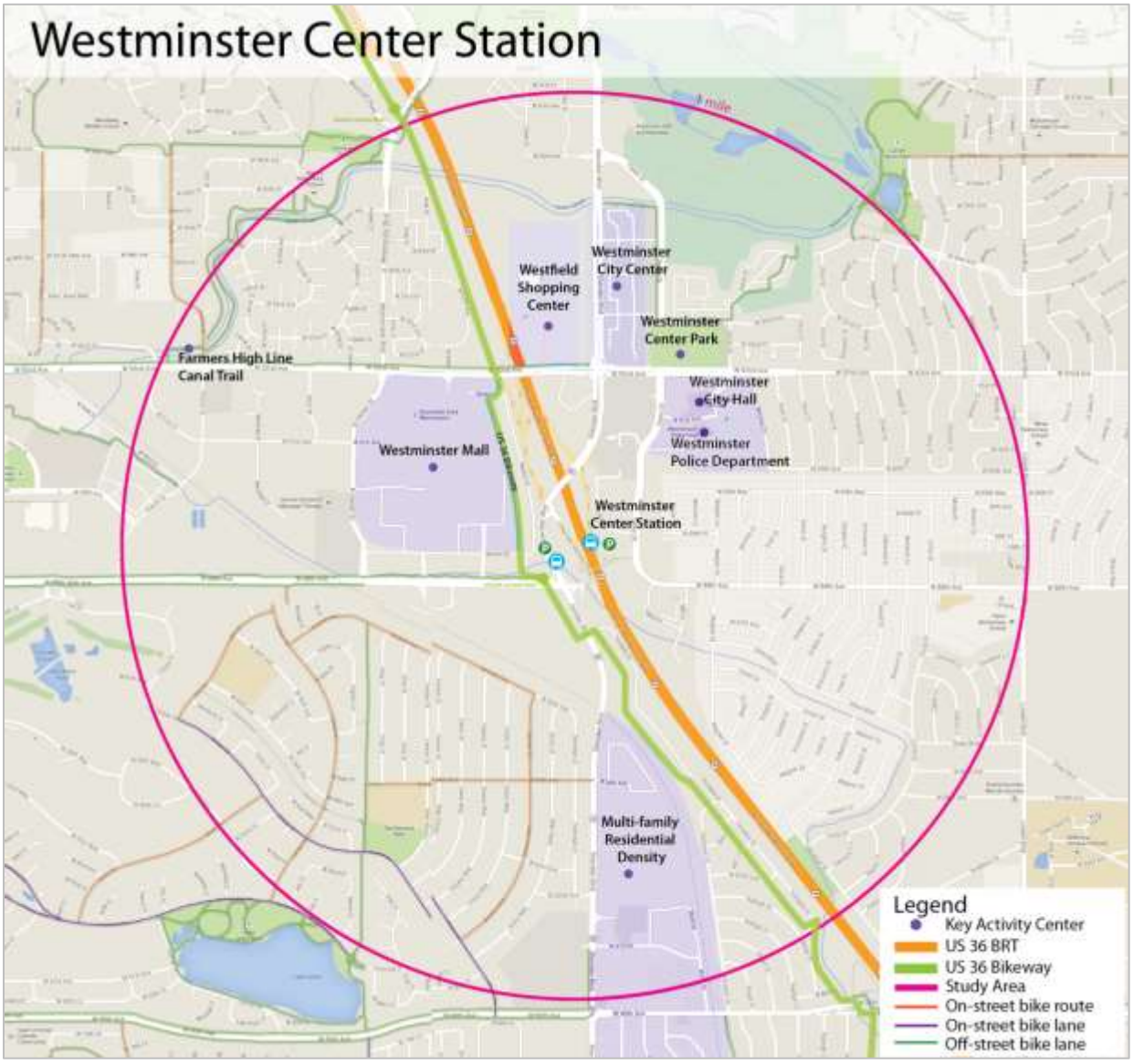

Figure 10 Westminster Center BRT Station Area

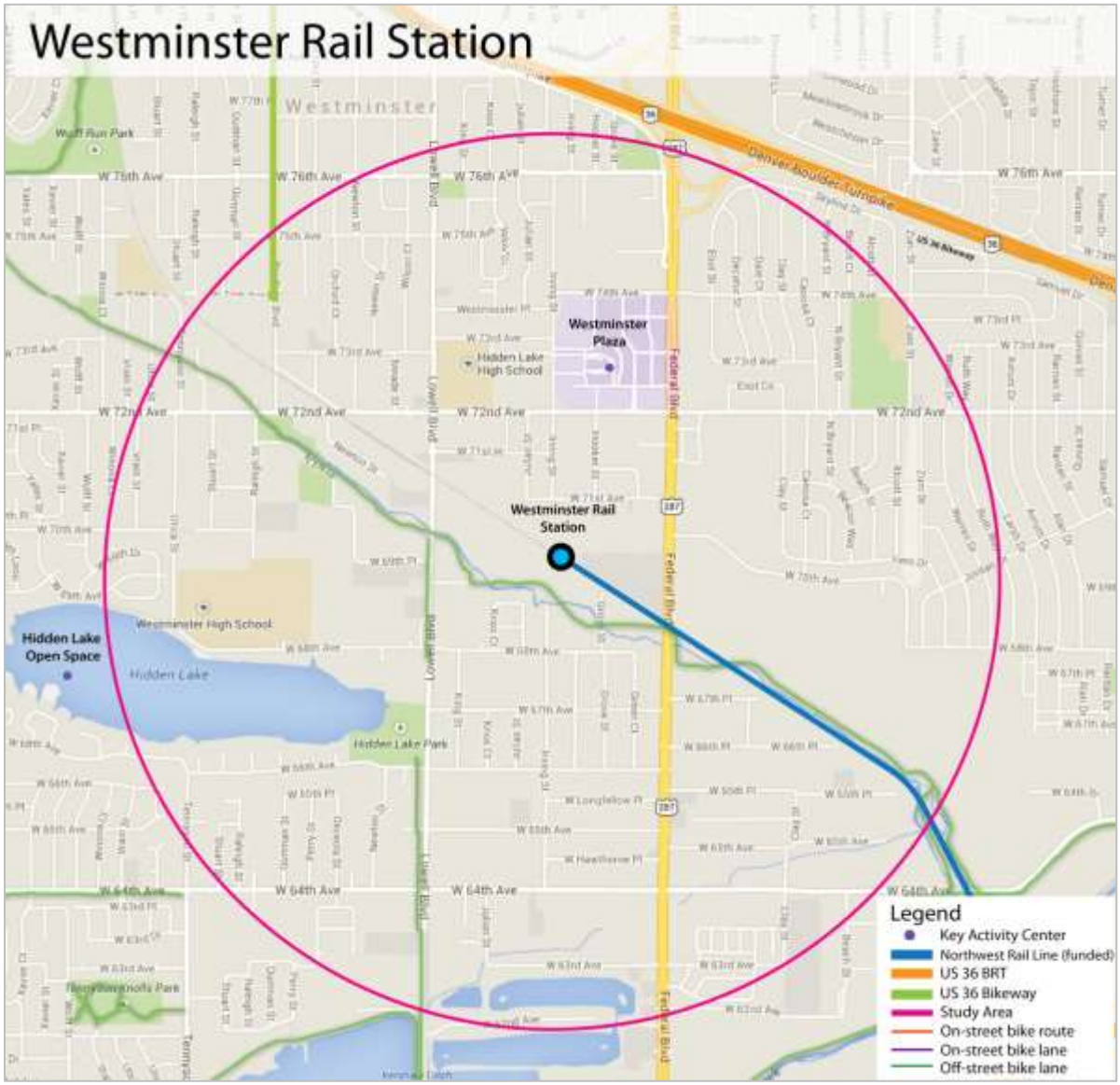

Figure 11 Westminster Rail Station Area

Recommended Technology: Smart Bike System

There are a number of trip destinations within 3 miles of the Westminster Center and the future Westminster Rail Station that would be well served by a bicycle share system. However, the dispersed nature of much of the surrounding area around the two stations makes it difficult and expensive to provide smart dock stations in a way that would cover the major destinations and the local population that primarily lives in single-family, low-density development. As such, smart bike technology may provide more flexibility in dispersed areas with pseudo "stations" developed using specially branded bike racks and geofencing at key destinations such as at the Westminster Center BRT Station, the Westminster Rail Station, the Westfield Shopping Center, St. Anthony's Hospital, and the apartment complexes in the area.

Church Ranch BRT Station

Key Characteristics

- The Church Ranch BRT Station is located at US 36 and Church Ranch Boulevard in a significant commercial district that includes a two retail malls, restaurants, hotels, and entertainment attractions.
- The station offers some bicycle share potential to visitors with a number of hotels oriented towards business travelers and attractions such as a movie theater, ice rink, Butterfly Pavilion, and Westminster City Park.
- Though there are some multi-family apartment complexes west of the station, the majority of land use around the station is single-family residential.
- The Walnut and Big Dry Creek Trails provide off-street bicycling opportunities and connections to parks, open space, and key destinations.

Major Activity Centers

- The Westminster Promenade is an outdoor pedestrian village located directly east of the Church Ranch BRT Station and includes a variety of restaurants, retail, and entertainment venues including a 24-screen movie theater, ice rink, and bowling center.
- The Shops at Walnut Creek are located across on the west side of US 36 and include a Super Target, restaurants, and smaller retail stores.
- There are a number of hotels within 1 mile of the station including the Westin Hotel, located a ½ mile east of the station, which is geared toward business travelers and conferences. Other hotels include the Drury Inn & Suites, Marriott, Spring Hill Suites, and La Quinta Inn & Suites located approximately a ½ mile southwest of the station.
- There are several local attractions nearby the station including the Butterfly Pavilion located a ½ mile east of the station and Westminster City Park and Recreation Center, located approximately 1 mile east of the station, providing open space and activities for visitors.
- Approximately ½ mile south of the station, the Cleo Wallace Center provides children with residential and community-based psychiatric and behavior care.
- The Church Ranch Corporate Center is located ½ mile south of the station along Church Ranch Boulevard. This Center is business-oriented but also includes apartments, hotels, dining, shopping, childcare, an assisted living facility, a convenience store, service station, and a variety of other amenities.
- Beyond the immediate 1 mile station area, there is a second commercial district at the Church Ranch Boulevard/Wadsworth Parkway intersection that includes several larger retail stores and several multi-family apartment complexes nearby. This commercial district is approximately 1.5 miles west of the station.
- The Front Range Community College has a campus approximately 3 miles northeast of the station.
- Single-family residential land uses make up the majority of land use outside of the above destinations.

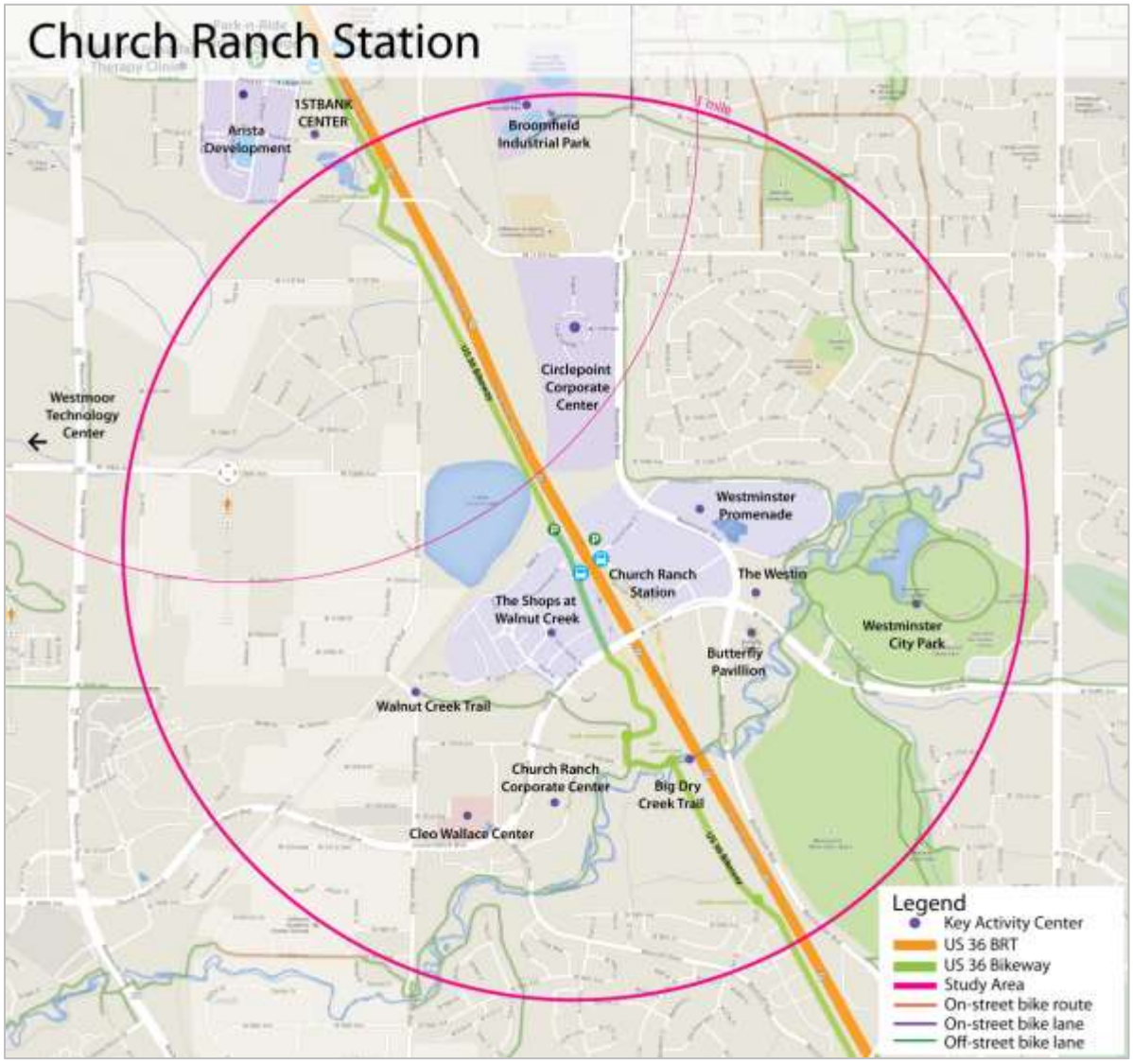

Figure 12 Church Ranch BRT Station Area

Recommended Technology: Hotel-Provided Bicycle Fleets (near-term)/Smart Bike System (long-term)

The majority of attractions are located within walking distance (½ to 1 mile) of the station and as such the effectiveness of a bicycle share system may be limited. However, despite a close concentration of key activity centers, there may still be potential for a visitor-oriented system that includes the BRT Station, local area hotels, and entertainment attractions such as the Westminster City Park and the Westminster Promenade. For example, hotels could provide bicycle fleets to their guests as a visitor amenity. This would be an easy way for visitors to access the retail, entertainment, and recreational amenities in the area.

Given the number of destinations and the otherwise dispersed nature of the surrounding area, it may be difficult and expensive to provide a smart dock bicycle share system. Therefore, smart bikes may be a more cost-effective way of providing bicycle share with pseudo "stations" developed around key attractions.

Broomfield BRT Station

Key Characteristics

- The Broomfield BRT Station is located across from the 1STBANK CENTER, a concert and entertainment venue, in a mixed-use portion of Broomfield that includes residential and commercial uses.
- Though there are residential and commercial land uses within 1 mile of the station, there is also significant vacant and undeveloped land.

Major Activity Centers

- The Broomfield Urban Transit Village (called Arista) is located directly west of the Broomfield BRT Station and is a new mixed use development consisting of several residential towers, ground floor retail, and the 1STBANK CENTER.
- The Children's Hospital Colorado Therapy Care is located ½ mile west of the station along Arista Place. The 20,000 square foot facility provides pediatric care and serves as a major employer in the station area.[19]
- The Broomfield Civic Center, which includes the City Hall, Court House, Motor Vehicle Department, and Public Library, is located approximately 1.5 miles northeast of the station. There are a number of retail and shopping centers in this area as well.
- The Rocky Mountain Metropolitan Airport, used for business and personal travel, is a public airport located 1 mile west of the station.
- One mile southwest of the station is the Westmoor Technology Park which includes ten office buildings and a conference center.
- The Broomfield Industrial Park is located ½ mile east of Broomfield BRT Station and provides pickleball courts, baseball diamonds, basketball courts, open grass areas, playgrounds, and picnic areas.
- The Circle Point Corporate Center includes seven buildings as part of a master-planned office park. It is approximately 1 mile southeast of the station off West 112th Avenue and Westminster Boulevard.
- Other significant employers include Hunter Douglas and Sandoz, Inc. located on Midway Boulevard, located approximately 2.5 miles north of the station, and Brocade Communication Systems and Trimble Navigation, located 3.5 miles southwest of the station.

[19] Children's Hospital Colorado Therapy Care. Broomfield
http://www.childrenscolorado.org/about/locations/broomfield/therapy-care

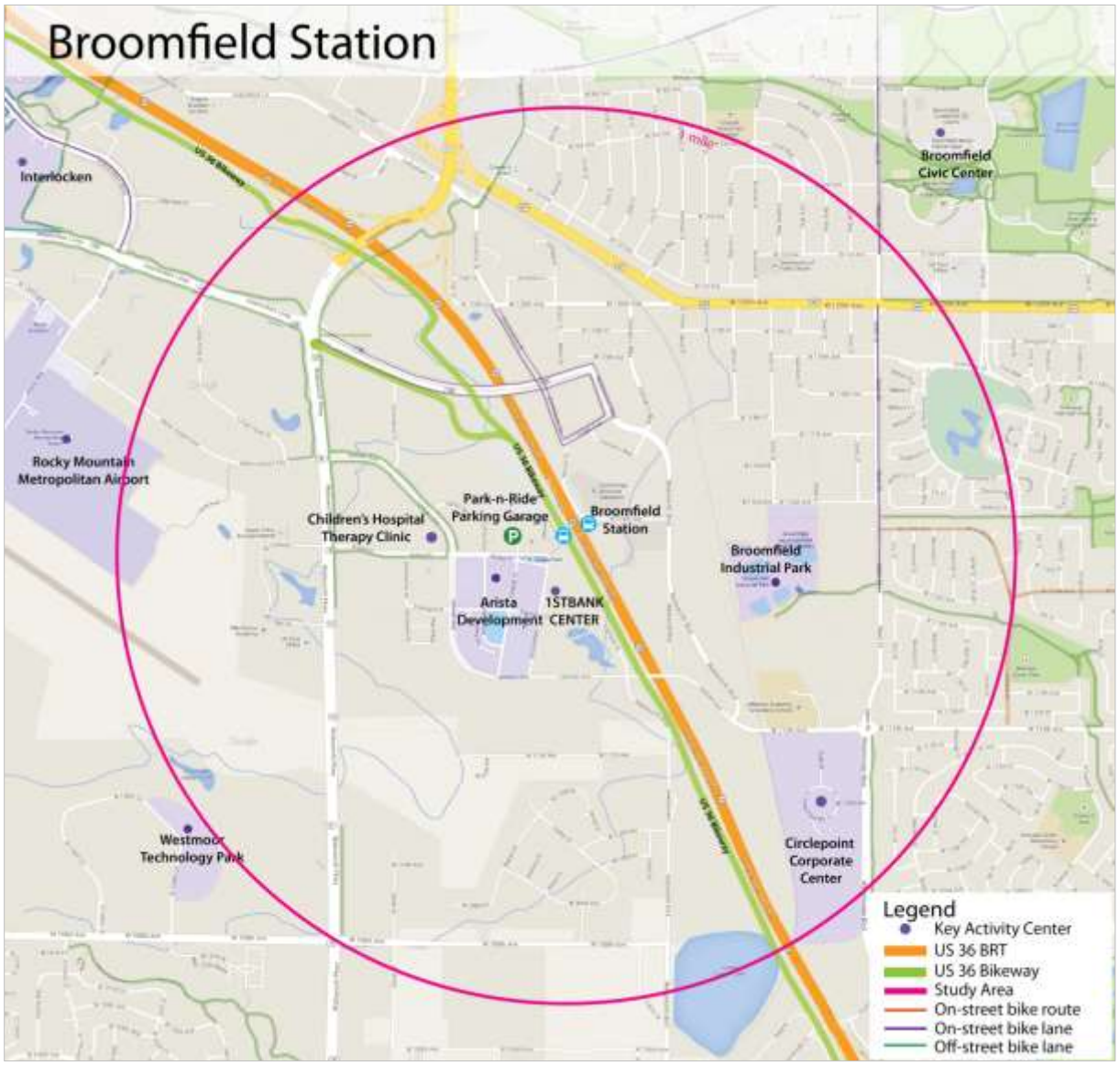

Figure 13 Broomfield BRT Station Area

Recommended Technology: Employer-Provided Bicycle Fleets (near-term) / Smart Bike System (long-term)

The Broomfield BRT Station provides the most potential for bicycle share along the US 36 Corridor. The station is located some distance away from the key destinations, particularly major employment centers, in the area. Therefore, bicycle share is an ideal way to fulfill the first and final mile of travel. It could also be a means of connecting the Arista development and 1STBANK CENTER with the Broomfield Town Center and other retail, restaurant, and entertainment destinations in the region.

In the short term, major employers at the Interlocken Advanced Technology Environment, along Midway Boulevard, at the Westmoor Technology Park, and at the Circle Point Corporate Center should be encouraged to provide bicycle fleets. However, these will have limited effect in filling the last mile transit trip from the station unless there are bicycles available at the station. It is

encouraged that over the long term, a coordinated and automated bicycle share system be implemented with public stations at the Broomfield and Flatiron BRT Stations, the Broomfield Town Center, and other major employment centers to provide an effective first and final mile connection. Given the number of bicycle share stations that would be required, a smart bikes system is recommended.

Flatiron BRT Station

Key Characteristics

- The Flatiron BRT Station is located at the East Flatiron Crossing Drive and US 36 intersection and is within ½ mile of the Flatiron Crossing Shopping Mall. It provides a close connection to the major employers and employment campuses on Interlocken Boulevard, which are between one and two miles from the station.
- Beyond the commercial land uses, there is a small residential development east of US 36 and some single-family residential neighborhoods between 2 and 3 miles west of the station.[20]
- Northeast of the station is the Carolyn Holmberg Preserve at Rock Creek Farm, a small Boulder County Open Space with trails, picnic tables, and fishing ponds.

Major Activity Centers

- The FlatIron Crossing Mall, located southwest of the Flatiron BRT Station, has over 200 retail shops including a Nordstrom and Macy's, restaurants, and a movie theater.
- FlatIron Marketplace is an older mall just south of the station that is located in an anticipated new urban renewal area (URA).[21] URAs allow for the use tax increment financing to redevelop run-down areas, fix up infrastructure or attract new businesses or jobs. In the future, mixed-use development is envisioned for this marketplace.
- The Interlocken Advanced Technology Environment is a 963-acre, advanced technology business park located 1 mile south of the Flatiron BRT Station. Interlocken includes several of the largest employers in the City and County of Broomfield,[22] including Oracle, Level 3 Communications, Vail Resorts, and Staples.
- The Parkway Circle is a residential development located approximately ½ mile north of the Flatiron BRT Station.
- The Colorado Technology Center (CTC) is a large campus located in Louisville, approximately 1.5 miles north of the station. The CTC is home to several leading

[20] As of 2012, there were 11,855 employed within 1 mile of the BRT station, of which only 0.2 percent lived in the station area. From 36 Commuting Solutions' US 36 First and Final Mile Study.

[21] Quinn, Megan. "FlatIron Marketplace owner expected to breathe new life into Broomfield retail." Broomfield Enterprise. 8 August 2013. Accessed 10 November 2014. http://www.broomfieldenterprise.com/ci_23852318/flatiron-marketplace-owner-expected-breathe-new-life-into

[22] http://www.broomfield.org/DocumentCenter/View/4246

manufacturing and high-technology companies including Pearl Izumi, Whitewave Foods, Coherent Technologies, Inc., Comfort Systems USA, Kiosk Information Systems, and Fresca Food.

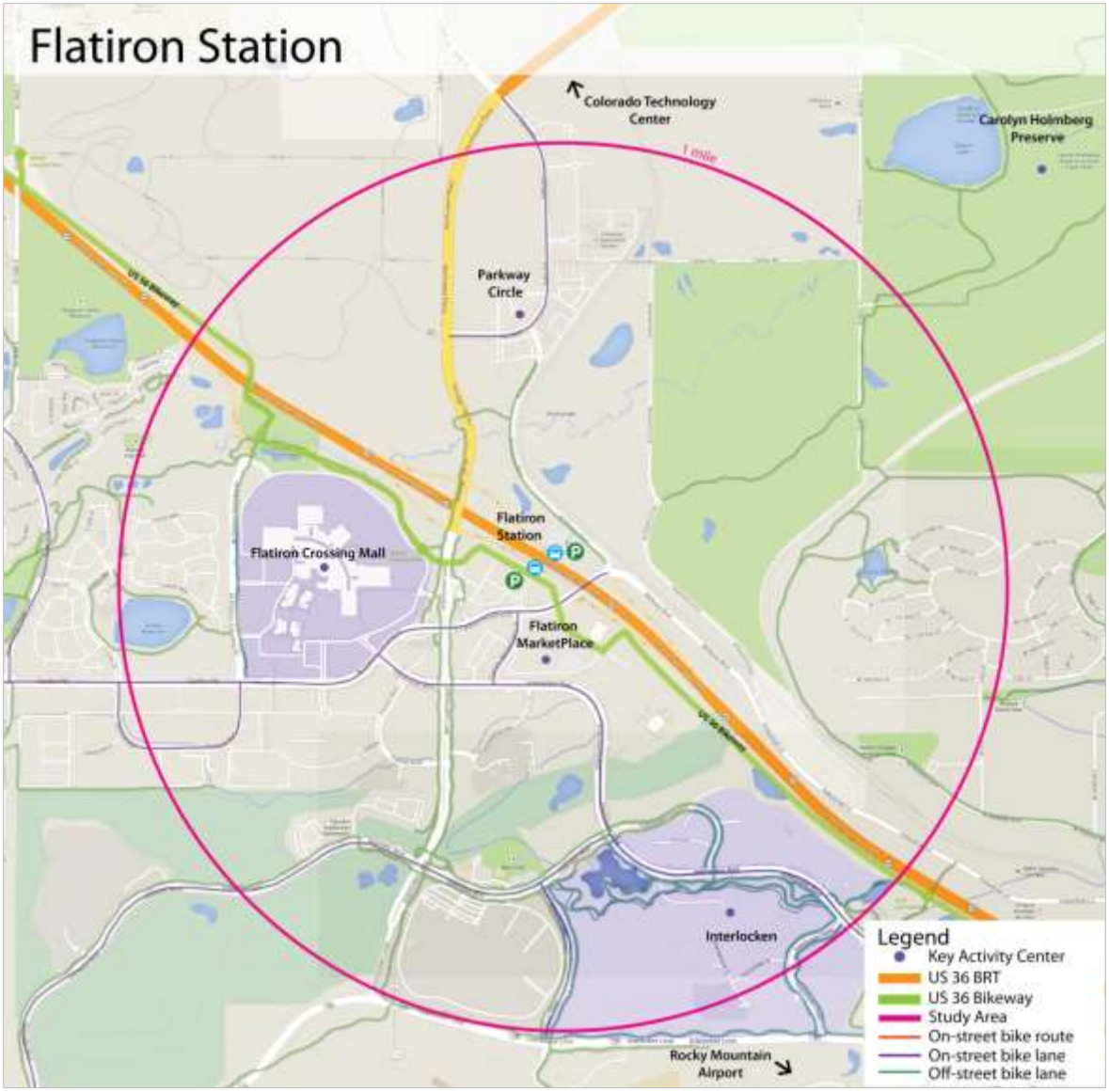

Figure 14 Flatiron BRT Station Area

Recommended Technologies: Employer-Provided Bicycle Fleets (near-term) / Smart Bike System (long-term)

The Flatiron BRT Station could be integrated into one bicycle share system to serve this station, the Broomfield BRT Station, and employees at Interlocken Advanced Technology and the CTC. Bicycle share could also serve future developments in the area, including the pending development of the former StorageTek site in Louisville.

McCaslin BRT Station

Key Characteristics

- The McCaslin BRT Station is immediately surrounded by commercial land uses with single- and multi-family residential land uses to the northeast and southeast of the station. The station area encompasses the Town of Superior and the City of Louisville, thereby providing access to both town centers and some increased residential densities.
- Louisville is consistently ranked as one of the best small towns to live due to its historic downtown (see below), its proximity to trails and open space, and a significant number of employment opportunities. The City's Comprehensive Plan (2013) has designated the station in the McaCaslin urban center, which is undergoing further planning as part of the McCaslin Boulevard Small Area Plan. This plan "will provide the required regulatory framework necessary to implement the vision of the Comprehensive Plan for the properties in the McCaslin Urban Center and Urban Corridor" while addressing "specific use and density allowances, building placement, block structure, landscaping, and signage requirements consistent with the urban center and urban corridor patterns envisioned along McCaslin Boulevard."[23]
- With Superior's and Louisville's extensive on-street and off-street bicycle network, (like the Coal Creek and Mayhoffer Singletree Trails) coupled with planned improvements (such as the US 36 Bikeway and Davidson Mesa underpass), the McCaslin BRT Station is well suited for bicycling and transit integration.

Major Activity Centers

- The Avista Adventist Hospital is the largest employer in Louisville, located 1 mile southeast of the station. This comprehensive medical center provides a full-range of medical specialties to the Louisville, Broomfield and Boulder area communities. East of the Avista campus is another large employer, the Centennial Peaks Hospital, which offers mental health treatment. With both hospitals located adjacent to the US 36 Bikeway, they are well suited for bicycle access.
- Another major employer in the area is Key Equipment Finance, located approximately 1 mile south of the station along McCaslin Boulevard.[24]
- The Colony Square Shopping Center, located just north of the station, has a number of restaurants and small service shops.
- Located less than ½ mile southeast of the station are CableLabs and Medtronic. CableLabs is a non-profit research and development consortium focused on cable services while Medtronic is a bio-tech company focused on developing and

[23] City of Louisville. http://www.louisvilleco.gov/portals/0/Planning/Comp%20Plan/2012-2013compplan/2013%2004%2002%20Table.pdf

[24] "About Key Equipment Finance." Key Equipment Finance. Accessed November 10, 2014. http://www.keyequipmentfinance.com/

manufacturing medical device technology and therapies. Both companies are major employers of Superior and Louisville residents.

Figure 15 Superior Town Center Rendering Source: Superior Town Center

- On August 19, 2014, the Town of Superior's Board of Trustees voted in favor of an amendment to the approved Planned Development Plan for the Superior Town Center.[25] This Amendment sanctions the creation of a pedestrian-oriented Town Center at the southeast corner of the McCaslin BRT Station. The application provided for approximately 157 acres of mixed-use development that will help complete Superior connect Original Town to Rock Creek Ranch and Waterford. This could include commercial/retail, office, private indoor recreation, civic space, a pre-K school, two hotels with up to 500 rooms, 1,400 homes, three large multi-sport playing fields, and a large two acre Town Square and Pedestrian Promenade that would connect the Town Square to Coal Creek and its recreation amenities and trails.
- The McCaslin BRT Station is located 2.5 miles from Historic Downtown Louisville, five square blocks that include over 100 businesses including shops, restaurants, galleries, studios, and live music almost every night of the week. The Louisville City Hall and Public Library are also within the downtown core.

[25] Superior Town Center. Accessed November 10, 2014. http://www.superiortowncenter.com/html/projectinfo.html

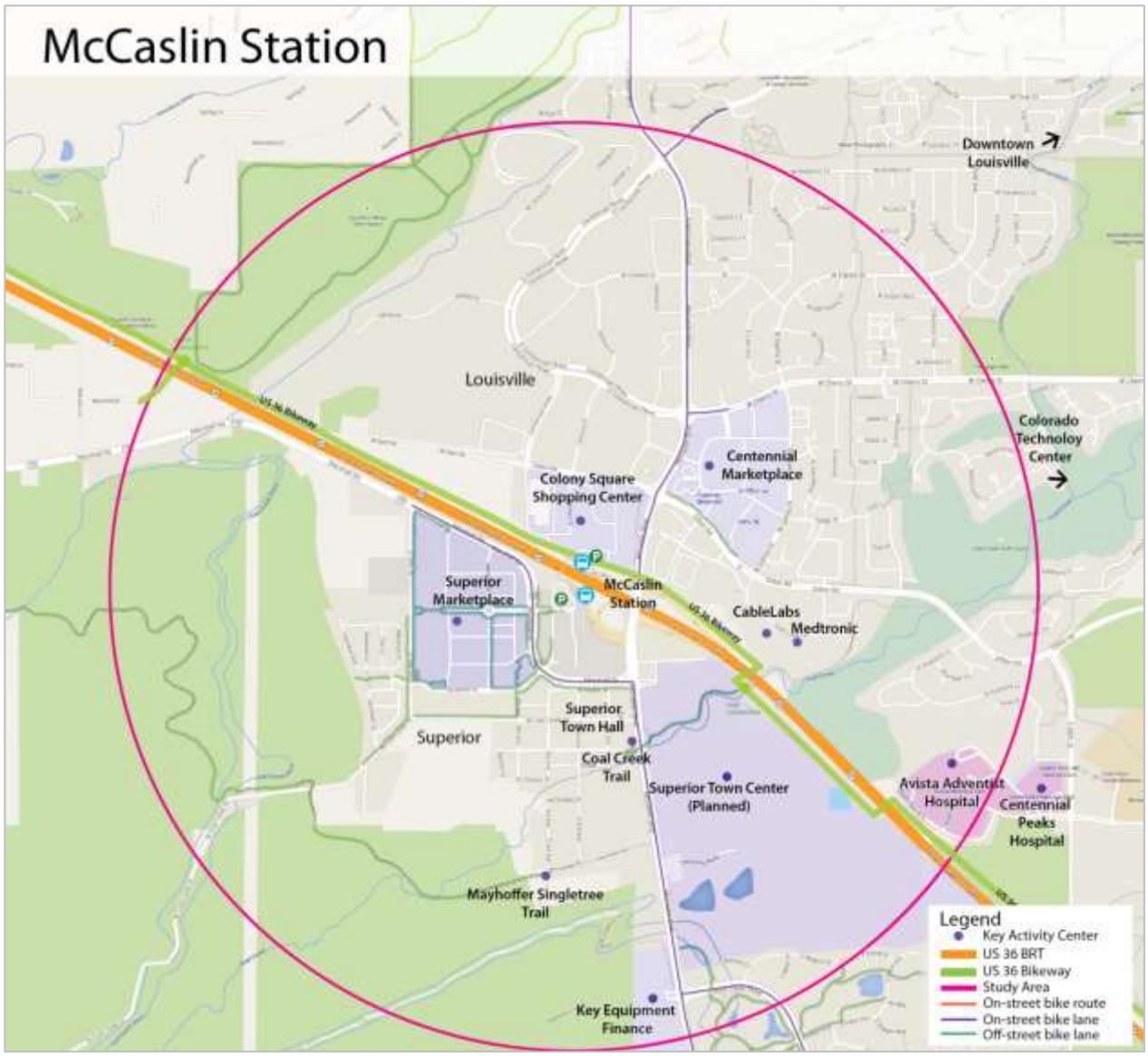

Figure 16 McCaslin BRT Station Area

Recommended Technologies: Employer-Provided Bicycle Fleets (near-term) / Smart Bike System (long-term)

With numerous key activity centers located outside of the immediate station area (distances that are too far to quickly walk), bicycle share has the potential to be extremely successful. Over the long term, it is encouraged that a coordinated automated bicycle share system be implemented with public stations at the McCaslin BRT Station, Superior Market Place, downtown Louisville, Davidson Mesa Open Space, and future development at the Superior Town Center and the former Sam's Club on McCaslin Boulevard. The Superior Town Center, while located within walking distance of the station, can still benefit from the additional mobility and transit accessibility brought by bicycle share.

Smart bikes would provide direct access to Louisville's downtown and commercial core and the extensive trail network around the McCaslin BRT Station.[26] For example, this station could become a gateway to the mountains and open space by connecting riders to the Coal Creek Trail, Eldorado Canyon State Park, the Davidson Mesa Open Space, and the Centennial Valley. As the planned Davidson Mesa underpass of US 36 is completed, there will be even more connections between Lafayette, Louisville, and Superior to the Eldorado Canyon State Park. Due to the extensive trail connections nearby, the Town and/or the City should consider studying the feasibility of a full-service bicycle station (with bicycle storage, long-term rentals, and bicycle maintenance facilities) or a long-term bicycle rental facility at this station.

With major employment centers such as the Avista Adventist Hospital (approximately 1 mile southeast) and the Key Government Finance Center (approximately 1 mile south), there are immediate opportunities for employer-provided bicycle fleets. Similar to the Broomfield and Flatiron BRT Stations, employer-provided bicycle fleets will have limited effect in serving the last mile transit trip from the station unless bicycles are available at the station.

Table Mesa BRT Station

Key Characteristics

- While there are some apartment buildings and multi-family residential areas around the immediate station area, the majority of land use is single-family residential.
- There are a number of parks and other open spaces within the station area.
- Lower commercial uses than with other BRT stations along the corridor.

Major Activity Centers

- Table Mesa BRT Station is approximately 2 miles from the south end of the University of Colorado Boulder campus.
- East Boulder Community Center is located approximately 1 mile east of the BRT station.
- Meadows on the Parkway shopping center, which includes a branch of the Boulder Public Library, is located approximately 1 mile north of the BRT station.
- Table Mesa Shopping Center, which includes a King Soopers, a bank, and restaurants as well as nearby apartments and a branch of the Boulder Public Library, is located approximately 1 mile west of the BRT station.

[26] Given the number of bicycle share stations that would be required, smart bikes may be the most cost-effective way of providing a bicycle share system, though a smart dock system may be explored as an idealized option.

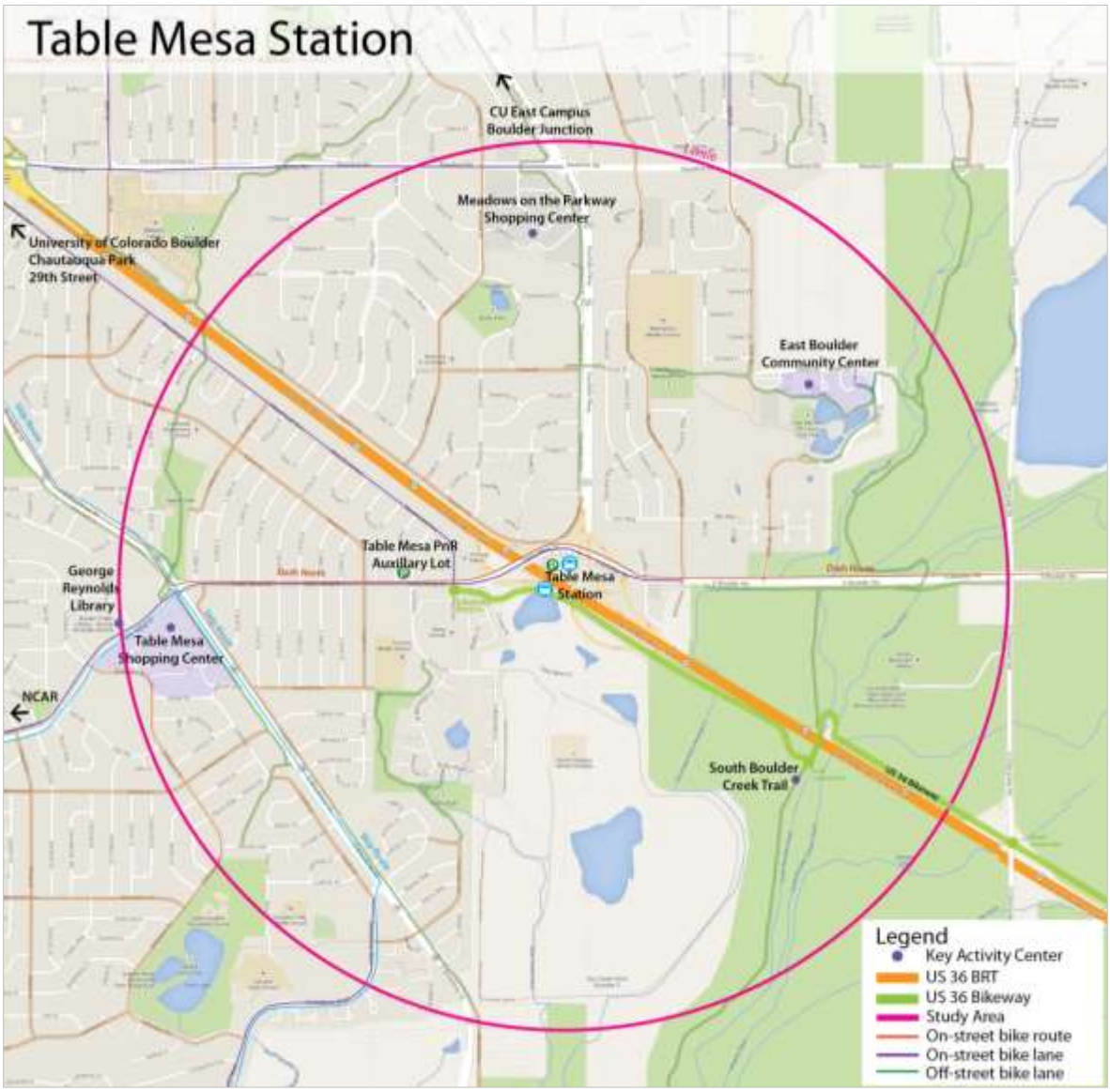

Figure 17 Table Mesa BRT Station Area

Other Considerations

Over the past year, Boulder B-cycle (a smart dock bicycle share system) has been expanding its coverage area. Future expansion is described in the organization's 2020 Vision Plan, which includes an expansion of the system south to Table Mesa by 2020 and stations at the Table Mesa BRT Station, in addition to those at 30th and Colorado Avenue, South Broadway Street and Table Mesa Drive.[27] Annual B-cycle memberships are reciprocal between systems so members

[27] Boulder B-cycle. 2020 Vision Plan—Full System Buildout. https://boulder.bcycle.com/LinkClick.aspx?fileticket=-5nsBUQSFjw%3d&tabid=1104

of Boulder B-cycle (including members using the future system at Table Mesa) would also have reciprocal membership to Denver's system.

Recommended Technology: Smart Dock System

With the southward expansion of Boulder's B-cycle system to the Table Mesa BRT Station expected by 2020, no other bicycle share system is recommended. Boulder B-cycle docking stations at the Table Mesa BRT station would provide bicycle share visibility and reliability, as well as a seamless service for Denver and Boulder B-cycle members who travel the US 36 Corridor. Additionally, the Table Mesa B-cycle station would enable transit riders to access the key activity centers via Table Mesa Drive, Thunderbird Drive, and the US 36 Bikeway.

Conclusion

The implementation of a fully-integrated, high-technology bicycle share system is a long-term transportation option for the Corridor. The following strategies can be implemented in the near term to lay the groundwork to develop a more comprehensive bicycle share system over the long term.

A central agency (such as 36 Commuting Solutions) should assume responsibility for advancing bicycle share along the Corridor. This agency would be responsible for coordinating stakeholders, making decisions regarding the development of the system, monitoring progress in the industry, and leading near-term efforts. In the near term, the central agency should develop educational resources for employers, apartment building managers, and other private entities to establish bicycle fleets (both low- and high-technology options) at their locations.

Over the long term, the agency should work with RTD and local agencies to implement a high-technology, publically-available bicycle share system at the seven stations and key destinations as outlined in this report. Ideally, this bicycle share system would integrate with the existing systems implemented in the near-term to create a holistic, public/private system oriented for the first and final mile of commuting trips in the corridor. The central agency may assume responsibility for fundraising, planning, and implementing the bicycle share system, including the purchase of equipment. This would allow organizations an easy pathway to setting up their own systems while providing a common technology platform, which is key for bicycle share system integration.[28] They may also take on operations or transition this responsibility to a third party.

Although smart bikes have not been implemented at a citywide scale to date, these systems offer the flexibility needed to serve each station area's low-density land uses in the most

[28] Low-technology equipment could include several options at a variety of price points. However, high-technology equipment should be sourced from one vendor so that these systems are compatible with a larger publically-available system in the future.

affordable manner. Upcoming launches of citywide smart bike systems in Phoenix, Hamilton, and other cities should be monitored to understand any issues or problems with operating these types of programs on a large scale.

Summary of Station Area Recommendations

The stations with the most potential for short- and long-term implementation of bicycle share are the Broomfield and Flatiron BRT Stations which have a significant number of large employers located at least one mile from the station. The McCaslin BRT Station may also have potential with two key employment campuses between one and four miles of the station.

The Westminster Rail, Westminster Center BRT, and Church Ranch BRT Stations have less potential for near-term employer-provided bicycle fleets but may be good candidates for a future automated bicycle share system. The dispersed land uses around these and all station areas lend themselves to smart bike systems that are less expensive per bicycle and can be distributed more freely than smart dock stations.

Stations where visitors and tourists are considered an important market, e.g., at the Church Ranch BRT Station, may be good locations for a private company to provide longer-term bicycle rentals.

The Table Mesa BRT Station is currently included in Boulder B-cycle's long-term expansion plans. The central agency should work with Boulder B-cycle, the City of Boulder, and RTD to help secure funding or to provide other resources to expedite the implementation of bicycle share stations at and around the Table Mesa BRT Station. There may be opportunities for Federal Transit Administration (FTA) or other public funding grants to support stations connecting to the US 36 BRT.

Appendix D

Attachment A: Bikeshare Feasibility Workshop Summary

Northwest Corridor Bicycle/Pedestrian Accessibility Study

Bike Share Feasibility Workshop

Thursday, October 16, 2014 2:00 – 3:30 PM

Attendees:

Name	Organization	Email
Genevieve Hutchison	RTD	Genevieve.hutchinson@rtd-denver.com
Melina Dempsey	DRCOG	MDempsey@drcog.org
Paul Aldretti	DRCOG	PAldretti@drcog.org
Alex Hyde-Wright	Boulder County	ahyde-wright@bouldercounty.org
Debra Baskett	City and County of Broomfield	dbaskett@broomfield.org
Audrey DeBarros	36 Commuting Solutions	Audrey@36commutingsolutions.org
Rich Dahl	City of Westminster	rdahl@CityofWestminster.us
Grant Penland	City of Westminster	gpenland@CityofWestminster.us
Alex Ariniello	Town of Superior	alexa@superiorcolorado.gov
Andrea Meneghel	CDR Associates	ameneghel@mediate.org
Jessica Juriga	Toole Design Group	Jjuriga@tooledesign.com
Adrian Witte (phone)	Toole Design Group	awitte@tooledesign.com
Geneva Hooten	Toole Design Group	Ghooten@tooledesign.com

Summary of Discussion

Toole Design Group (TDG) and its project team conducted a bike share feasibility workshop with stakeholder members. TDG presented an overview of bike share along with four key technologies. The group discussed goals for bike share within the corridor as well as benefits/disadvantages to each technology type.

Bike Share Technologies

Andrea Meneghel, CDR Associates, opened the meeting by stating the purpose of the meeting, facilitating a round of introductions and reviewing the agenda. Jessica Juriga (TDG) provided a general overview of the Northwest Corridor Bicycle and Pedestrian Accessibility Study and then focused the group on the objectives for the bike share task.

Adrian Witte, TDG, presented an overview of bike sharing, U.S. bike share programs, and the four primary technologies (please see the presentation for the information presented). The four bike share technologies are:

- Bike libraries,
- Employer-provided bicycle fleets,
- Smart bike systems, and
- Smart dock systems.

For each technology Adrian provided a case study, advantages, disadvantages, and an overview of inter-system compatibilities.

Discussion Points and Questions

Operations

- Bike share systems have both public and private sector operators. It is common for cities or local government agencies to own systems and contract the operations. The cities of Boulder and Denver have created non-profits to own and operate their bike share systems.
- Typically, cities own the systems and place stations on city-owned land. In other situations, private operators lease systems to the city or cities provide the land as an in-kind contribution.

System Features – Bikes and Helmets

- No systems in the US are using electric bikes. There are systems in Europe doing so and some European vendors are beginning to enter the US market.
- Helmets are not often provided. When they are used, the liability is often carried by the provider, not the agency. Typically helmet use is low due to users being spontaneous trip-makers. Where you have annual memberships for bike share programs, helmet use is higher. Some systems have helmet vending machines.

How is your community discussing bike share systems?

- The City and County of Broomfield has discussed what can be successful given land use and geographic layout. Nothing regarding bike share is in the comprehensive plan, but the concept has been thought about and discussed.
- The City of Westminster has tied bike sharing to visitor use and discussed systems near retail or recreation areas and trails.
- The Town of Superior sees bike sharing more as a transportation demand management application around the future town center.

Who would use bike share in your communities?

- Employees of major corridor employers
- Visitors
- Commuters
- Those making in-community trips

Goals for Bike Share

The stakeholder group discussed goals for bike share within the US 36 Corridor. Using a simple voting structure, the group decided on a goal ranking. However, with greater discussion and debate, the group decided that bike share should complement and extend transit and support commuting trips. The other goals are ranked as following:

1. To complement and extend transit
2. To support commuting trips
3. To encourage and support recreational trips (tourists and visitors to the corridor)
4. To support economic development (including tourism, businesses, retail, etc.)
5. To provide accessibility to all socio-economic groups

Voting on goals led to greater discussion and debate, including the following comments:

- To grow bicycling in the corridor as an additional mode of travel/commuting is an important goal; to grow it in a recreational sense isn't as high of a priority.
- To grow bicycling in the corridor is implied within all of the goals.
- The First and Final Mile Study and a potential bike share program all reflect the ultimate goal of increasing transit ridership throughout the US 36 corridor.

Due to the importance of understanding stakeholder goals for bike share, a follow-up question is included as part of an online survey.

Corridor Consistencies, Costs and Ridership

- It is important to have some consistency and compatibility throughout the corridor for the bike share systems. However, systems may have to be station specific given that each station area has very unique and distinct needs.
- Investment costs and pricing models need to fit community specific purposes.
- The final report for this task will include capital and operational cost estimates.

Next Steps

The project team will be sending the Northwest Corridor Working Group members a survey to solidify bike share goals, key destinations, and recommended bike share technology for the seven stations under study.

After obtaining this information, the project team will complete a bike share feasibility memo to be sent to Stakeholders on November 12, 2014. All comments are due back to the project team by November 19, 2014.

Appendix E
Future Actions to Consider

Future Actions to Consider

Based on stakeholder feedback received on the Draft Summary Report and Appendices, the following list of future action items was compiled. The Summary Report also includes a broader list of future implementation considerations, including continued collaboration. The Corridor Working Group should use these lists to facilitate future decision-making and detailed design for the first and final mile improvements.

Topic	Future Action to Consider
Branding & Wayfinding	Material details for the wayfinding signs—such as stone versus cast concrete bases, graffiti coatings, and hardware—should be discussed during the next phase of design.
	During the next design phase, once materials are chosen, specific maintenance considerations (such as how often signs would be replaced, how graffiti should be removed) should be discussed.
	During the next design phase, the detailed placement of signs for all station study areas should be conducted.
	Some of the proposed signage is on RTD property. As such, further discussions with RTD will be needed so that all station signage is coordinated.
	Consider adding a sign type for a directional sign with smaller maps, to be used within the station study areas.
Connectivity Improvements	The conceptual design plans were prepared using high-resolution aerial imagery, as GIS data received from the Corridor communities was inconsistent. As the design progresses to the next phase, a planimetric survey should be conducted and detailed data, such as topography and parcel boundaries, should be incorporated.
	The City & County of Broomfield requested an extension of the Flatiron route to Nickel Street. Though this extent is out of the scope of this project, the extension should be considered as part of a future phase of design.
Secure Bike Parking	The advertising policies for RTD, CDOT, and local communities should be explored to determine whether advertising and/or sponsorship could be applied to the Bike-n-Ride shelters.