



SALT LAKE CITY

9-LINE TRAIL EXTENSION STUDY

JANUARY 2018

ACKNOWLEDGEMENTS

Salt Lake City wishes to thank the organizations and individuals who contributed to this project. This was truly a collaborative venture that could not have happened without the input, creativity, and participation of many people and many organizations. Thank you all.

ABBREVIATIONS

ADA	Americans with Disabilities Act
AADT	Annual Average Daily Traffic
BST	Bonneville Shoreline Trail
CATNIP	County Active Transportation Network Improvement Program
FHWA	Federal Highway Administration
FTN	Frequent Transit Network
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
UDOT	Utah Department of Transportation
UPRR	Union Pacific Railroad
UTA	Utah Transit Authority
WFRC	Wasatch Front Regional Council





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CHAPTER 1

INTRODUCTION



PREVIOUS PLANNING EFFORTS

The concept of the 9-Line Corridor (formerly referred to as the Transvalley Corridor) dates back almost 25 years to the 1992 Open Space Master Plan. The original vision sought to connect east and west Salt Lake City by linking neighborhoods and parks via a system of urban trails. Since that time, a number of planning efforts and studies have been developed that focus on various segments or issues within the corridor such as transportation, land use, redevelopment, and recreation. The review of existing studies (below) summarizes the important role that the 9-Line Corridor can play in connecting, revitalizing, and enhancing the various neighborhoods through which it passes.

1992 Salt Lake City Open Master Plan

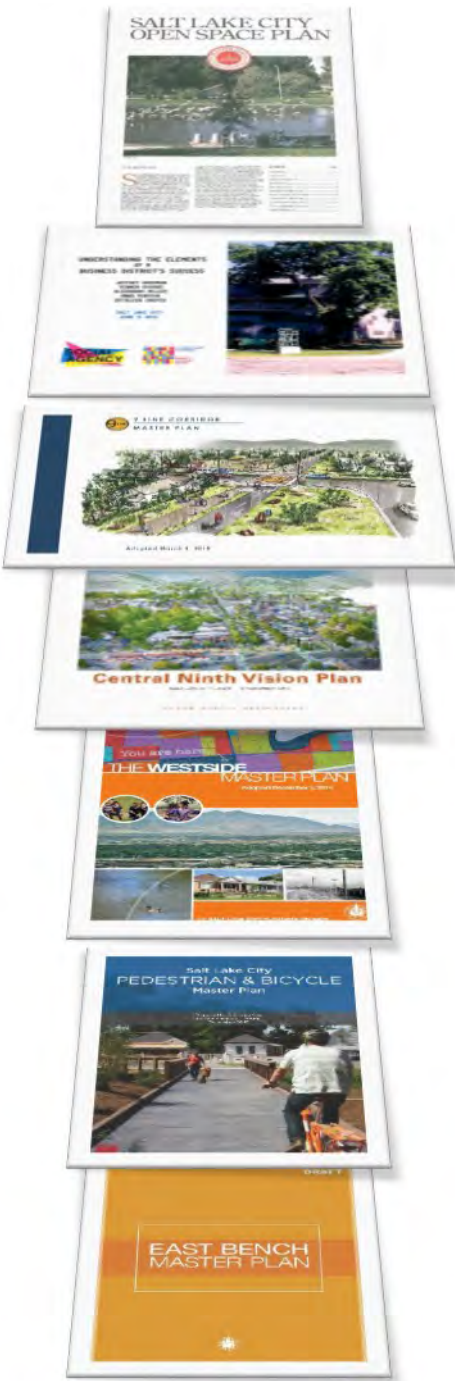
The 1992 Open Space Master Plan established the original vision for the Transvalley Corridor. Planned to connect the east and west sides of Salt Lake City while accessing many existing parks, the route originally followed Sunnyside and 800 S before connecting with the Union Pacific rail corridor (now the 9-Line). From there the route was proposed to travel west and link up with Indiana Ave. Much has changed since the 1992 plan was created, however the concept of linking east and west Salt Lake City with a network of non-motorized routes still remains relevant and of interest.

Westside Master Plan Update

The Westside Master Plan establishes a vision for the neighborhoods bound by I-80 on the north, SR 201 on the south, I-215 on the west, and the I-15 corridor on the east. In particular the plan identifies a series of development nodes that were established through the public process as opportunity sites. Many recommendations possess opportunities for synergy with the 9-Line Corridor such as:

- Develop a community commercial node at 900 South & 900 West.

- Create a pilot program for wayfinding and orientation incorporating the community nodes and assets such as the Jordan River Parkway and the 9-Line.
- Develop ways to link the 900 S / 900 W intersection to the 9th & 9th neighborhood through design elements such as pavement markings, signage, or special road signs.
- Highlight the intersection of Redwood Road and the 9-Line. Consider buying property to establish a new public space or incentivizing development to activate the area.
- Reinforce the “River District” and implement urban design improvements for streets and sidewalks that support the river theme.
- Develop the Surplus Canal Trail including a wayfinding system and design elements that celebrate the industrial nature of the corridor.
- Explore the development of a small summer recreation center supporting canoeing and kayaking near the Surplus Canal.



9-Line Corridor Master Plan

The 9-Line Corridor Master Plan seeks to guide the development of improvements along the former rail corridor by identifying recreation, transportation, community development, and placemaking treatments and nodes of activity. Recommendations are separated into three distinct zones:

- Trailway, including the trail and its supporting furnishings
- Corridor, including the area beyond the trailway but within the ROW and;
- Adjacent Land Uses & Buildings, including the proposed development nodes

Recommendations for the trailway include a number of elements such as:

- Addition of a future pedestrian path and conversion of the existing trail to a dedicated bicycle path when future demand necessitates expansion.
- Development of a rain garden between the existing trail and future pedestrian path.
- Water-wise landscaping improvements including new shade trees and a native grass seed mix providing all-season interest.
- Rest areas including benches, lighting, trash receptacles or other amenities located approximately every mile along the corridor.

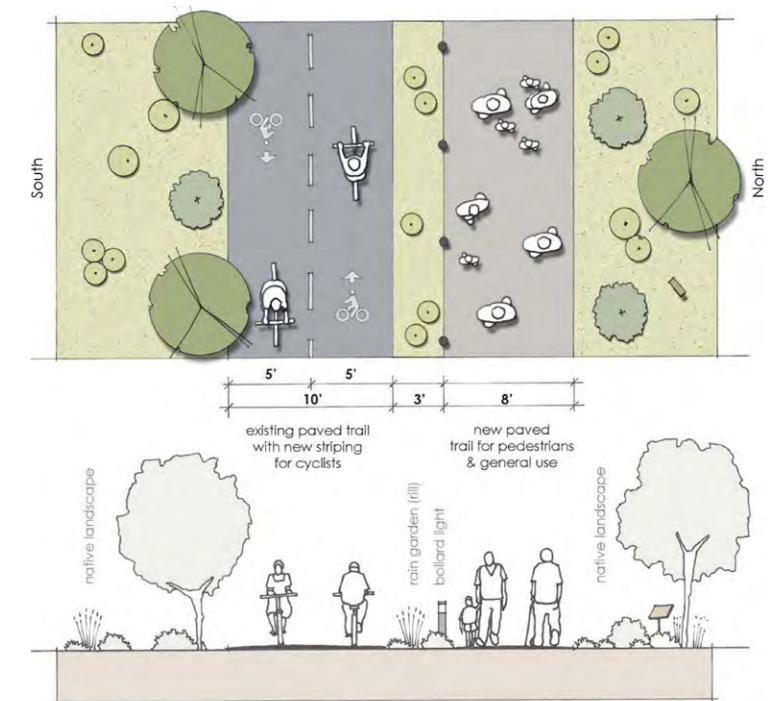
- Wayfinding signage that recognizes the area's history and accounts for the large non-English speaking populations near the corridor
- Bollard lighting to promote extended use of the trail while mitigating the social and environmental effects of light pollution
- Opportunities for public art
- Gateways at key locations to bring awareness and visibility to the corridor
- Trail intersection improvements that promote safety and contribute to the corridor's identity through special pavement or branding

In addition, the 9-Line Master Plan also identified a number of key nodes along the corridor. These include:

- Surplus Canal Node
- Redwood Node
- Navajo Node
- Oxbow Node
- 900 West Node
- I-15 Node
- Central Ninth Node

Salt Lake City Pedestrian and Bicycle Master Plan Update

The 2015 Salt Lake City Pedestrian and Bicycle Master Plan Update seeks to accommodate and encourage biking and walking by residents of all ages and abilities. The Plan describes the 9-Line Corridor (Transvalley Corridor) at a conceptual level and shows the alignment on either 800 S or 900 S from Emigration Canyon to the Surplus Canal. A number of existing and proposed bikeways and trails interface with the 9-Line throughout its nine-mile extent. Existing and future connections can be found on the map on pages 10 and 11.



9-Line Proposed Cross-sections (Image Credit: CRSA)

Mormon pioneers enter the Salt Lake Valley via Emigration Canyon

1847

University of Deseret (later known as University of Utah) is established

1850

Liberty Park constructed

1882

Oregon Short Line constructs 1 mile of track along 900 South west from their mainline at 400 W

1900

East High School is founded

1913



Hogle Zoo opens in its current location near Emigration Canyon

In the future, the 9-Line Corridor could have a pedestrian path parallel to the existing paved trail, which would be reserved for bicyclists and other wheeled uses.

SLC RDA designates the West Temple Gateway Project Area encompassing Central Ninth

1931

1981

900 S Social Agency Lab Report

A 2014 report on the elements of a business district's success by the Social Agency Lab at Harvard University's Department of Urban Planning and Design recommends a number of strategies to connect and revitalize neighborhoods along 900 S from 900 E to 900 W. The report analyzes what has allowed the successful revitalization of 9th & 9th East as a neighborhood node, and attempts to translate those principles to achieving success at Central Ninth and 9th & 9th West. Recommendations include:

- Establish business improvement districts to foster placemaking efforts and champion the vision for the neighborhood
- Connect the corridor through streetscape improvements, wayfinding, and a protected bike lane
- Bring bike share to the corridor
- Construct planted medians at key nodes throughout the corridor

Central Ninth Vision Plan

In 2011, SLC RDA staff conducted a neighborhood survey that determined that streetscape improvements were the preferred investment desired by the Central 9th community. In response to this, the RDA initiated the 900 South Streetscape charrette on November 12th through 15th of 2015. The goals resulting from the charrette were to:

- Maximize on-street parking
- Support bicycle infrastructure, and;
- Maximize the installation of street trees within the project area.

Base on these goals, the design team developed a concept for the corridor with a calmed street with median parking and enhanced opportunities for street trees. New mid-block crossings facilitate improved pedestrian mobility while a raised, protected bike lane was proposed to facilitate bicycle movement through the site. The conceptual design was presented to the public on the last night of the charrette. The RDA is currently pursuing engineering and implementation of the concept developed through the three day charrette.

East Bench Master Plan

The East Bench Master Plan serves as the guide for the development of the East Bench area encompassing numerous neighborhoods including Yalecrest, Wasatch Hollow, Foothill Sunnyside, Bonneville Hills, Beacon Heights, Sunnyside East, and East Bench. In addition, the East Bench includes a number of regional institutions and cultural destinations such as the University of Utah, Research Park, and Utah's Hogle Zoo.



Central Ninth Vision Plan
(Image Credit: Urban Design Associates, Inc.)

The East Bench Master Plan specifically identifies implementation of the 9-Line (Transvalley Corridor) as an important component of the plan. In addition, the plan calls for:

- Expanded sidewalks and green spaces on the north side of Sunnyside Ave. between 1300 East and Foothill Drive
- Construction of a dedicated shared use path
- Improvement of the pedestrian experience with shade trees and rest areas
- Improvement of the pedestrian and bicycle crossing at Foothill Drive
- Improvement of the bicycle and pedestrian facilities east of Foothill Drive to the Bonneville Shoreline Trailhead
- Improvement of the Bonneville Shoreline Trailhead in coordination with the City, This is the Place State Park, and Hogle Zoo utilizing existing parking facilities in a joint agreement
- Development of a wayfinding and branding program that links the corridor to the 9-Line

Other Relevant Studies

In addition to the previously summarized studies, a number of other complete or on-going planning efforts have been initiated that also affect the 9-Line Corridor. These include:

- Foothill Drive Implementation Study (ongoing)
- Salt Lake City East-West Connectivity Study (pending)
- The Salt Lake City Transit Master Plan (2017)
- The Salt Lake City Downtown Streetcar Alternatives Analysis (ongoing)
- Salt Lake City Downtown Master Plan (2016)
- GREENbike Strategic Implementation Plan (2014)

Salt Lake City Parks and Open Space Plan completed identifying the Transvalley Corridor

1992

SLC RDA designates the Granary District Project area

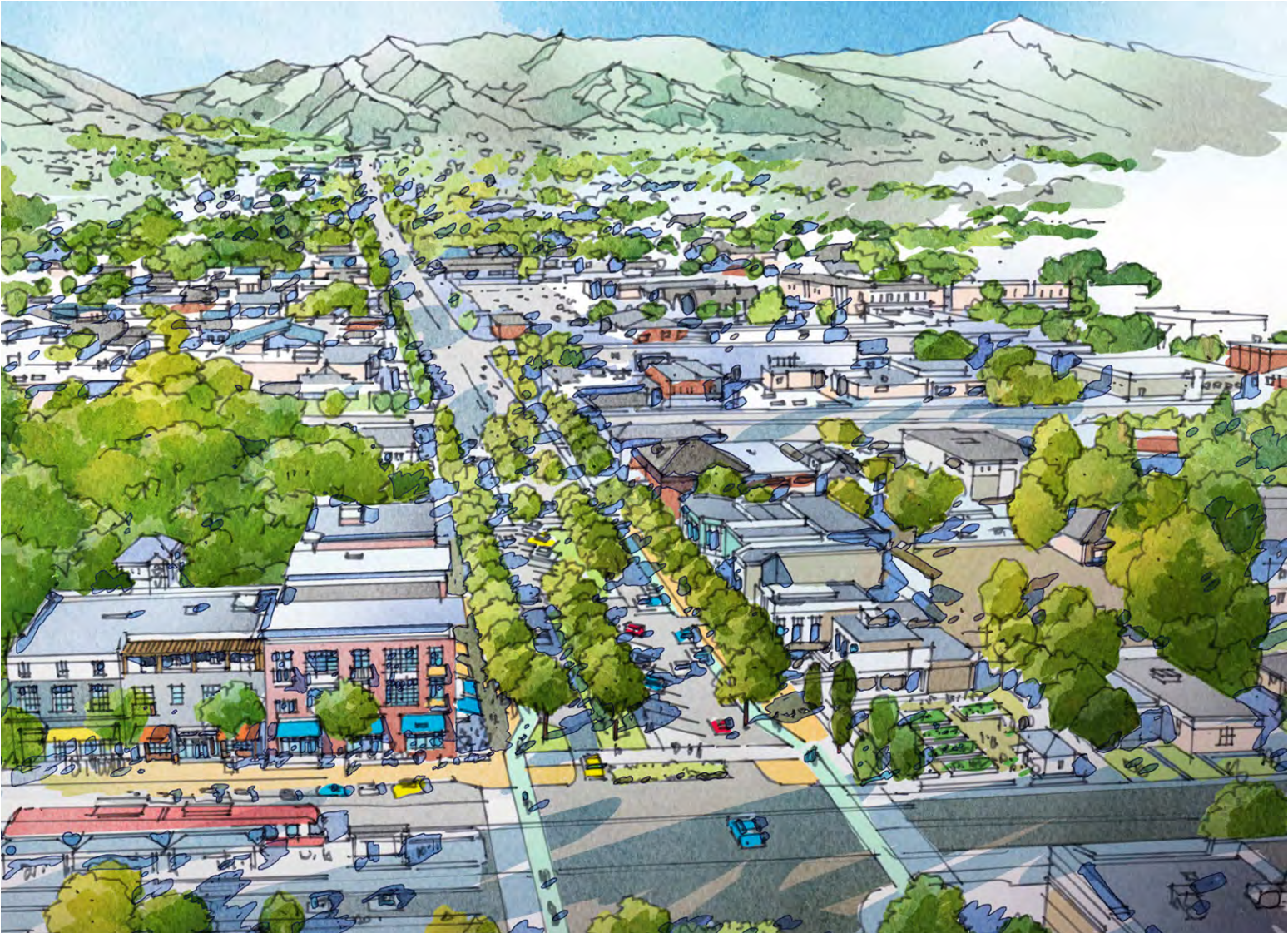
1999

State Transportation Board approves abandonment of 900 South rail line

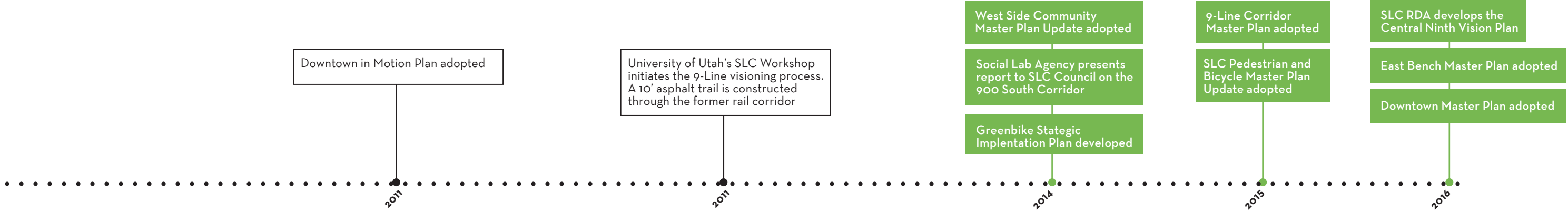
2006

- Salt Lake City Downtown in Motion (2008)
- University of Utah Campus Master Plan (2008)

These various efforts support the vision of the Transvalley Corridor as a vibrant, green, and multi-modal corridor connecting east and west Salt Lake City.



Central Ninth Vision Plan rendering (Image Credit: Urban Design Associates, Inc.)

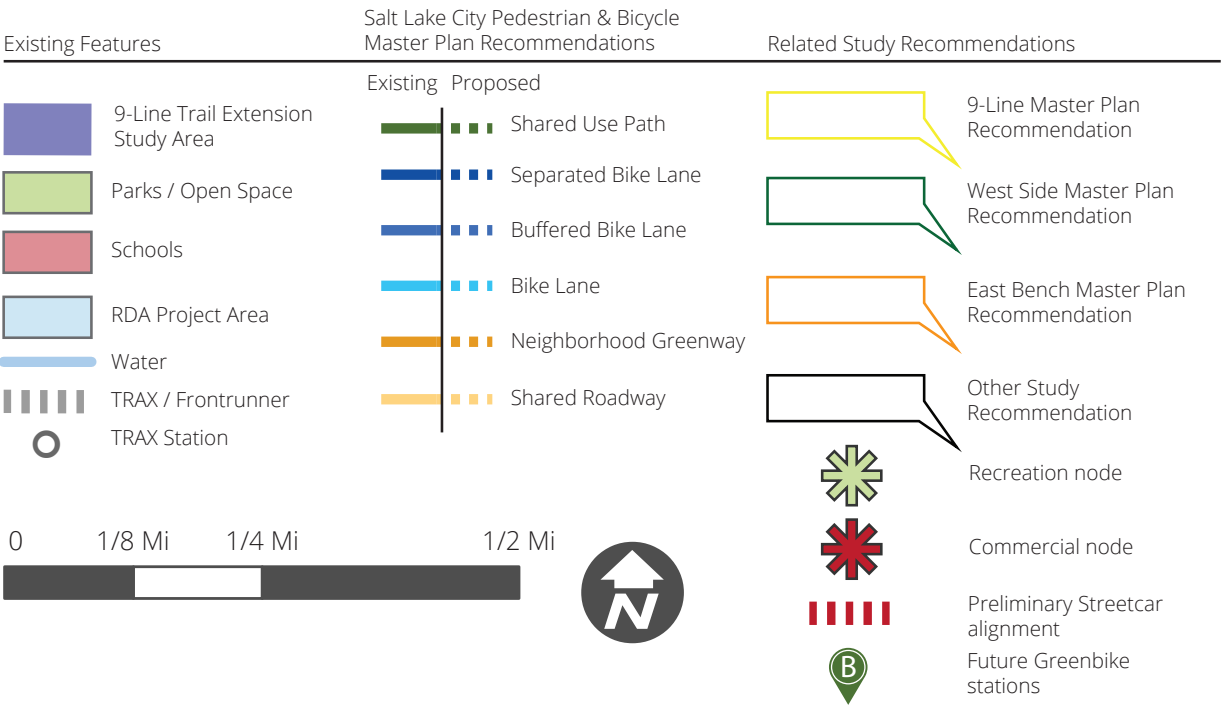


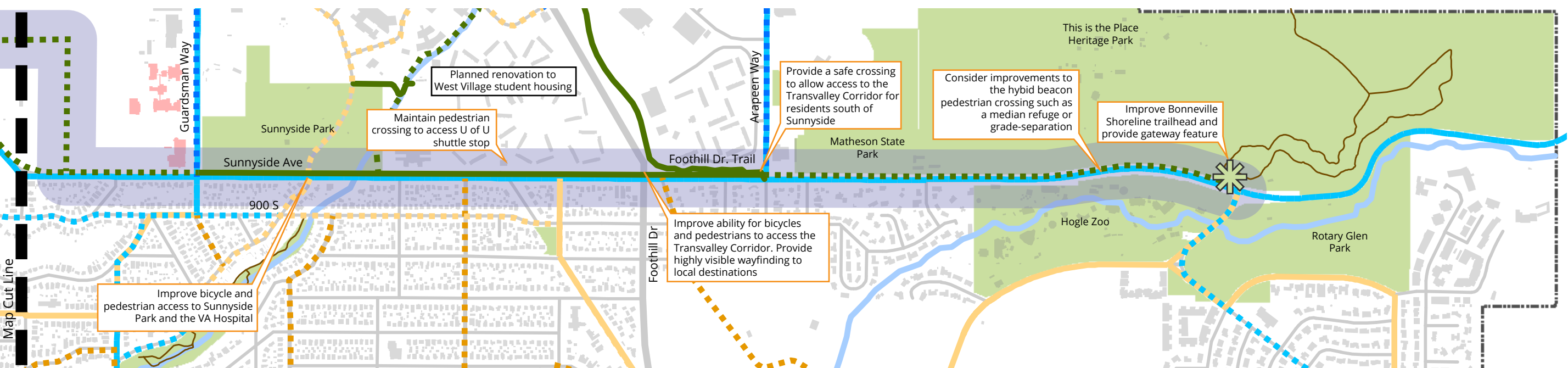
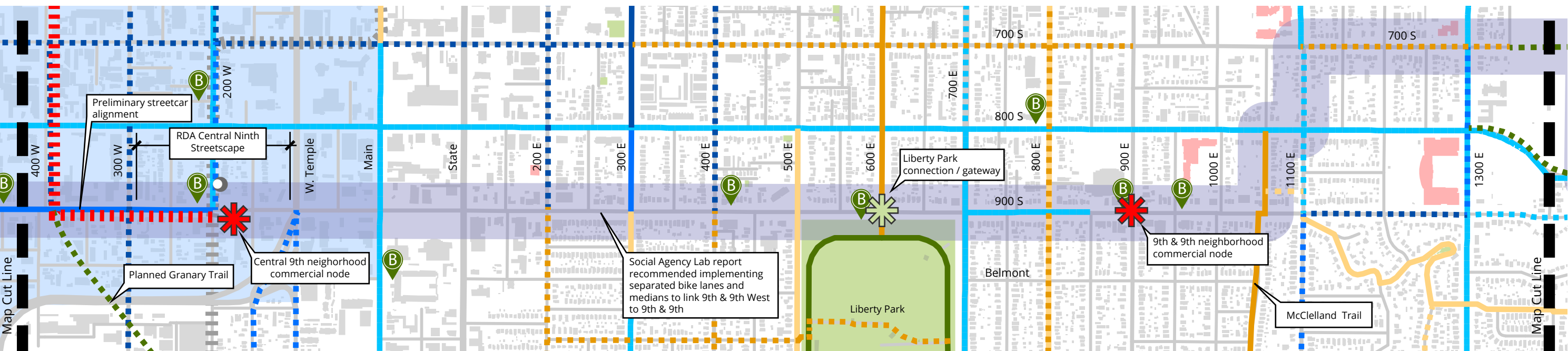
SUMMARY OF ASSOCIATED STUDIES



The Comprehensive 9-Line Corridor Vision

Since the 9-Line (Transvalley Corridor) concept was developed in 1992, numerous master plans and studies have continued to embrace and enhance the concept of a distinct, attractive and low-stress non-motorized transportation corridor that contributes to a variety of community goals such as recreation, economic development, green infrastructure, placemaking, and mobility. Although realizing this vision will require widespread coordination among public agencies, neighborhoods, and institutions; it also presents a significant opportunity to share resources and leverage investments. As the case studies later in this chapter will demonstrate, there are notable and successful precedents where active transportation projects have served as a catalyst to unlock significant and diverse community benefits.





VISION AND GOALS

In order to propose the vision for the 9-Line Trail Extension Study, the Planning Team looked at both previous Salt Lake City planning efforts and national examples of transformative trail projects.

Planning Context of the 9-Line

In order to build upon the initial vision of the Transvalley Corridor (now referred to as the 9-Line Trail Extension), the Planning Team reviewed vision and goals statements from numerous neighborhood and city master plans that possess potential synergy with the concept of a cross-city bicycling and walking facility. The resulting goals from other planning efforts were summarized and categorized (on page 13) to develop an updated framework for the 9-Line Trail Extension Study.

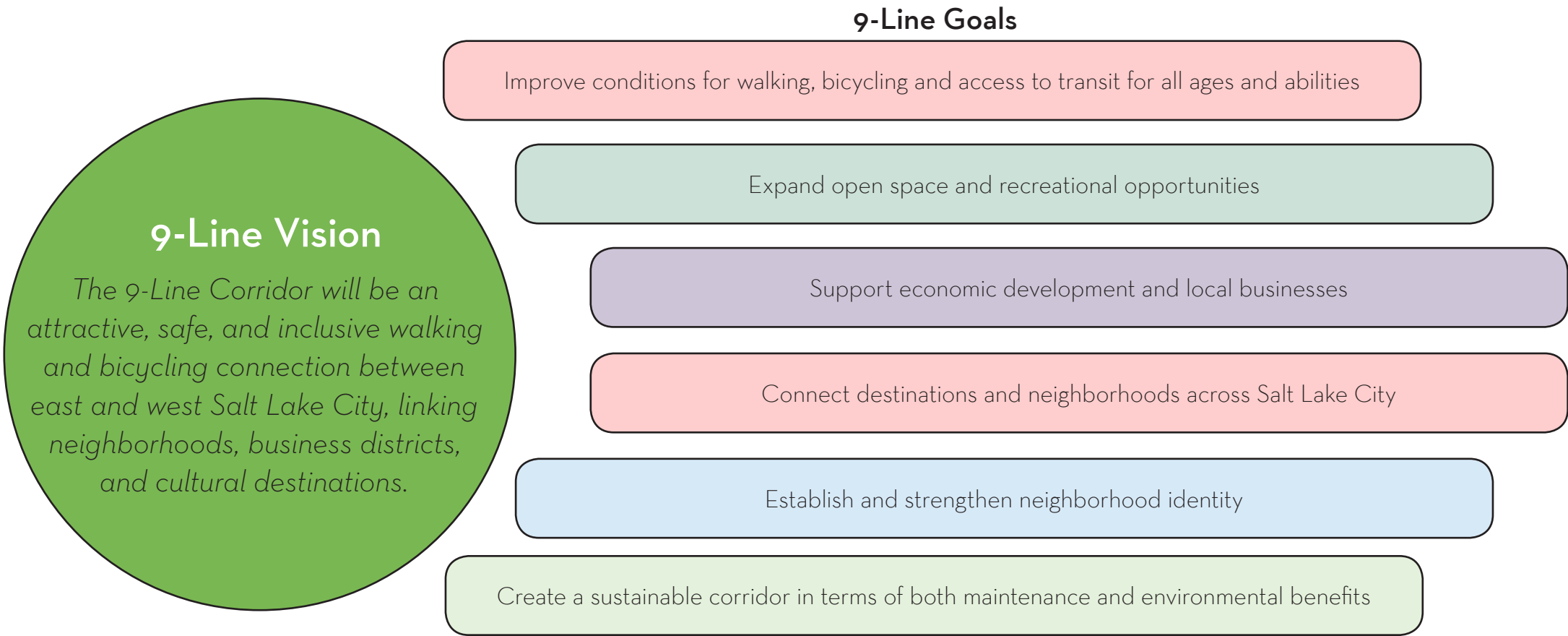
Based on this comprehensive understanding of how the 9-Line contributes to a variety of the City’s goals related to active transportation, open space, community development, placemaking, equity, and transit, the Planning Team established the vision statement and goals below to guide the development of the project.

Examples of Transformative Trail Projects

Due to the 9-Line’s key role in meeting a variety of City goals, this plan presents national examples of places where trails have created transformational changes in their communities. These projects not only provide new active transportation connections by linking residents and visitors to local destinations, they have also spurred economic development, revitalized neighborhoods, improved connections to transit, and created a destination unto themselves that have strengthened local communities and economies.

Two of the most prominent national examples of trails that have created transformational changes in their communities are the **Indianapolis Cultural Trail** and the **Atlanta Beltline**. Although

these trail projects were major capital investments made over many years, their worth has been proven by millions of dollars in redevelopment and local investment since construction. Pages 14-17 profile each respective project.



9 LINE CORRIDOR IMPLEMENTATION STUDY: SAMPLE GOALS FROM RELEVANT PLANS

Previous Study	Active Transportation	Open Space / Recreation	Community Development	Placemaking	Equity	Transit Integration
9-Line Corridor Master Plan	Connect stable residential neighborhoods, growing commercial and neighborhood centers	Promote thriving recreation locations.	Feature retail, service, recreational, and educational options at key nodes along the 9 Line, as well as encouraging and facilitating connections to neighborhood nodes in the surrounding community.	Serve as a mechanism for the neighborhoods of West Salt Lake to celebrate their history and character by functioning as a community and cultural asset that connects people of all ages to services and educational opportunities	Program the trail and its nodes to allow use by a range of user groups – intergenerational, multiple non-motorized modes, and multiple speeds/uses. Whether it is a person strolling through to enjoy the landscaping and nature or a commuter passing through to their job, the trail will recognize and embrace this diversity.	
	Provide the opportunity to enhance resident connections to the surrounding businesses and neighborhoods that form a unique and attractive community					
	Improve physical and cultural connections between the east and west sides of the City that in turn offer regional connections	Become the primary destination in Salt Lake City for river recreation and other types of parks and public spaces.		Support connections to the history of the area and the culture of the corridor and surrounding neighborhoods. Incorporating art, lighting, and including/programming areas that celebrate this culture (restaurants, cafes, and other gathering spaces). Creating layers of activity and experiences for all users. Stitch into surrounding neighborhoods, complement/enhance them. Enhance and enliven spaces along, adjacent to, and nearby the corridor.		
	Support connections to the West Salt Lake industrial business community, helping it continue to be a healthy and diverse growing employment and economic base for Salt Lake City.					
	Design the trail and its surroundings to create a corridor that is safe for pedestrians, cyclists, and other non-motorized users.					
Salt Lake City Pedestrian and Bicycle Master Plan Update	Develop a safe, comfortable, and attractive walking and bicycling network that connects people of all ages, abilities, and neighborhoods to the places they want to go.	Provide opportunities for recreational bicycling.	Integrate walking and bicycling into community planning to enhance livability, health, transportation, the environment, and economic development.		Recognize that walking and bicycling are the most affordable transportation choices.	Integrate pedestrian and bicycle facilities with transit routes, stations, and stops.
Westside Master Plan Update	Enhance and expand the internal network of assets, nodes and resources ensuring that all residents and employees in the Westside have access to goods, services and activities and the opportunity to walk or bicycle safely to them.	Make the Westside a destination synonymous with recreation, trails, open space and the outdoors by celebrating and spotlighting the Jordan River, the Jordan River Parkway, the 9 Line and the community’s parks and natural spaces.	Promote reinvestment and redevelopment in the Westside community through changes in land use, improved public infrastructure and community investment to spur development that meets the community’s vision while maintaining the character of Westside’s existing stable neighborhoods.	Create a beautiful community with a system of guidelines to create and strengthen public spaces that will foster community interaction and pride and catalyze ongoing redevelopment and growth.		
	Strengthen the connections both within and between the Westside and other parts of Salt Lake City by improving the community’s gateways and corridors and strengthening the transportation network for all modes of travel.					
East Bench Master Plan	Create major streets that serve as primary transportation corridors and provide multiple choices for moving people safely and efficiently.	Ensure that all East Bench residents are in close proximity to a variety of year round and well maintained recreational opportunities.		Promote development and infrastructure improvements that complement the unique architectural styles and development patterns that define individual neighborhoods.		
	Create major streets that are not perceived as barriers between neighborhoods. Intersections should create active and safe nodes that connect neighborhoods.					
	Improve bicycle and pedestrian connectivity to regional destinations .	Preserve the Wasatch foothills as the scenic backdrop of the City for wildlife habitat and recreation.		Invest in social development and infrastructure improvements that create friendly, safe, and welcoming neighborhoods that encourage interaction through all stages of life.		
	The East Bench mobility network will provide a efficient, safe, and accessible transportation system that provides multiple options for connecting people to employment, services, shopping, entertainment, recreational and cultural opportunities within the East Bench community, and connects the East Bench to the City and region.	Provide riparian corridors and other open spaces that include opportunities to interact with nature, are natural trail corridors that connect the City’s open space resources, and provide habitat for wildlife and native vegetation.		Create major streets that provide a sense of arrival and showcase the City’s approach to transportation, land use and sustainability.		
Salt Lake City Transit Master Plan	Improve bicycle and pedestrian access to transit.		Create economically vibrant, livable places that support use of transit.	Provide a complete transit system that supports a transit lifestyle.	Provide access to opportunity for vulnerable populations.	Increase the number of people riding transit.

CASE STUDY: THE INDIANAPOLIS CULTURAL TRAIL

Revitalizing Downtown Indianapolis

The Indianapolis Cultural Trail was originally conceived as a way to connect and catalyze the City of Indianapolis's six downtown cultural districts. Much like the 9-Line Corridor, these districts each possessed their own unique identities with historic buildings, restaurants, museums and destinations. The Central Indiana Community Foundation (CICF), initiated the project seeking to replicate the success of Indianapolis's Monon Trail by providing a downtown greenway linking the area's existing cultural assets. In 2006, the City assembled the design team to develop a detailed feasibility study that identified the final route and provided a preliminary cost estimate. Following development of the feasibility study, the team sought to implement a pilot project to demonstrate that the proposed facility (a combination of shared use path and two-way protected bike lanes) could work. At the time, few examples of protected bike lanes existed in the U.S. All funding for the five-block pilot project was raised from private sources which allowed the design team to specify quality materials and treatments to build support and momentum for completion of the trail.

Implementation of the trail was made possible through a series of "lane reconfigurations" on Indy's downtown streets. Specific design elements of the project include a trail/protected bike lane surface constructed of tightly fitting pavers, traffic signal modifications to allow dedicated phases for trail users, ADA improvements, landscaped stormwater planters, lighting, and public art.

To fund the project, the Mayor of Indianapolis initially committed to raising \$15 million in Federal transportation funding. Then, in 2006, Eugene and Marilyn Glick donated an additional \$15 million for the naming rights. Private fund raising continued until 2010 when Indianapolis was awarded a \$20.5 million Transportation Investment Generating Economic Recovery (TIGER) grant. Nearly \$20 million went to replacing aging city infrastructure like sewers and roadways.

Early on it became evident to the project partners that a separate non-profit would be needed to operate and maintain the trail. As part of the fundraising, CICF created a maintenance endowment of \$6 million. Indy Cultural Trail Inc. (ICT) was formed as the voice for the trail and now administers this endowment to perform maintenance for landscaping, electrical issues, and snow removal. A Memorandum of Understanding between ICT and the City of Indianapolis further defines maintenance responsibilities with the City performing upkeep on the hardscape elements, traffic signals, and pavement markings.

Since development of the Cultural Trail, Indianapolis has achieved a number of other related successes. ICT opened Pacer's Bike Share in 2014 and has seen strong ridership. Pacer's Bike Share benefits immensely from the Cultural Trail, which provides a safe and comfortable facility for bicyclists of all abilities and creates a clear and attractive connection to the area's major tourism destinations. Most bike share stations are located on, or within a few blocks of the Cultural Trail. The Indy Bike Hub also opened in 2013 with a location directly on the Cultural Trail. The Bike Hub serves bicycle commuters by offering secure bike parking, showers, and changing rooms. A small fitness area and bike shop is also provided on-site. The facility is run through a public-private partnership with the YMCA.

Several parallels exist between the Indianapolis Cultural Trail and the 9-Line Corridor. Like the Cultural Trail, the 9-Line Corridor offers the potential to link several unique destinations and neighborhoods with bicycle and pedestrian facilities, spur redevelopment in transitional neighborhoods, showcase public art, and contribute to an attractive streetscape setting.

Project Summary:

Description: A combination of shared use paths and two-way protected bike lanes surrounding Downtown Indianapolis including hard and softscape streetscape improvements, public art, lighting, wayfinding, and low impact design stormwater treatments

Length: 8.0 miles

Cost: \$63 million (\$27.5 million in private donations & \$35.5 million Federal Funds)

Year Completed: 2012

Ongoing Maintenance: Shared between the City of Indianapolis and the non-profit, Indianapolis Cultural Trail, Inc.

Outcomes: Revitalized downtown Indianapolis neighborhoods and has fostered a newfound interest in bicycling leading to additional bicycle infrastructure projects and the implementation of new bike share system



Alabama Street section of the Indianapolis Cultural Trail



Pacers Bike Share users along the Indianapolis Cultural Trail

Developers who cited “proximity to the trail as a major reason” for selecting their sites, have accounted for over \$300 million in development since 2008. Previously struggling areas of Downtown such as Fletcher Place and Fountain Square have seen significant revitalization since the trail was installed.

CASE STUDY: THE ATLANTA BELTLINE

A Visionary Community Development Project

The Atlanta Beltline represents one of the most comprehensive economic development and transportation projects currently underway in the U.S. The project was conceived by a Georgia Tech Masters student in 1999 and has evolved from a grassroots campaign into a multi-agency, multi-billion dollar recreation, transportation and economic development effort.

The Atlanta Beltline is in the process of repurposing a historic 22-mile rail corridor that encircles that City of Atlanta. 22 miles of streetcar lines and 33 miles of shared use paths will follow the corridor and connect to key destinations around the City. In addition, 1,300 acres of greenspace, public art, streetscape improvements, and 5,600 affordable workforce housing units are proposed. When complete, the Beltline will link 45 individual neighborhoods throughout Atlanta with trails, streetcar, and connectivity to Atlanta's commuter rail, MARTA.

Atlanta Beltline, Inc. (ABI) was formed in 2006 by the Atlanta Invest to serve as the non-profit champion and implementor of the Atlanta Beltline vision. A non-profit sister organization, Atlanta Beltline Partnership, raises private capital and promotes broad-based support for the Beltline vision by conducting outreach and hosting a number of events and programs associated with the project. With an anticipated cost of \$4.8 billion, a creative and diverse approach to funding has been required. A primary funding mechanism has been the creation of a Tax Allocation District. Local, state and federal governments, Atlanta Public Schools, MARTA, the PATH foundation, and the Trust for Public Lands have also been funding partners in the Beltline's development. The Atlanta BeltLine has generated a direct economic impact of more than \$2.4 billion dollars in private development. This is six times greater than the total public/private investment of \$400 million to date.

Although the scale of the Atlanta Belt Line is much larger than that of the Transvalley Corridor, there are similarities between the two projects. First/last mile connectivity, redevelopment, open space, placemaking, public art, and even affordable housing are common threads between the two projects. The Atlanta Beltline demonstrates an innovative approaches to funding, managing and promoting a complex and holistic project with active transportation as a common element.

Project Summary:

Description: Redevelopment of a 22-mile rail corridor to create over 33 miles of multi-use trails, new transit options, open space, public art, and affordable housing

Length: 33.0 miles of multi-use trails

Projected Cost: \$4.8 Billion including streetcar infrastructure (projected)

Anticipated Completion: 2030

Ongoing Maintenance: Once completed, parks and trails built by Atlanta BeltLine become the responsibility of the City of Atlanta. Community Improvement Districts are being considered to help fund the additional maintenance obligation.

Outcomes: Catalyzed over \$2.4 billion million in private development, \$10 - 20 billion expected over the life of the project



Atlanta Beltline



Atlanta Beltline West End Trail

In addition to 33 miles of multi-use trails, the Atlanta Beltline will implement 22 miles of pedestrian-friendly rail transit, develop 1,300 acres of parks, provide 5,600 affordable housing units, and remediate 1,100 acres of brownfields

CHAPTER 2

EXISTING CONDITIONS ANALYSIS



EXISTING CONDITIONS ANALYSIS

The 9-Line Trail Extension is a complex and multi-faceted project involving coordination with many realms including planning, transportation, parks, and engineering. A broad analysis of existing conditions was developed to respond to the multiple project objectives and provide a solid foundation for the development of recommendations and alternatives. Traffic volumes, existing and planned transit, existing/future bicycling and walking routes, destinations, ongoing projects, and existing street configurations were all analyzed to inform the plan’s recommendations.

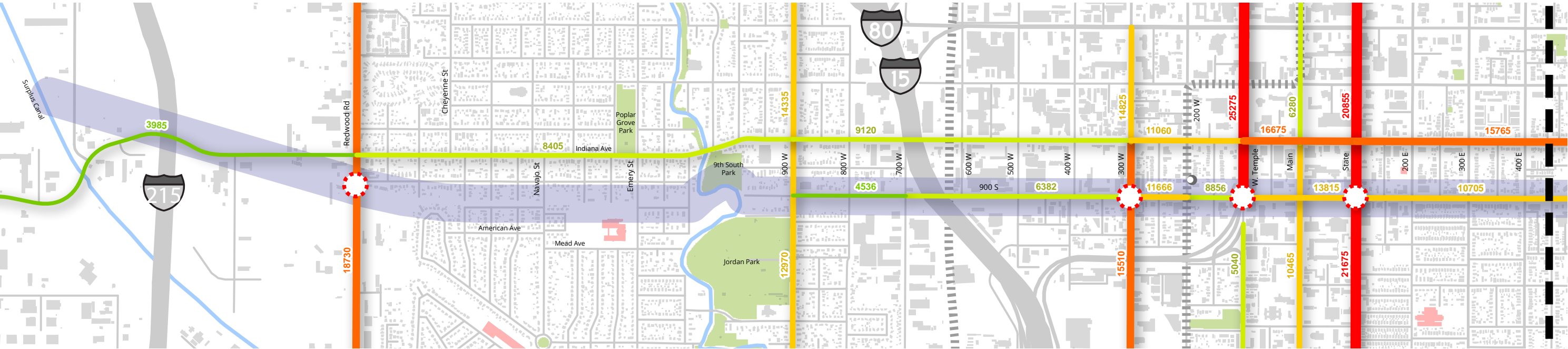


Existing 9-Line Trail west of I-15 at start of study



Existing 9-Line Trail west of I-15 at end of study

EXISTING TRAFFIC VOLUMES



Data Source: UDOT 2014 AADT / Salt Lake City Transportation Division Traffic Counts (dates vary)

Traffic Volume Analysis

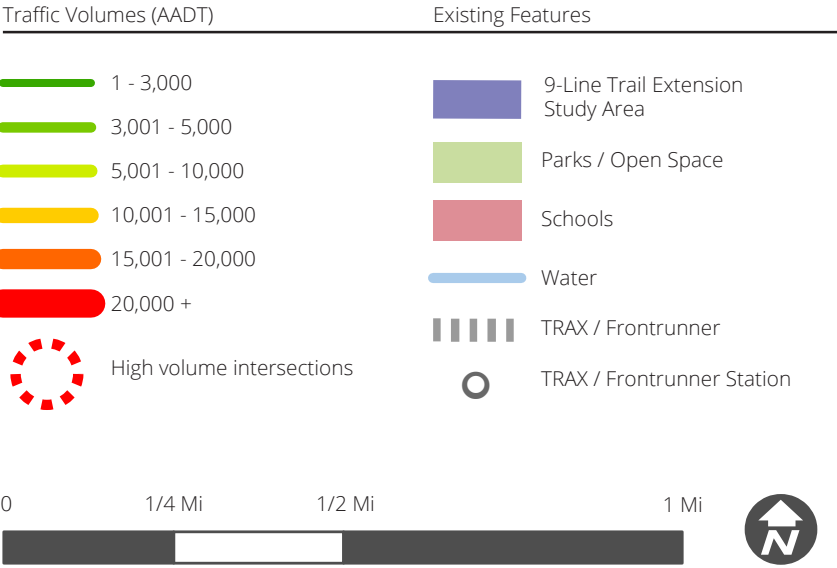
Traffic volumes along the 9-Line Trail Extension corridor vary significantly. Traffic volumes range between 4,500 and 14,000 average annual daily traffic (AADT) with the highest volumes occurring along Sunnyside Ave. and between West Temple and State St.

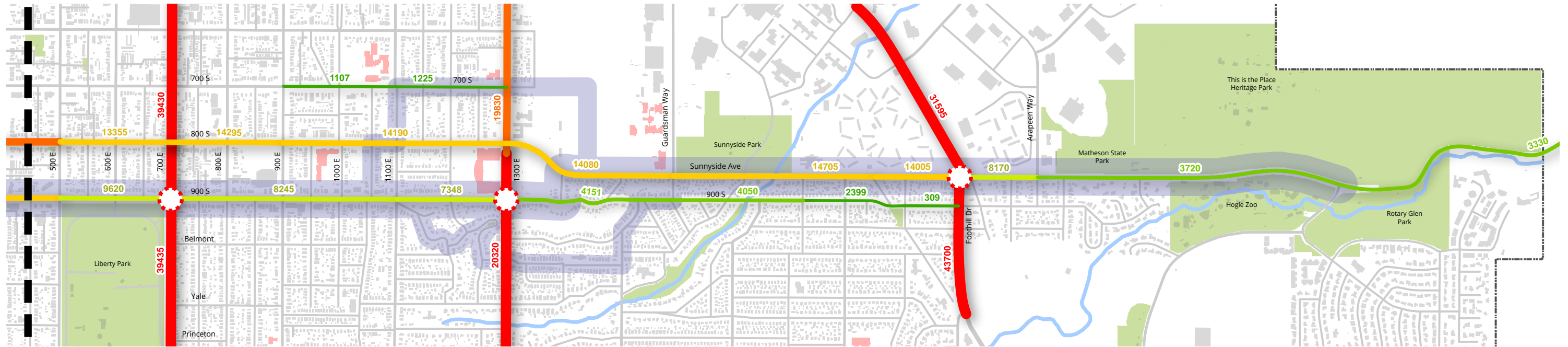
Additionally, the 9-Line Trail Extension crosses several high volume roadways with cross-street AADT counts over 15,000 vehicles per day. These intersections present challenges in developing a safe and comfortable bicycling and walking corridor for all ages and abilities. Special treatments should be considered at these intersections to mitigate the speed and volume of motor vehicle traffic along the cross street. Treatments could include median refuges, curb extensions, leading

pedestrian interval signal phasing, hybrid beacons (at mid-block locations), or even grade-separated crossings.

High-volume intersections include:

- Redwood Rd.
- 300 West
- West Temple
- State St.
- 700 E
- 1300 E
- Foothill Dr.





Data Source: UDOT 2014 AADT / Salt Lake City Transportation Division Traffic Counts (dates vary)



900 South west of 300 W carries a relatively low 6,400 cars per day

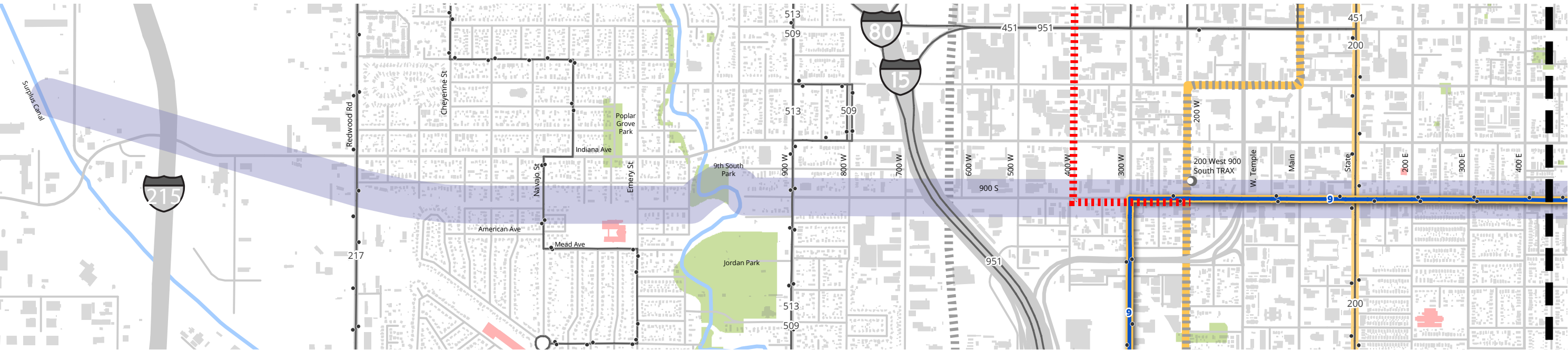


900 South near Liberty Park carries about 10,000 cars per day



700 East near Liberty Park carries nearly 40,000 cars per day

EXISTING & PLANNED TRANSIT



MULTI-MODAL INTEGRATION

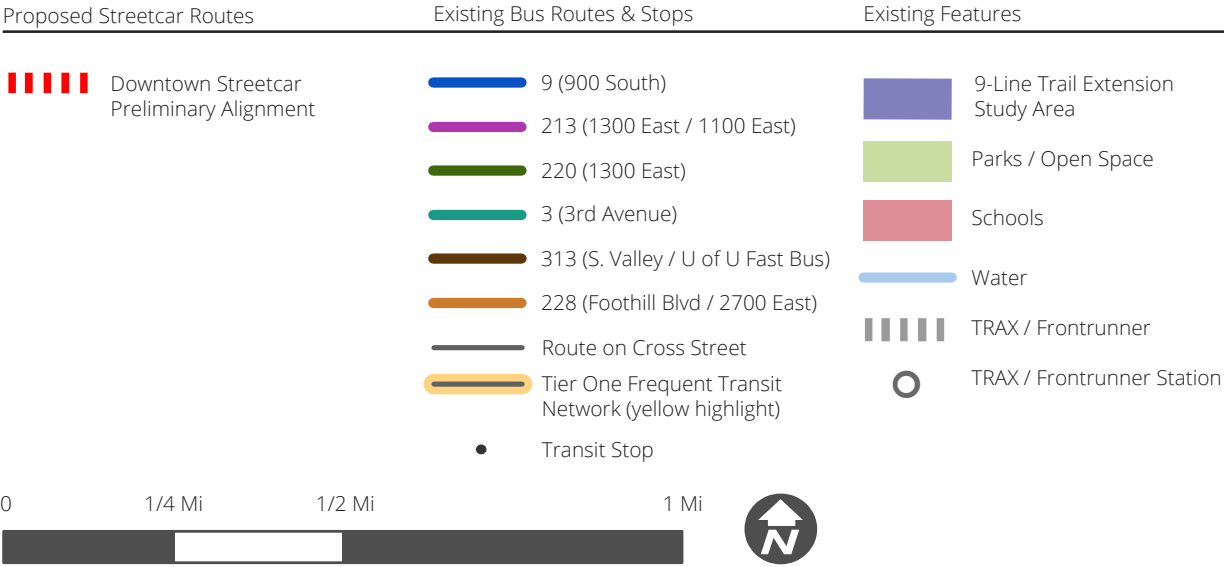
Integration of bicycling, walking, and streetscape improvements with rail and bus transit service will be a critical component of the success of the 9-Line Trail Extension. Comfortable and convenient bicycling and walking facilities and supporting infrastructure contribute to first/last mile connectivity and improve ridership. UTA’s First / Last Mile Strategies study suggested that active transportation improvements , along with other first/last mile strategies could improve transit ridership 3-6%.

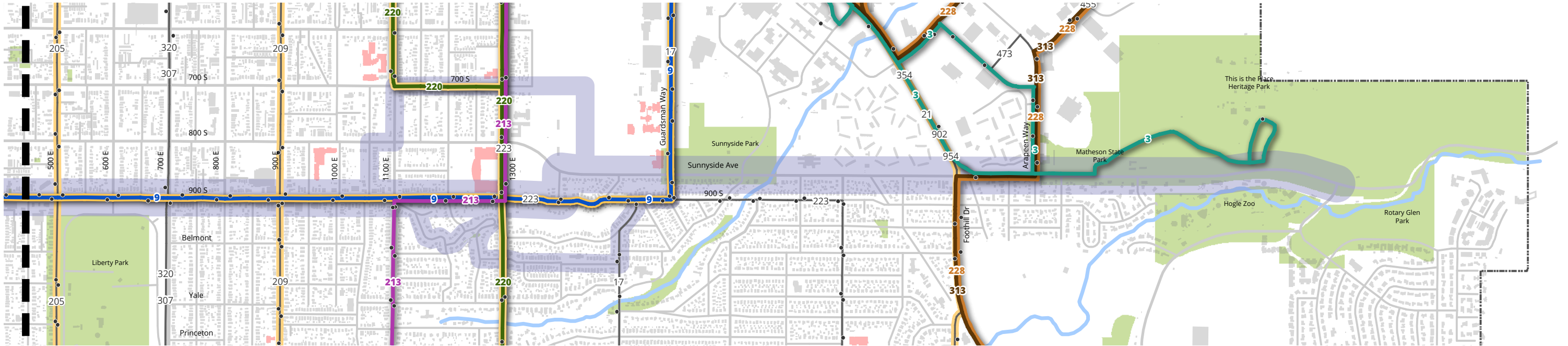
In addition to providing connections to transit, the 9-Line Trail Extension Study will need to coordinate proposed designs with passenger boarding areas. Bus pullouts or other design strategies may also be needed if changes to the roadway are proposed.

FUTURE TRANSIT

The Downtown Streetcar route indicated in the map above, depicts the preliminary alignment of a route connecting the Central Ninth TRAX Station to Downtown Salt Lake City. Preliminary plans call for the streetcar to be routed in existing travel lanes along 900 S so no additional ROW would be required. The future streetcar would provide an additional transit connection to Downtown that could be easily accessed by the 9-Line.

In addition to the planned streetcar route, Salt Lake City also recently adopted a Transit Master Plan which identifies a frequent transit network (FTN) that includes service on 900 S. Modes of transit were not identified in the Transit Master Plan, however the FTN would be “fast, reliable, and permanent” while allowing “people to ride transit without a schedule and transfer with ease”.





900 South TRAX (light rail) station at the Central 9th Commercial Node

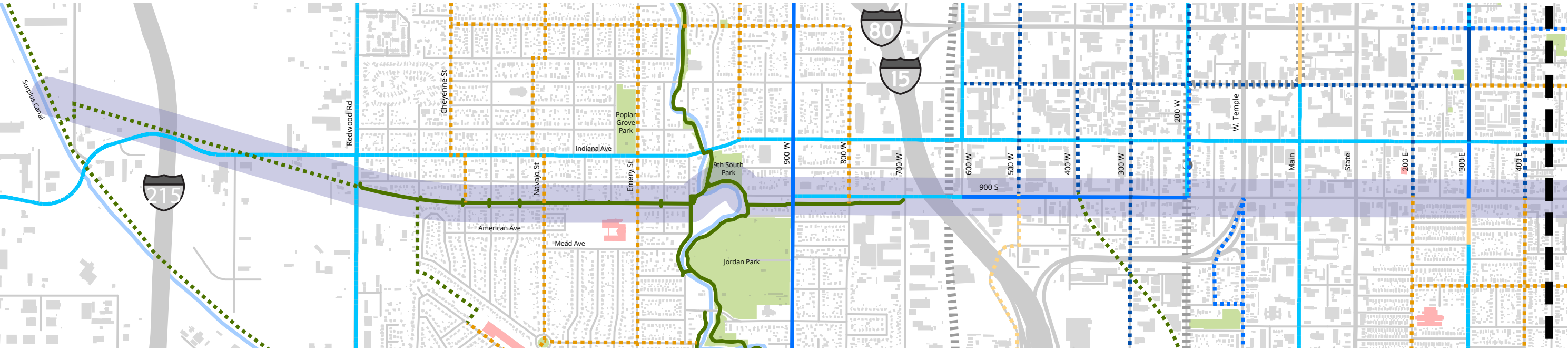


Bus stop on Route 9 near Main Street



Bus stop on Route 9 near 300 E

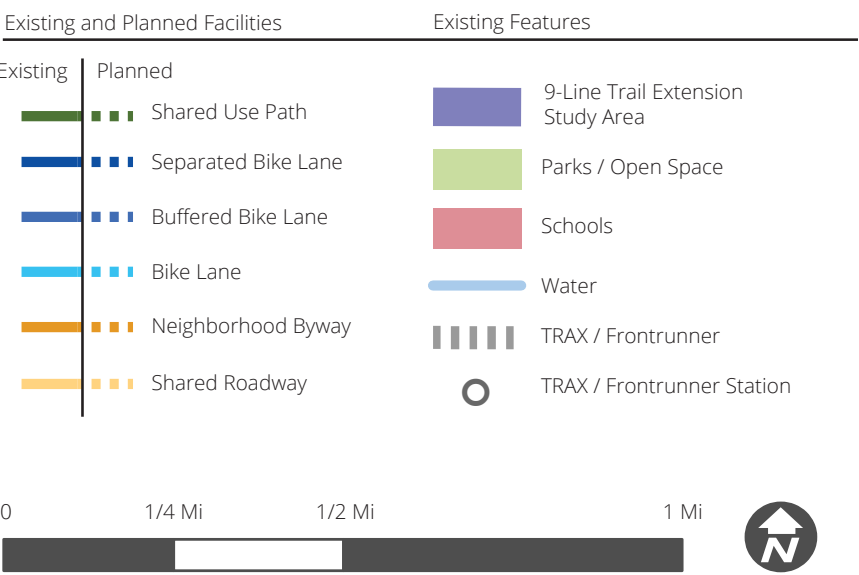
EXISTING & PLANNED BICYCLING & WALKING FACILITIES

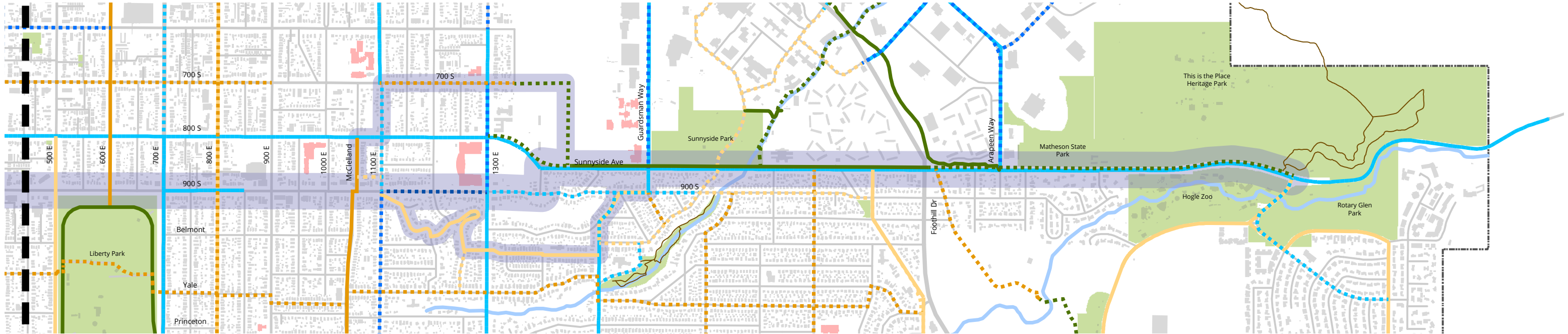


WALKING AND BICYCLING NETWORK

The 9-Line Trail Extension fills a valuable role in the overall bicycle and pedestrian network for Salt Lake City. As one of the few continuous east-west routes in all of Salt Lake County, the 9-Line corridor offers the potential to link to several existing bicycling and walking facilities of regional importance including the Jordan River Trail, the 600 E Neighborhood Byway, the McClelland Trail, the Bonneville Shoreline Trail, and Emigration Canyon. The 9-Line Corridor is also one of 10 potential east-west trail corridors identified in the Salt Lake County East-West Trails Master Plan.

Many future facilities are also planned throughout the corridor and represent important connections that should be considered in the design of the 9-Line Trail Extension. The Surplus Canal on the west end of the project corridor will provide an important low-stress bicycle and pedestrian connection to the Salt Lake City Airport. Neighborhood byways planned at Cheyenne St., Navajo St., Emery St. and 800 E offer additional low-stress north-south connections. The Granary Trail is a planned rail-to-trail corridor near 400 W that will connect Central Ninth to the Smith's Ballpark area. Finally, a planned neighborhood byway along Connor St. connecting to a shared use path through Bonneville Golf Course will provide a critical connection from Wasatch Boulevard and points south to the University of Utah and Research Park. Conceptual design at Sunnyside Ave. and Connor St. should consider how to safely route bicyclists and pedestrians across Sunnyside.





Existing 9 Line Trail a block east of Redwood Rd, looking east

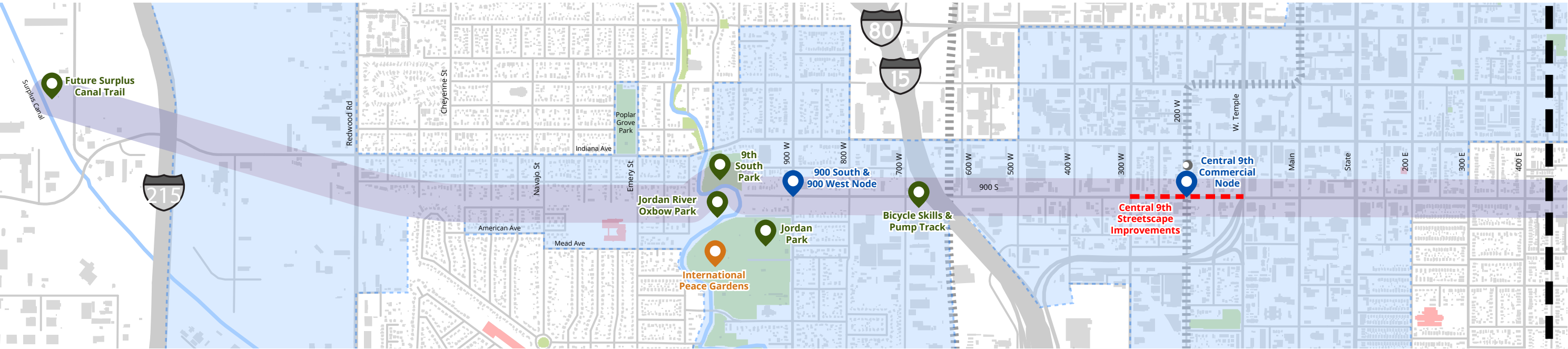


The 600 East Neighborhood Byway prioritizes pedestrians and bicyclists crossing 900 South north of Liberty Park and reduces through vehicle traffic



Shared lane markings on Gilmer Dr between 1100 East and 1500 East direct bicyclists to use a less steep route than riding straight up or down 900 South

DESTINATIONS & RELATED PROJECTS



DESTINATIONS & RELATED PROJECTS

One of the many strengths of the 9-Line Trail Extension corridor is the project area’s numerous and diverse destinations. The project links many of Salt Lake City’s most popular recreational assets such as the Jordan River Trail, Jordan Park, Liberty Park, Matheson State Park, and the Bonneville Shoreline Trail. Linking these recreational amenities with comfortable bicycling and walking facilities will improve community access to recreation, promote community health, and promote the concept of 900 S as part of a “Green Loop” consistent with the Downtown Plan.

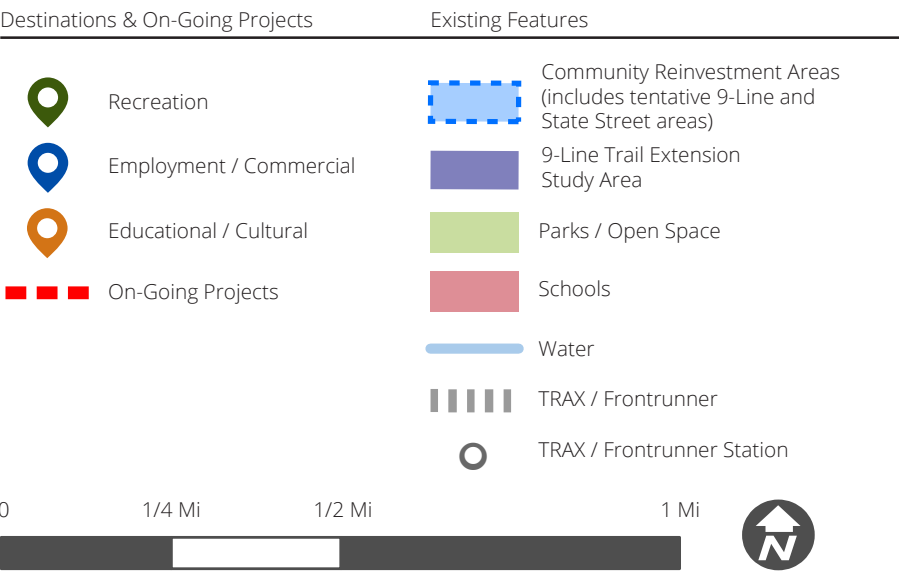
The 9 Line Extension Corridor also links three planned or existing neighborhood commercial nodes. These nodes include 900 South & 900 West, Central Ninth, and 9th & 9th. Connecting these commercial nodes will allow developing business nodes, such as 900 South and 900 West, to leverage the success of more established business districts along the corridor.

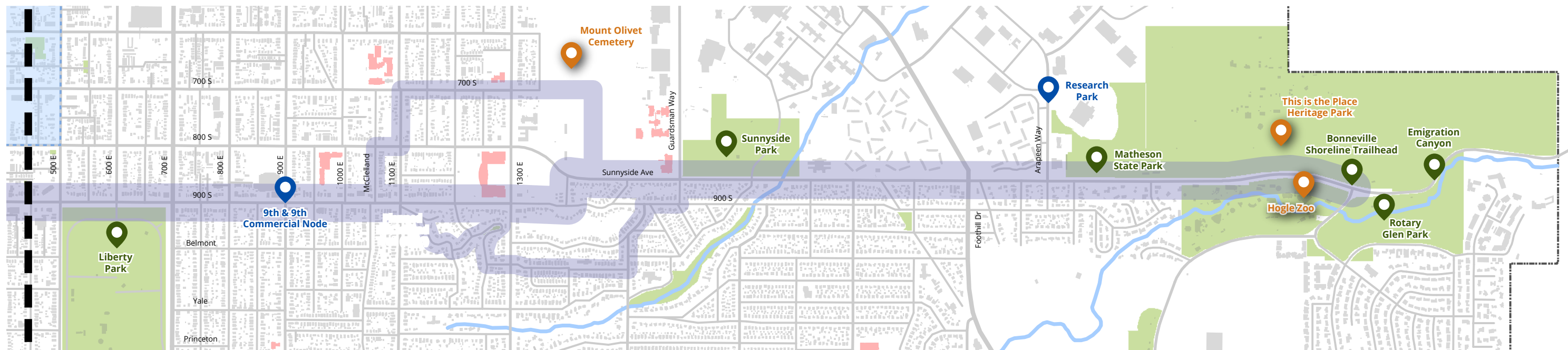
A number of cultural destinations also exist throughout the corridor. By in large, many of these destinations such as This is the Place Heritage Park, Utah’s Hogle Zoo, Matheson State Park are located in the East Bench. Connectivity to these destinations could

provide visitors a new way to experience each destination. Opportunities for interpretive signage could also be incorporated with the future trail.

RELATED PROJECTS

A number of exciting projects have been initiated throughout the corridor that could provide opportunities for synergy with the 9-Line Trail extension. In 2017, the RDA began public involvement efforts related to the creation of two new community reinvestment areas along the existing 9-Line Trail and State St. Second, in 2017, Salt Lake City Council allocated funding (pending conditions of approval) for the RDA to construct streetscape improvements in the Central Ninth area from 300 W to West Temple. Salt Lake City Transportation also completed construction of the McClelland Trail in 2017 which provides a connection from the 9 & 9th business district to neighbor hoods south.





900 South Constructed Wetlands beautification improvements were made to the previously empty area between the 9 Line and 900 South west of 900 West in 2014

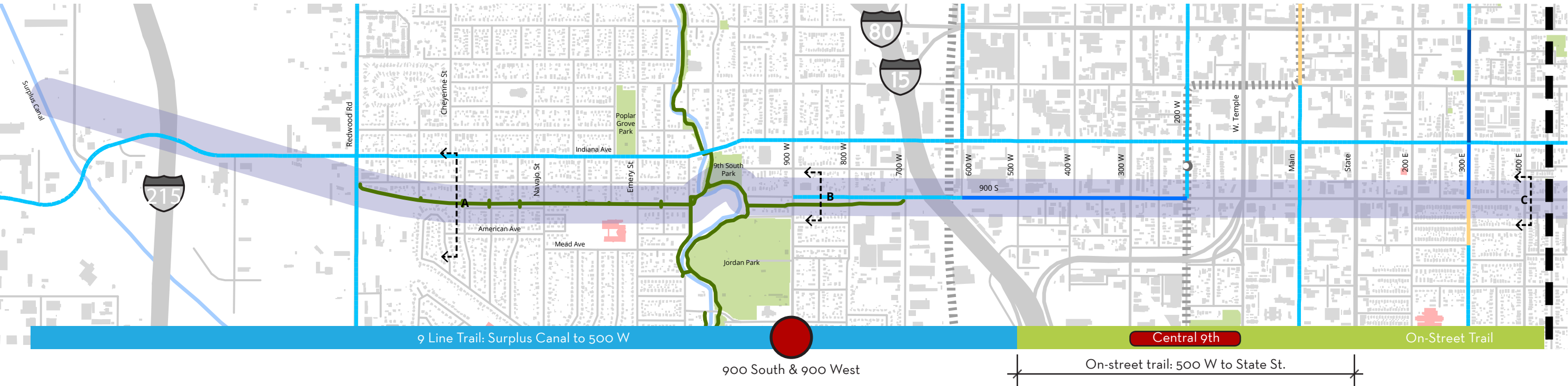


Pump track on 900 South near the I-15 overpass



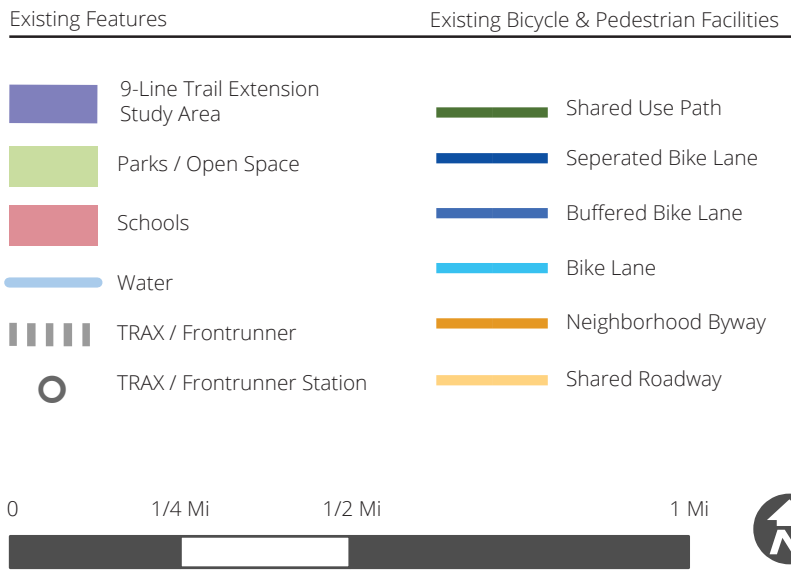
Streetside amenities like outdoor dining, bike racks, and angled parking at the 9th & 9th East Commercial Node

CORRIDOR SEGMENTS & CROSS-SECTIONS

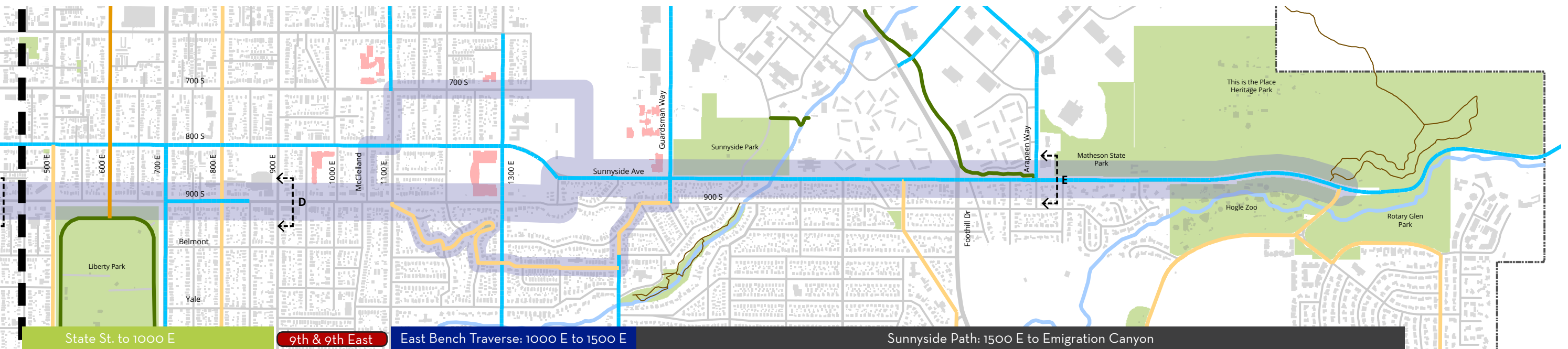


CORRIDOR SEGMENTS & CROSS-SECTIONS

Based upon a number of factors including land use, ROW widths, street configuration, on-street parking, and topography, the Project Team divided the corridor into five segments which shared similar characteristics. Existing and planned commercial nodes at 900 South and 900 West, Central Ninth, and 9th & 9th East were also categorized separately based upon the unique land use, on-street parking needs, and urban form of these areas.



Existing 9-Line Trail at Redwood Rd.



900 S at 300 W, existing buffered bike lane



900 S at Liberty Park

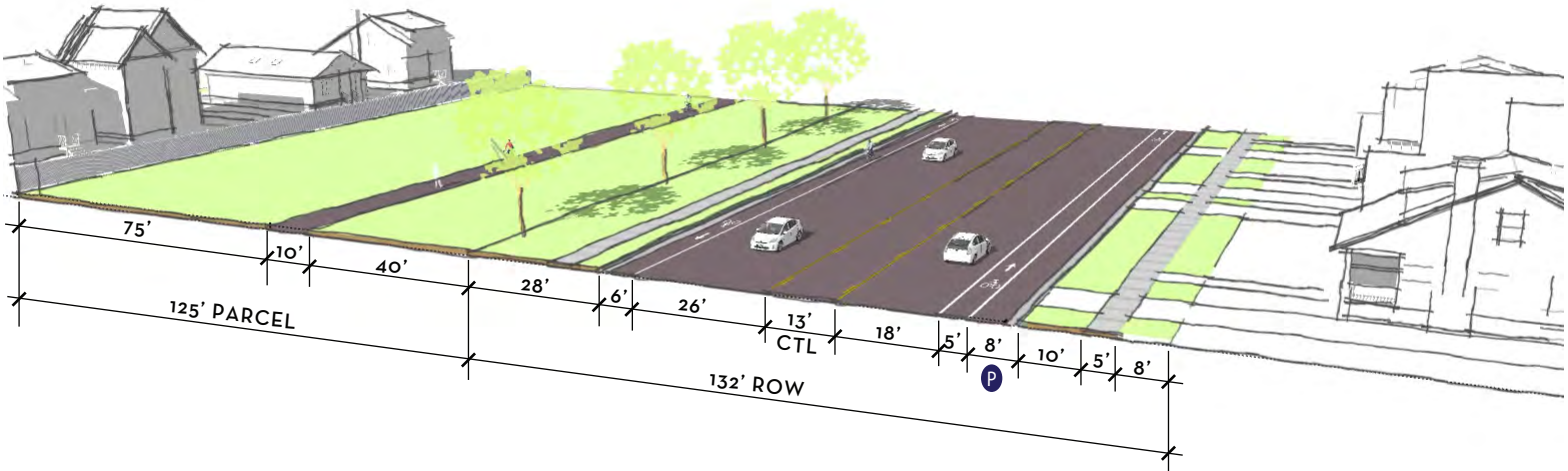


Sunnyside Avenue at Hogle Zoo, existing bike lane

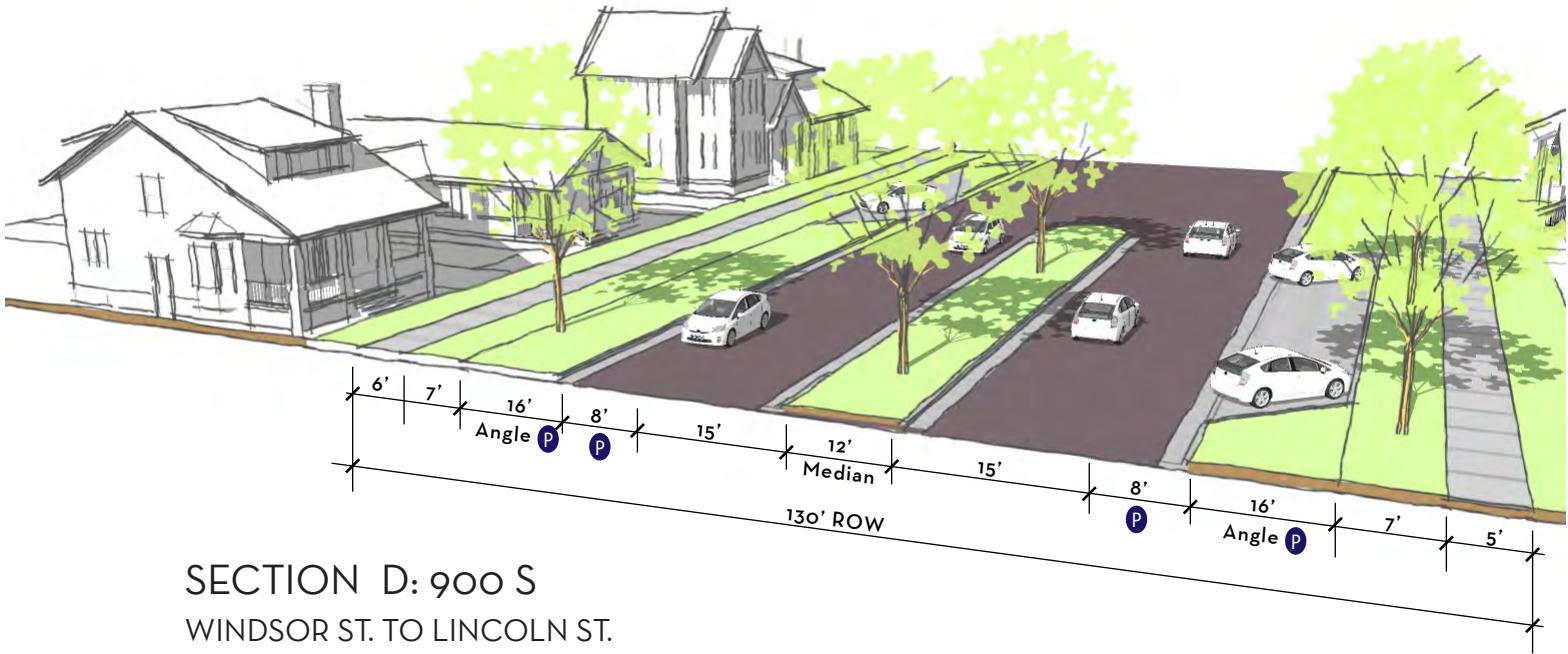
EXISTING CORRIDOR SEGMENTS & CROSS-SECTIONS



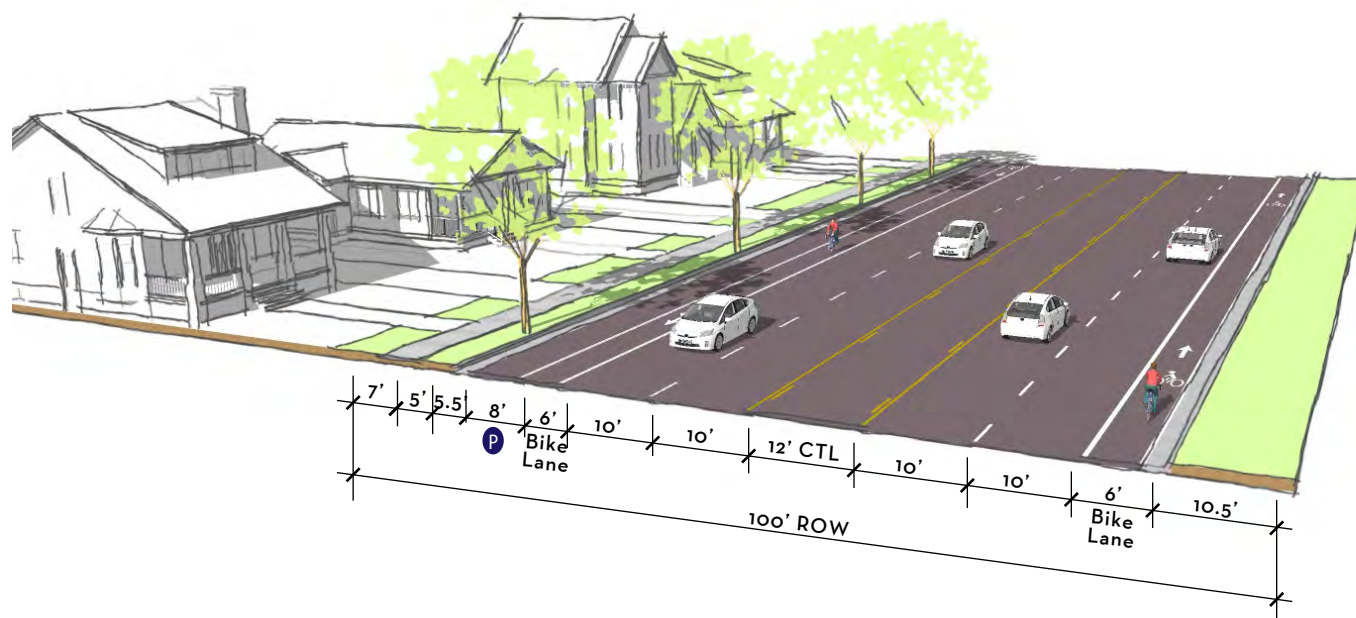
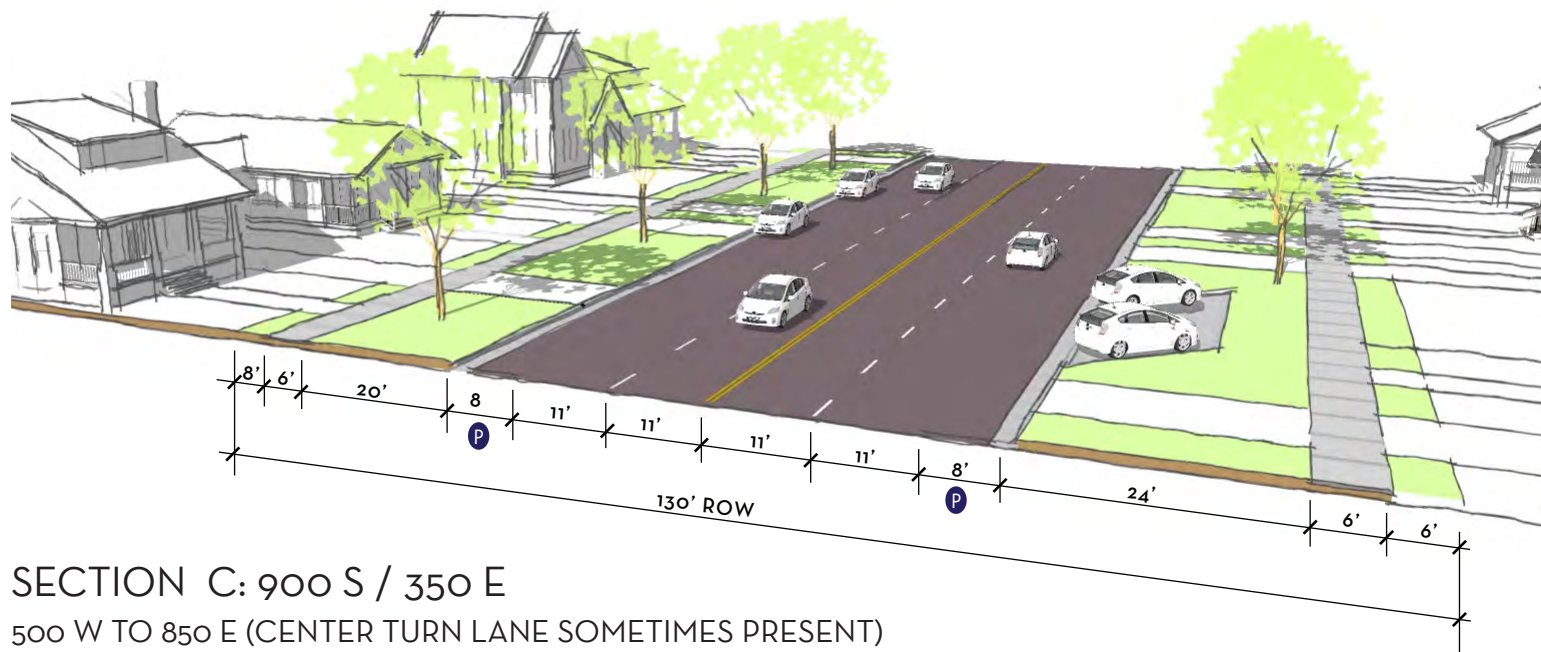
SECTION A: 9-LINE TRAIL
REDWOOD RD. TO 900 W



SECTION B: 9-LINE TRAIL
900 WEST TO 700 WEST



SECTION D: 900 S
WINDSOR ST. TO LINCOLN ST.



BICYCLE & PEDESTRIAN COUNTS

EXISTING BICYCLE AND PEDESTRIAN USE

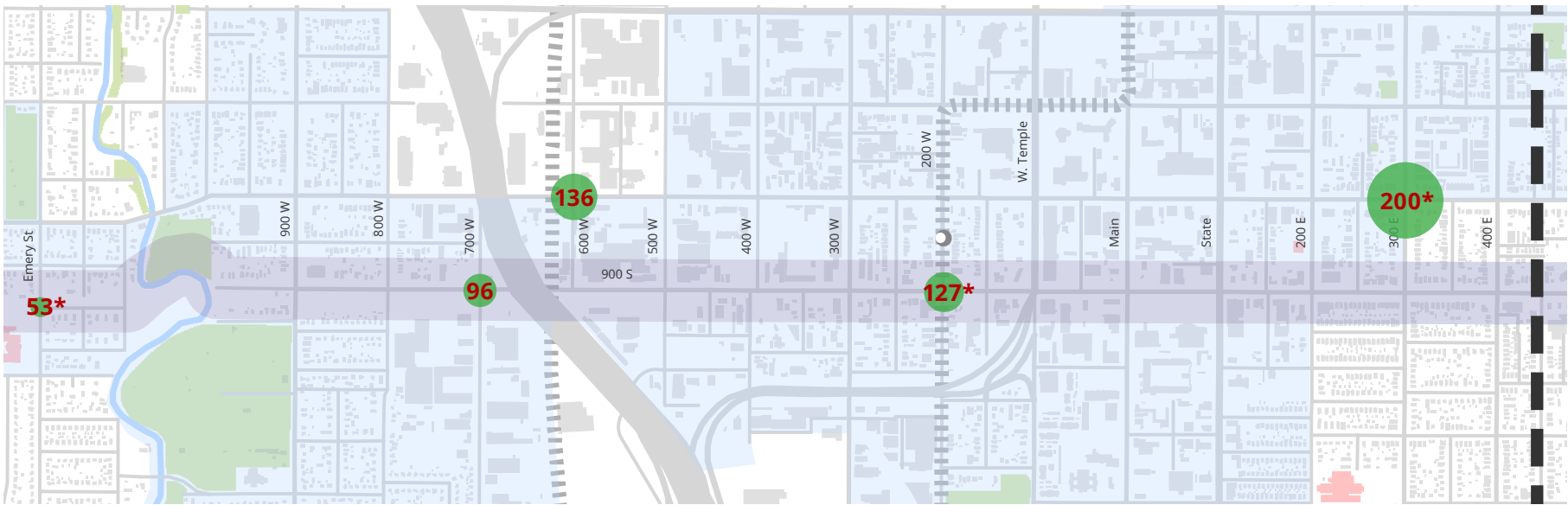
In order to determine existing bicycle and pedestrian activity levels, the Planning Team with support from local volunteers, conducted active transportation user counts within the study area. Active transportation user counts were completed on June 23rd and 25th, 2016. During those two days, three different two-hour counts were conducted: Thursday morning (7:00 am to 9:00 am), Thursday afternoon (4:00 pm to 6:00 pm), and Saturday mid-day (11:00 am to 1:00 pm) at 7 locations throughout the project corridor. Weather during the count times was generally clear and sunny with temperatures in the 70’s for the Thursday morning count and 80’s for the Thursday afternoon and Saturday morning time slots. Count volunteers used the National Bicycle and Pedestrian Documentation Project (NBPDP) methodology, which the City has used since it began manual volunteer bicycle counts in 2010.

BICYCLE AND PEDESTRIAN COUNTS AT SELECT LOCATIONS

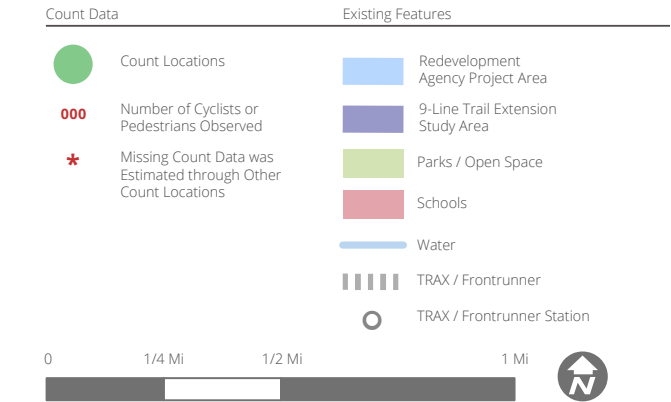
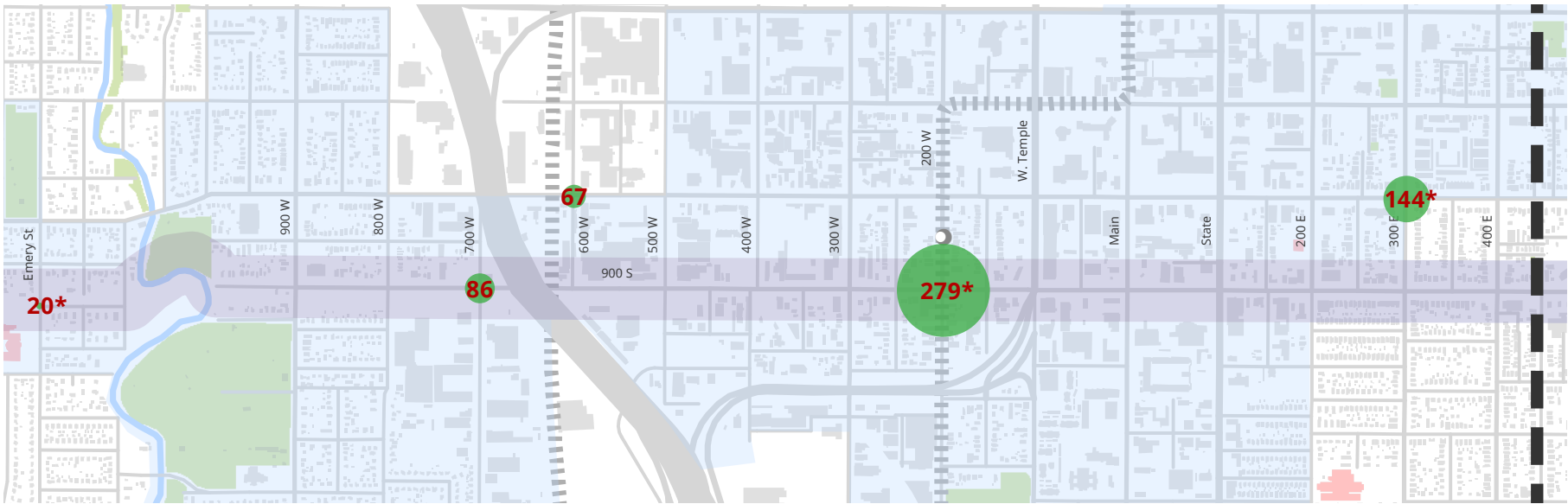
Location	Bicycles	Pedestrians	Total
9-Line at Emery Street*	53	20	73
9-Line Trail at 700 West	96	86	182
800 S at 600 W	136	67	203
900 S at 200 W*	127	279	406
800 S at 300 E*	200	144	344
900 S at 900 E	157	414	571
Sunnyside Ave at Crestview	560	189	649

* These locations lacked data for one or more count times due to volunteer shortages or no-shows. In these cases, missing count data was estimated based on trends demonstrated at nearby count locations.

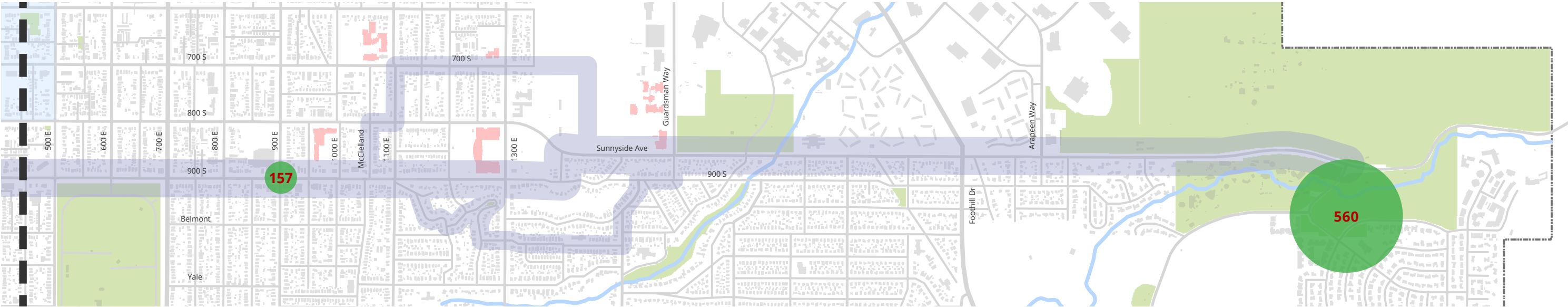
BICYCLE USER COUNTS



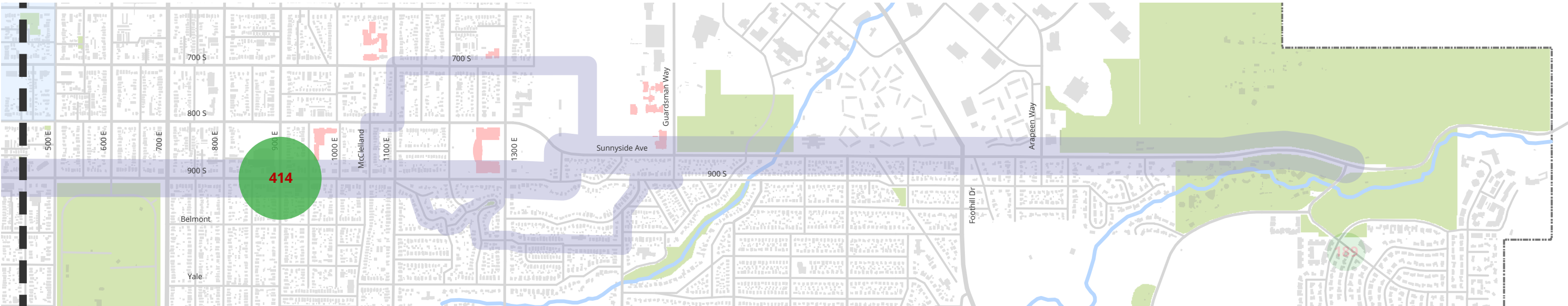
PEDESTRIAN USER COUNTS



BICYCLE USER COUNTS



PEDESTRIAN USER COUNTS



USER DEMAND ANALYSIS



Purpose

This demand analysis estimates, based on counts of existing users, how many people may walk and ride a bike on the corridor and quantifies what the general benefits from people driving less would be if this plan’s recommended improvements are implemented.

Process

Step One

Active transportation user counts were completed as described on pages 32 and 33 of this document.

Step Two

The existing, two-hour count data was extrapolated using methodology developed by the NBPDP that produces estimated daily, weekly, monthly, and yearly counts from the totals, the time of day, date, season, and climate of the two-hour counts and the City.

Step Three

Research into bicycling and walking usage increases after 23 similar bicycling-related projects and 12 similar pedestrian-related projects that included some or all of the elements recommended in the 9 Line Extension Plan were implemented (i.e. road diets, complete streets elements, signal timing improvements, separated bike lanes, buffered bike lanes, bike lanes, improved crossings, calmer traffic) yielded a 56% median increase in bike traffic and 38% for pedestrian traffic. Some of these projects are listed on this page.

1st and 3rd Quartiles (Q1 and Q3, respectively) were also determined in order to also show a range instead of a single median point. The 1st Quartile was a 36% increase for bicycle traffic and a 21% increase for pedestrian traffic; the 3rd Quartile was a 129% for bicycle traffic and a 65% increase for pedestrian traffic.

Step Four

These median, Q1, and Q3 increases for both bicyclists and pedestrians were applied to the extrapolated “before” count totals from Step 2 to show the estimated future usage of and benefits

Similar Projects

300 South Separated Bike Lanes, Salt Lake City, UT
Central Ave 4-3 Lane Road Diet, Albuquerque, NM
25th Ave Pedestrian Crossings & Bike Lanes, San Francisco, CA
3rd & Broadway Separated Bike Lanes, Long Beach, CA
Edgewater Dr Road Diet, Orlando, FL
Separated Bike Lane Intersection Improvements, Montreal, Quebec
Providence & Stewart Rd Intersection Improvements, Columbia, MO
Esplanade Ave 4-3 Lane Road Diet, New Orleans, LA
Prospect Park West Two-Way Separated Bike Lane, NYC, New York
Intersection & Traffic Calming, Washington, D.C.
Decatur St Pedestrian & Intersection Improvements and Bike Lanes, New Orleans, LA
NE 125th Street 4-3 Lane Road Diet & Bike Lanes, Seattle, WA
Sherburne St Separated Bike Lanes, Toronto, Ontario
Franklin Ave Road Diet & Complete Street, Minneapolis, MN
Dining Area Improvements & Parklets, Los Angeles, CA

%
Increase

%
Increase

30%

n/a

n/a

16%

37%

49%

33%

13%

30%

23%

61%

n/a

51%

74%

123%

62%

190%

n/a

133-187%

n/a

13%

37%

114%

105%

38%

n/a

20%

36%

n/a

74%

of the improvement to the corridor if the 9-Line Trail Extension resulted in the same increases in usage as the similar projects researched and identified in Step 3 (see facing page).

Step Five

General benefits related to fewer vehicle miles traveled (i.e. reduced roadway maintenance, household transportation, crash, congestion, and environmental costs) were estimated based on the increase in bicycling and walking trips from Step 4. Additionally, general benefits that have not been quantified specifically for this project are also included (see facing page).

Results

User Increases

It is estimated that there will be between 1,000,000 and 3,500,000 new active transportation trips taken annually at the same seven count locations along and near the corridor. An active transportation trip could serve a utilitarian purpose, such as walking to the grocery store, or be purely recreational, such as walking for exercise. Even more users will likely be using the corridor (either traveling along or crossing it) between those count locations, as well.

Annual Benefits from User Increases

An additional 450,000 to 1,500,000 automobile trips will be replaced along or near the corridor annually because of the recommended improvements and the area’s new active transportation users, yielding 650,000 to 2,200,000 fewer vehicle miles traveled and \$750,000 to \$2,700,000 in cost savings every year after the project (not adjusting for inflation or including maintenance or capital costs).

These benefits are only the tip of the iceberg. Benefits related to personal and community health and economics, like reduced risk for diabetes and heart disease, reduced societal health impacts and costs, and increased property values and retail sales, are not included in these benefits but would very likely increase the overall benefit of the 9-Line Trail Extension projects.

ESTIMATED 9-LINE TRAIL ANNUAL TRANSPORTATION BENEFITS

\$770,000 – \$2,700,000
IN ADDITIONAL ANNUAL TRANSPORTATION COST SAVINGS



\$817,000
COLLISION COSTS REDUCED



\$181,000
CONGESTION COSTS REDUCED



1,600,000
ANNUAL AUTO TRIPS REPLACED

36–129%
MORE PEOPLE ON
BIKES



21–65%
MORE PEOPLE
WALKING



\$63,000
ENVIRONMENTAL
COST SAVINGS



\$1,290,000
HOUSEHOLD
TRANSPORTATION
COSTS REDUCED

IN ADDITION TO TRANSPORTATION COST SAVINGS...



**INCREASED
PROPERTY
VALUES**



**LOCAL
ECONOMY
IMPACTS**

*On average, for every
\$1 invested in trails, at
least \$3 is returned.*



**LOWER
HEALTHCARE
COSTS**



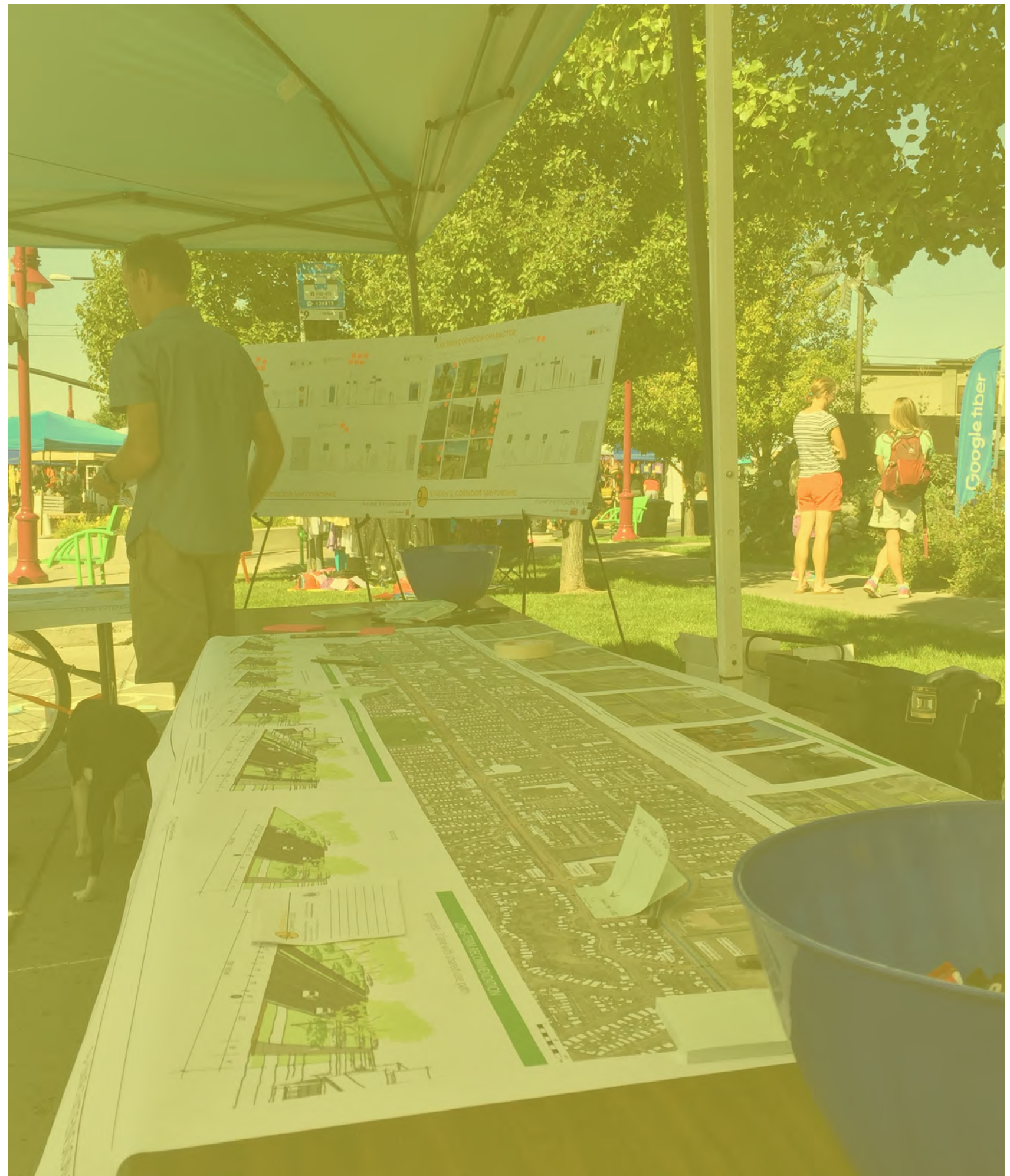
INCREASED EXERCISE
*People who live near bike/
ped paths get 45 additional
minutes of exercise per week.*



NOTE: ANNUAL COSTS IN 2016 DOLLARS

CHAPTER 3

PUBLIC INPUT SUMMARY



A COLLABORATIVE VISION

The 9-Line Trail Extension Study conducted a broad public engagement program over nearly two-years. Stakeholders throughout the corridor, agencies with various interests, and businesses provided feedback in a variety of ways including online engagement, traditional face-to-face meetings and interviews, charrettes, and surveys.

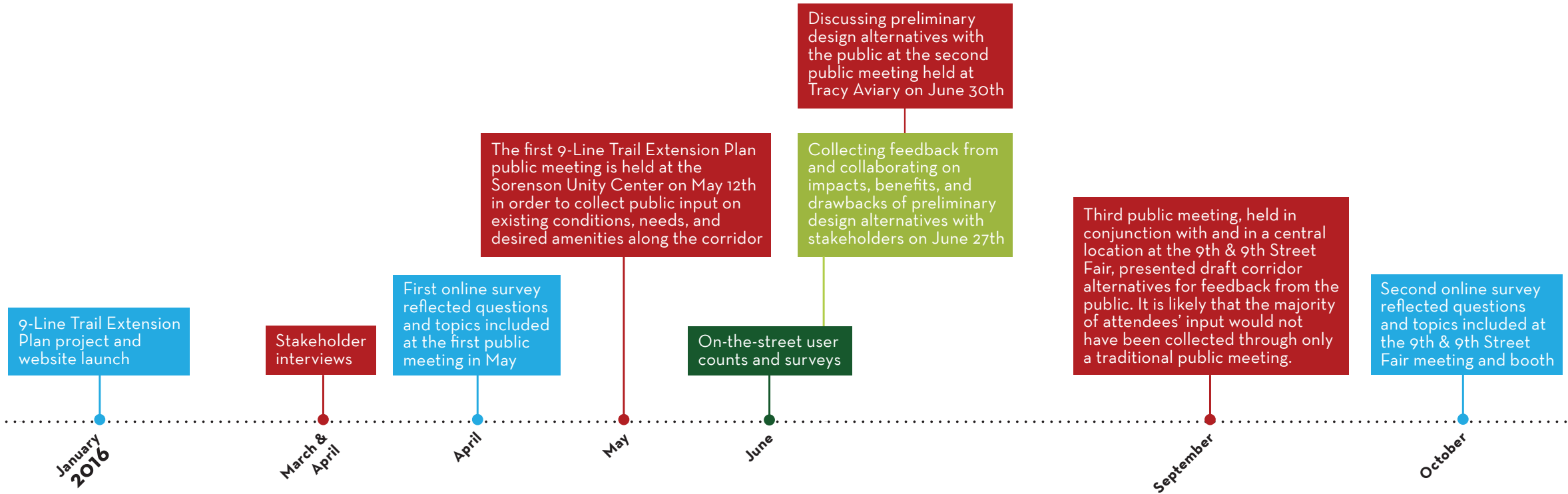
Priorities we heard included:

- Extending a paved, multi-use path at sidewalk level, separated from the street
- Planting native vegetation, trees and low-water landscaping
- Improving safety at intersections for people walking and bicycling
- Installing amenities such as benches, bike racks and high-quality, iconic wayfinding signage

The project team collected public input about the existing conditions, priorities, vision, and recommendations of the 9-Line Trail Extension Study through the following diverse methods. Opportunities to be involved were advertised through the use of yard signs along and near the corridor, Facebook, and City Council and Community Council newsletters and emails.



Project team members discuss attendees’ ideas at the third public meeting held in conjunction with the 9th & 9th Street Fair in September 2016



PUBLIC INPUT VENUES AND RESULTS

Project Website

In order to keep the public apprised and involved in the progress of the 9-Line Trail Extension Study, the project team developed and hosted www.9linecorridor.com. The website included pages about project updates, schedule, goals, background, and how to contact City staff and project team members for more information.

Stakeholder Interviews (8 representatives)

In March and April 2016, the project team and City staff met with stakeholders along the corridor in order to discuss their visions and goals, critical success factors, issues, and proper outreach channels to keep them informed and involved. These stakeholders included:

- Dennis Faris, Poplar Grove Community Council
- Allison Ginn
- Johnathon Bates, Research Park
- Patrick Cowley, UDOT Region 2
- Mike Perez, University of Utah
- Matt Mateus, Spy Hop
- Clark Ivory, This is The Place Heritage Park
- Sheridan Mordue, 9th & 9th Business District

Stakeholders were generally supportive of the plans to improve the corridor. Many stakeholders desired to improve safe connections to parks and open spaces, commercial districts, education (i.e. elementary, secondary, and higher education facilities), transit, and to their individual businesses, homes, or neighborhoods, especially west of the State Street area. Many agreed that the corridor should support all modes of transportation while effectively and carefully balancing the safety, access, and mobility needs of each.

Open City Hall Survey #1 (100 responses)

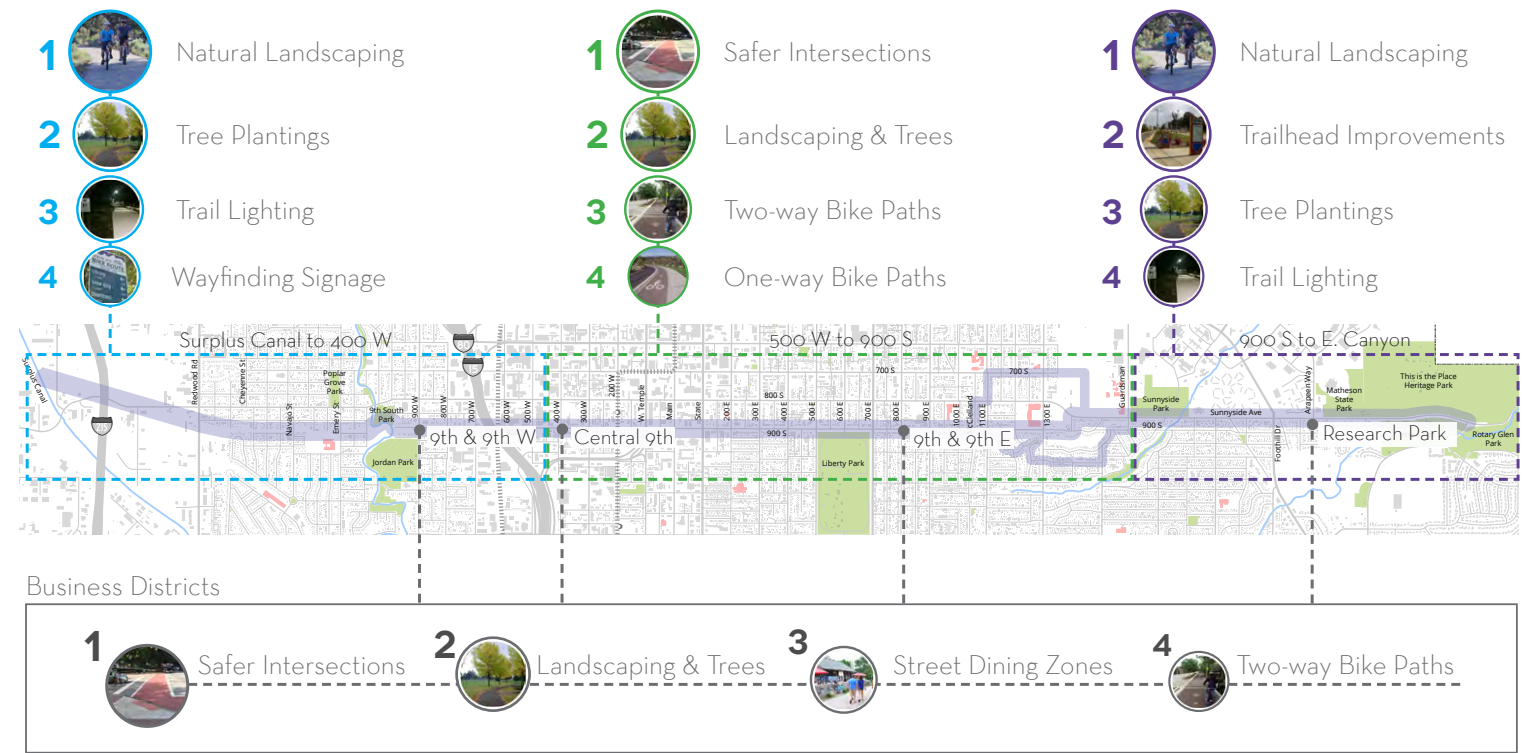
The opportunity to contribute to the plan online enabled people who could not attend in-person meetings to provide their input as effectively as those who could. All surveys for the 9-Line Trail Extension Study were hosted on Salt Lake City’s “Open City Hall” platform, a centralized site that allows people to engage with different topics that the City is currently addressing.

The first online survey, which was available in April 2016 and received 159 responses, focused on the existing conditions and needs of the corridor. Survey respondents could comment on the three plan sections: “Surplus Canal to 400 West”, “500 West to Guardsman Way”, and “Guardsman Way to Emigration Canyon”. Users included where they would like to see different amenities, like lighting, benches, improved crossings, one or two-way bike paths, improved sidewalks, shade, and programmed and unprogrammed park space.

87% said that the Plan’s vision aligned with their vision for the corridor

The most important goals, in order, were:

- Comfortable walking and bicycling routes
- Better access to recreation
- Connect neighborhoods
- Equitable neighborhood and transportation investment
- Supporting business districts
- Improving neighborhood character and identity
- Community-based public art



Streetscape (500 West to Emigration Canyon) and Trail (Surplus Canal to 400 West)
Treatment Preferences Results from Open City Hall Survey #1

Public Meeting #1 (~250 attendees)

The first in-person public meeting for the plan was held on May 12, 2016 from 5-7 pm at the Sorenson Unity Center on California Avenue near 900 West in Salt Lake City. The meeting was held in conjunction with the SLC Redevelopment Agency (RDA) open house about new RDA districts near and including the 9-Line corridor’s west side (west of 300 East).

One of the key activities at the meeting included two 25-foot long maps of the corridor from its western to its eastern terminus. Like Survey #1, meeting attendees could talk with project team members and City staff about the amenities they thought would improve existing needs and deficiencies along the corridor. Many of the comments were focused on the west side of the corridor, likely due to the meeting location and corresponding attendance of local residents.

Common themes included:

- Better lighting needed between I-15 and the Jordan River
- Improved security needed on existing 9-Line Trail



Attendees of the first public meeting discuss their ideas for where corridor amenities should be prioritized

- North-south streets should be improved to connect to the 9-Line
- Shade is desired, especially in locations where roadway is busy
- One or two-way bike paths should be added to the corridor in order to improve bicycle connections to and from destinations and homes
- Emphasis on walking, bicycling, and better recreation and open space opportunities

Counts and Surveys (76 surveys)

Before the stakeholder charrette and second public meeting, the project team conducted three two-hour counts of people walking and bicycling along the corridor. In addition to counting, volunteers also surveyed active transportation users to find out how and why they commonly use the corridor and what they would like to have improved. Conclusions from those counts and surveys can be found in previous sections.

Stakeholder Charrette (~30 participants)

In an effort to preserve a continuing dialogue with stakeholders along the corridor, project team members and City staff held a multi-hour charrette, or in-depth design strategies meeting, on June 27th from 5-7 pm at the Chase Mill at Tracy Aviary. This charrette was preceded by smaller staff and small group meetings and mini-charrettes occurring throughout the day.

The charrettes resulted in design ideas that the project team incorporated into the materials for the second public meeting materials that were presented to neighbors, stakeholders, and others three days later.

Public Meeting #2 (~75 attendees)

On June 30th from 5-7 pm, several days after the stakeholder charrette, the project’s second in-person public meeting was held at the Chase Mill at Tracy Aviary. The purpose of this meeting was to present the preliminary design ideas and strategies that were

developed over the course of the month and a half since the first public meeting. It gave attendees the opportunity to tell the project team whether their ideas had been accurately reflected and to provide a “sniff test” before the design went into more detail.

The corridor and the opportunity to comment on plan view (overhead) and cross section designs was divided into three sections:

West

- More lighting needed along the existing trail in order to increase usage and safety
- Improved crossing of railroad tracks needed between 600 and 700 West
- Support for 900 S to become the preferred bicycle and pedestrian corridor

Central

- Majority supported the two-way bike path located on the south side of the street
- Reducing intensity and impact of traffic to and from I-15 at West Temple should be considered
- Some expressed concern that 900 South is narrow already and altering it further would cause traffic flow and business issues
- General support for more and greater separation for bicycles and pedestrians

East

- Desire for better connections to the University of Utah from Sunnyside Avenue
- Accommodation of heavy existing bicycle use on Sunnyside leading into Emigration Canyon
- Calming traffic entering but especially exiting Emigration Canyon
- Improve crossing pedestrian safety near Hogle Zoo
- Add shade trees

Public Meeting #3 (400 + booth visitors)

On Saturday, September 10th from 9 am to 6 pm, the 9-Line Trail Extension Study team hosted the project's third public meeting during an existing event, the 9th & 9th Street Fair. This was the project's first opportunity where feedback from people who may not have otherwise attended a formal meeting or been aware of other methods to contribute could learn about the project and let their voice be heard.

The project team presented the draft recommendations for each section and major intersection along the corridor. Attendees could see how the roadway might look in the future and offer suggestions on how to improve routing, corridor amenities or amenity locations, and facility types that would make them more likely to walk and bike. In addition to the **hundreds of people** who visited and spoke with the project team at the booth, an additional 18 left



The booth included corridor maps similar to the first public meeting, except that the maps included draft recommendations about which attendees could discuss their concerns with the project team and City staff

comment cards. Like the other public meetings, it was ultimately very helpful hosting it along the corridor itself in order to gather feedback from local residents as well as to provide context for the recommendations presented.

The response from those who visited the 9-Line booth was highly positive and most were in favor of the project and its recommendations. Nearly all specific questions and concerns were discussed with attendees and subsequently considered or addressed in this plan's recommended design.

"Yes please, fund this!"

"We support the 9-Line concept. We would love to walk and bike separated from roads."

"Love separated bike lanes!"

"Please fix the super dangerous intersection by the University student housing on Sunnyside Avenue."

"What are the costs?"

"Consider natural plantings when redesigning 'green' areas."

Regarding the proposed design of the 1100 East & 900 South intersection: "Yes! We need this; have for a long time."

Open City Hall Survey #2 (159 responses)

The plan vision, facilities, priorities, and wayfinding recommendations discussed at the third public meeting were presented via Open City Hall and also in the project's second online survey. The survey received 101 responses during October 2016.

86% *strongly agreed with the Plan's vision.*

Separated bicycle paths, native plants, and raised medians best supported the vision.

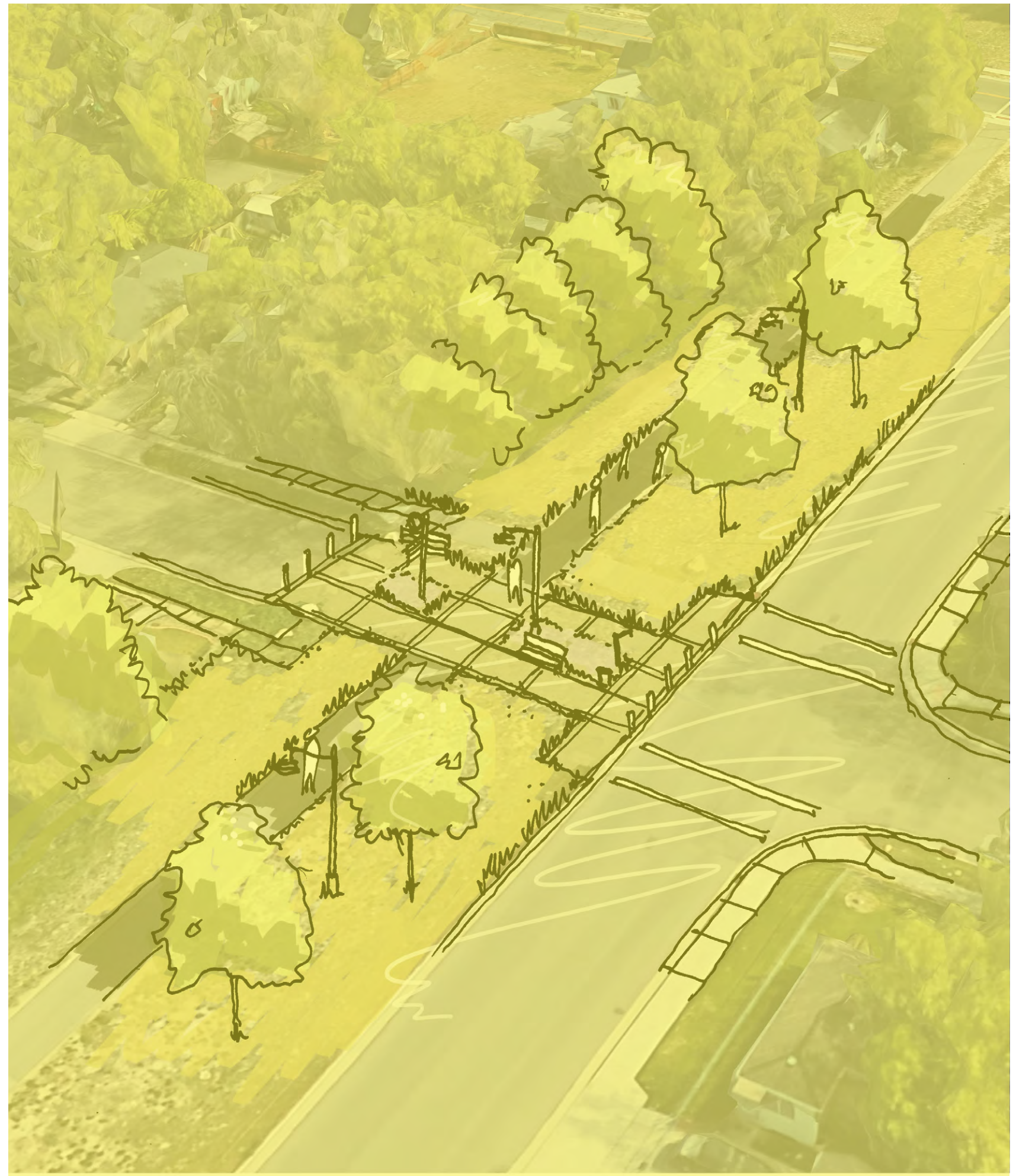
Wayfinding signage that incorporates natural materials was preferred over more modern designs.

Generally, respondents supported the design options and cross sections that created the most "complete" street or trail, including trees, separated bicycle facilities, and safer crossings.

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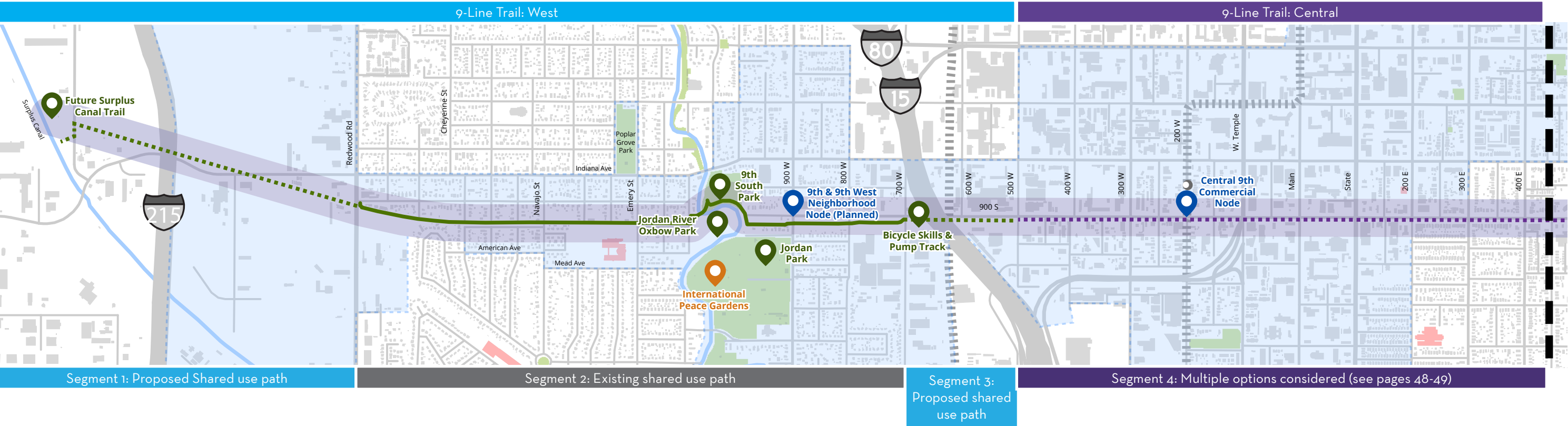
CHAPTER 4

TRAIL CONCEPT DESIGN



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CONCEPT DESIGN OVERVIEW

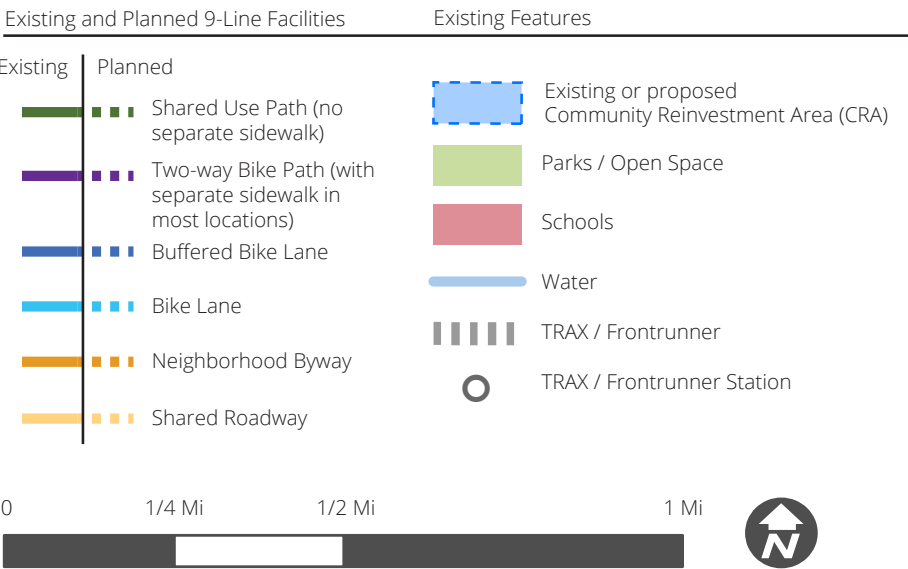


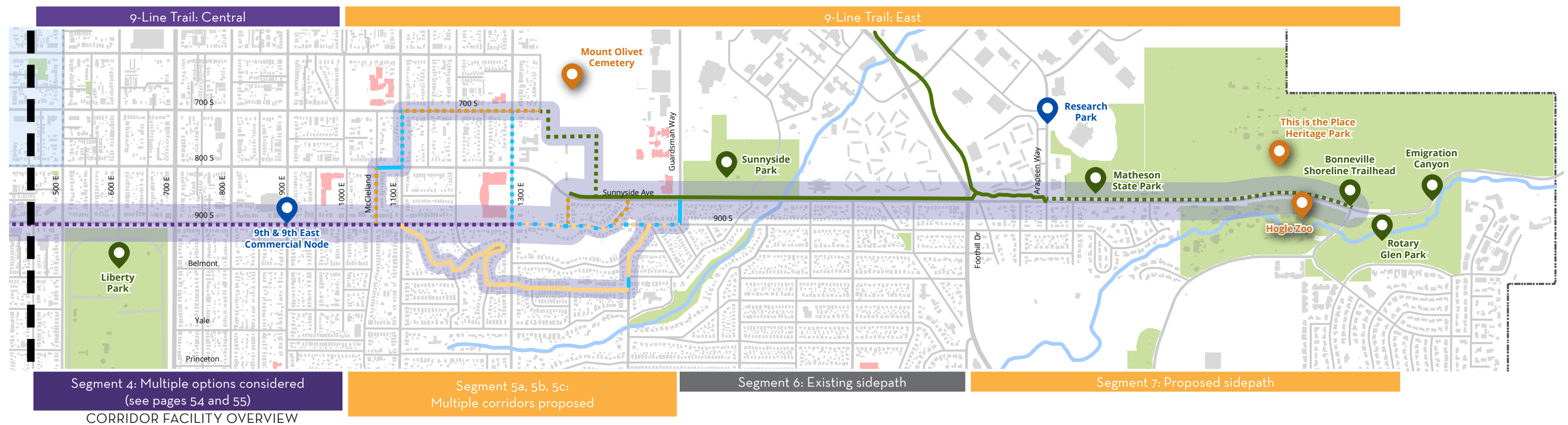
THE 9-LINE TRAIL VISION

The 9-Line Trail crosses through numerous neighborhoods, environments, and contexts throughout its extent from the Surplus Canal to the Bonneville Shoreline Trail. The corridor can generally be divided into three zones:

- **West Zone**- Extends from the Surplus canal to 500 W and is composed of the existing 9-Line Trail and two planned extensions on both the east and west end
- **Central Zone**- Extends from 500 W to Sunnyside Avenue while passing by Liberty Park and a number of established neighborhoods
- **East Zone**- Extends from the existing path on Sunnyside Ave. to the Bonneville Shoreline Trail and the mouth of Emigration Canyon

These zones have been further divided into distinct project segments based on the proposed facility types shown on page 39.





Segment	Existing / Proposed	Limit 1 (West)	Limit 2 (East)	Facility Type	Length	Notes
1	Proposed	Surplus Canal	Redwood Road	Shared use path	4,578' (0.87 miles)	Shared use path in former UPRR corridor; some acquisition needed
2	Existing	Redwood Road	700 W	Shared use path	8,139' (1.54 miles)	Existing shared use path; additional crossing improvements and landscape enhancements proposed
3	Proposed	700 W	500 W	Shared Use Path	1,463' (0.28 miles)	Shared use path from existing bicycle pump track and through former railroad corridor
4	Proposed	500 W	Lincoln St.	Multiple alternatives evaluated (see Page 48-49)	11,492' (2.18 miles)	Multiple alternatives considered. See page 54-55.
5a	Proposed	Lincoln St.	Guardsman Way	Varies (see notes)	5,585' (1.06 miles)	Two-way bike path from Lincoln St. to McClelland. One-way (uphill) bike path from McClelland to 1300 E with downhill bike lane. Uphill bike lane with downhill shared lane from 1300 E to Greenwood Terrace. Bike Lane on Greenwood Terrace.
5b	Primarily existing	Gilmer Ave / 1100 E	Guardsman Way	Shared roadway / bike lane	5,515' (1.04 miles)	Shared roadway on Gilmer to 1500 E bike lane to 900 S to Greenwood Terrace bike lane
5c	Proposed	McClelland Trail	Guardsman Way	Neighborhood byway / shared use path / sidepath	6,980' (1.32 miles)	Connect from the end of the existing McClelland Trail up to 700 S and through the Mt. Olivet Cemetery to the existing path along the East High football field (route to be determined / for future consideration)
6	Existing	Guardsman Way	Foothill Boulevard	Sidepath	3,953' (0.75 miles)	Sidepath along the north side of Sunnyside Ave.
7	Proposed	Foothill Drive	Upper BST Parking Area	Sidepath	6,777' (1.28 miles)	Sidepath along the north side of Sunnyside Ave.

9-LINE TRAIL: WEST SEGMENT

CORRIDOR OVERVIEW

The 9-Line Trail West stretches from the Surplus Canal to 500 W. The corridor exclusively follows the former Union Pacific Railroad ROW and has been partially developed as a rail trail beginning with the construction of the initial 9-Line Trail in 2011. Future expansion of the 9-Line west of Redwood Road will likely require the purchase of property or an easement from Union Pacific. The railroad rails and ties have been removed from I-215 east to Redwood Road. The line remains active west of I-215 to the Surplus Canal.

INITIAL 9-LINE TRAIL IMPLEMENTATION

The 9-Line Trail was implemented in 2011 in conjunction with the University of Utah's SLC Workshop. Over the past few years, improvements have been incrementally made to the corridor including branding and signage improvements in 2015, improvements to Wetland Park in 2016; and landscaping, improved crosswalks, and upgrades to the bicycle pump track in 2017.

IMPLEMENTATION CONSIDERATIONS

LAND USE INTEGRATION OPPORTUNITIES

Many exciting opportunities exist for integrating the development of the 9-Line Trail with broader land use initiatives. In 2017, the SLC RDA established the 9-Line Community Reinvestment Area (CRA). This designation provides the SLC RDA with a potential funding source through tax increment financing revenue that can be spent on beneficial community infrastructure projects including the 9-Line Trail. The CRA designation also allows the RDA to influence and guide how future development will interface with the trail through development standards, design guidelines, or form-based codes.

Recommendations:

- Leverage funding raised through the 9-Line CRA to facilitate capital and maintenance projects along the 9-Line Trail
- Consider development of a 9-Line CRA form-based code that specifically addresses how development should interface with the trail corridor
- Implement the land use recommendations identified in the 9-Line Corridor Master Plan.

IMPROVING THE EXISTING 9-LINE TRAIL

Until 2017, relatively few improvements have been made to the existing 9-Line Trail since its construction in 2011. However, in 2017 SLC Parks and Public Lands began constructing numerous improvements on and adjacent to the trail. These included:

- Decorative colored concrete crosswalks
- Expansion and improvements to the existing bicycle pump track
- Landscaping improvements including the installation of tree plantings, native seeding, and irrigation
- Construction of a community garden adjacent to the trail

These recent initiatives seek to enhance the 9-Line as a community asset by providing an attractive public open space with a diverse program of amenities. Additional recommendations to support this goal have been provided below:

Recommendations:

- Continue installation of trees and landscape improvements from 1100 West to Redwood Road
- Install pedestrian scale lighting throughout the 9-Line Trail West
- Improve bicycle and pedestrian connections to the 9-Line Trail such as nearby sidewalks and neighborhood byways

EXTENDING THE 9-LINE TRAIL EAST AND WEST

Extending the 9-Line Trail westward towards its planned terminus at the Surplus Canal will require coordination with Union Pacific Railroad to secure access.

Recommendations:

- Seek to secure property or an easement from Union Pacific Railroad Co, Salt Lake County and/or Rocky Mountain Power to facilitate trail access from the Surplus Canal to Redwood Rd.
- Seek to purchase and develop a rail trail on the former railroad property east of I-15.
- Seek to improve the the 9-Line Trail crossing of UTA and Union Pacific railroad tracks under I-15. Replace existing chicanes and gates with automatic gate arms to provide easier access for bicyclists, wheelchair users, and people with strollers.
- Coordinate with Union Pacific to seek out a solution to stopped freight trains that block 900 S, prevent east-west mobility, and promote dangerous crossing of the railroad tracks when stopped trains are present.



Existing Union Pacific Railroad corridor west of Redwood Rd.

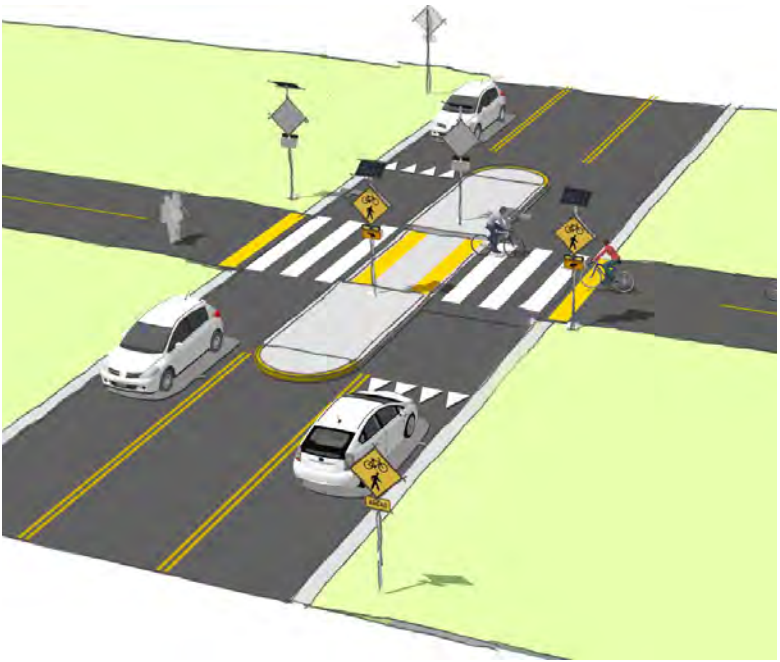
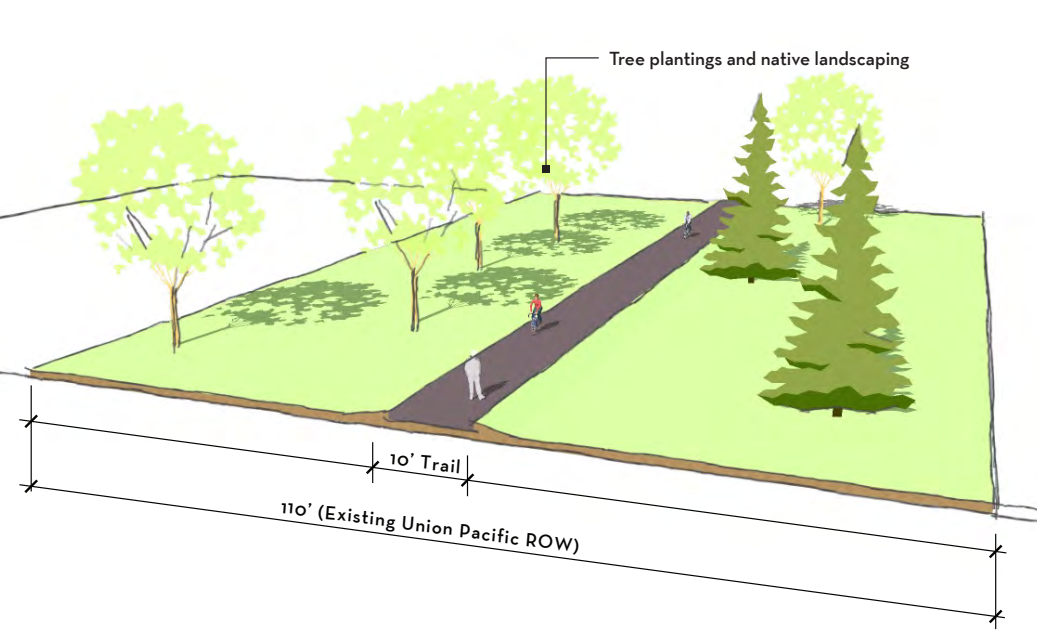


Existing 9-Line Trail terminus at Redwood Road



Existing 9-Line Trail terminus at 700 W

9-LINE TRAIL WEST: SURPLUS CANAL TO INDIANA AVE.



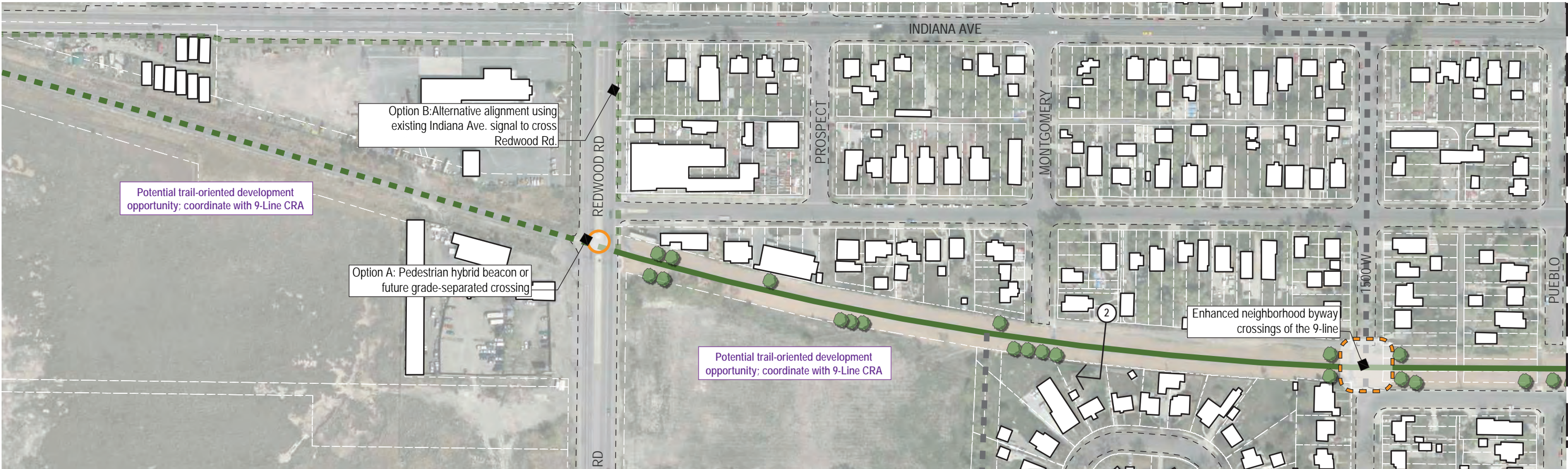
Existing and Planned Trails & Bikeways		Other Recommendations	
Existing	Proposed		
	9-Line Trail (offstreet)	Intersection / crossing improvements	
	9-Line Trail (on-street)	Land use integration opportunity	
	Other bikeways or trails	Transit integration opportunity	
		Parks and Public Lands integration opportunity	
Existing Features			
Parks / Open Space			
Schools			



1 Proposed 9-Line Trail
Native landscaping and tree plantings

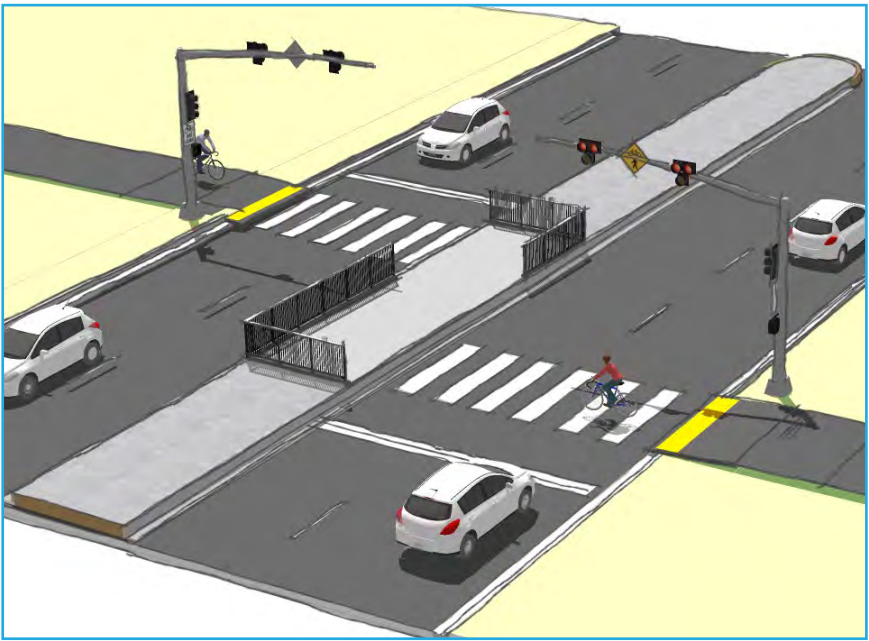
Midblock crossing with rectangular rapid flashing beacon (RRFB)

9-LINE TRAIL WEST: INDIANA AVE. TO JORDAN RIVER TRAIL

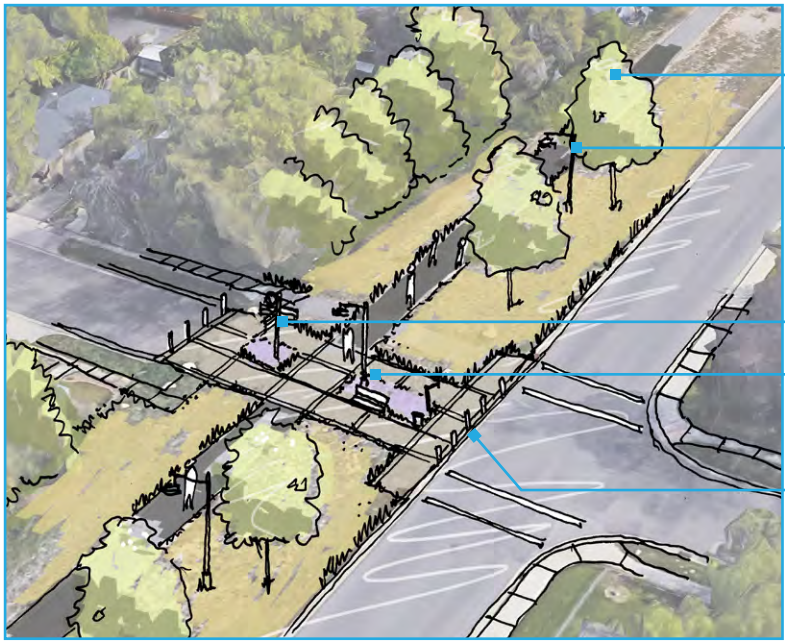


2

Enhancements to existing 9-Line Trail
Add native landscaping and tree plantings

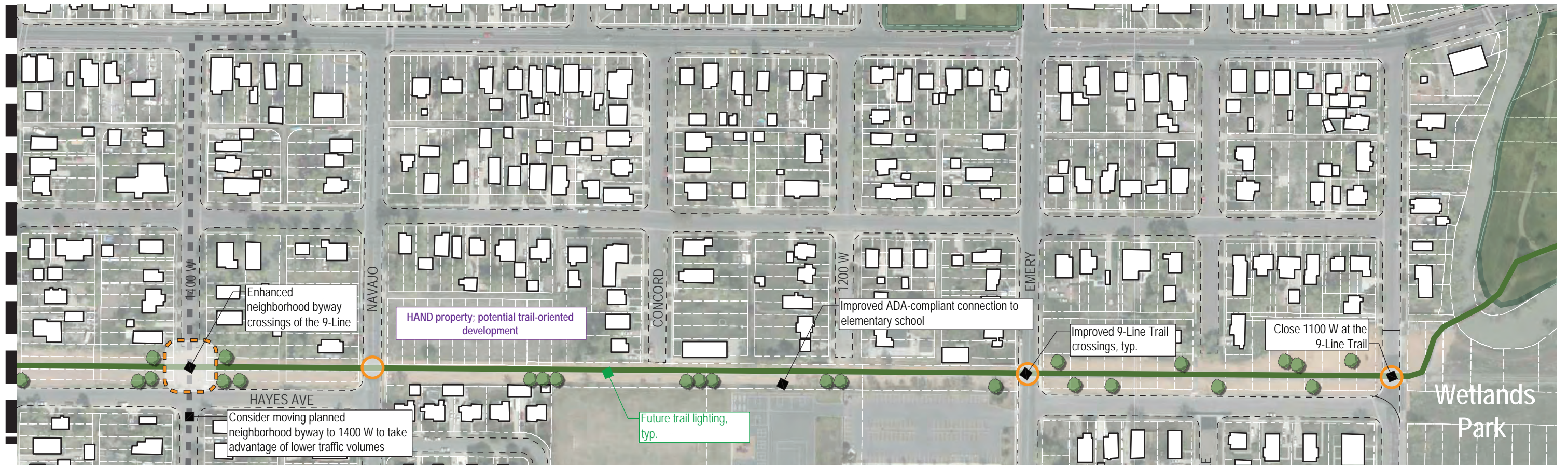


Pedestrian Hybrid Beacon
9-Line Trail and Redwood Rd

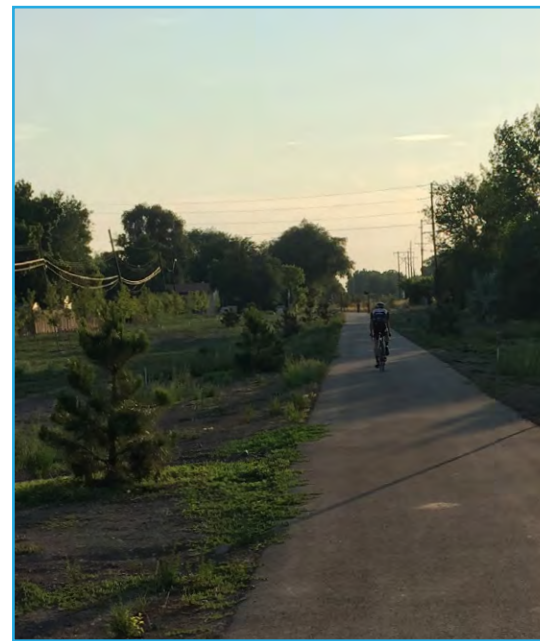


Typical neighborhood byway crossing of the 9-Line Trail
1500 W & 1400 W

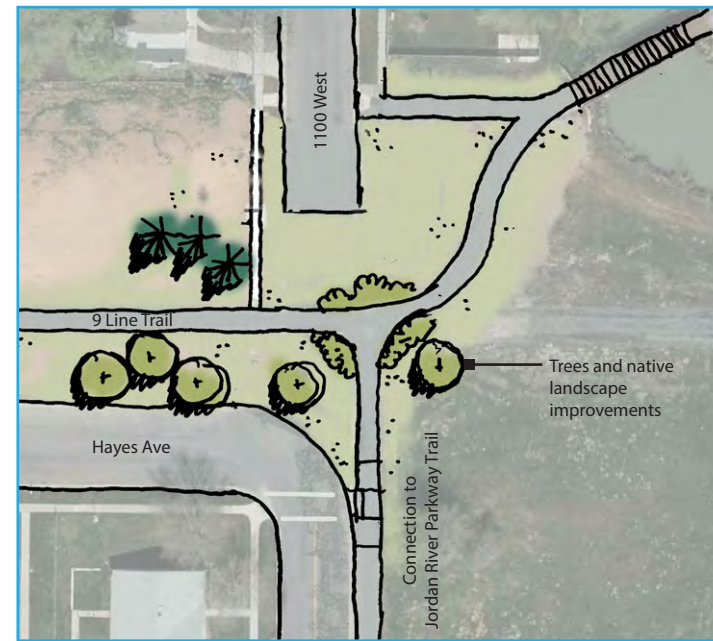
- Tree plantings, typ.
- Pedestrian scale lighting, typ.
- Wayfinding fingerboard sign
- Amenities such as benches, trash receptacles, and bike repair stations
- Bollards blocking through motor vehicle traffic while allowing bicycle and pedestrian access to the neighborhood byway



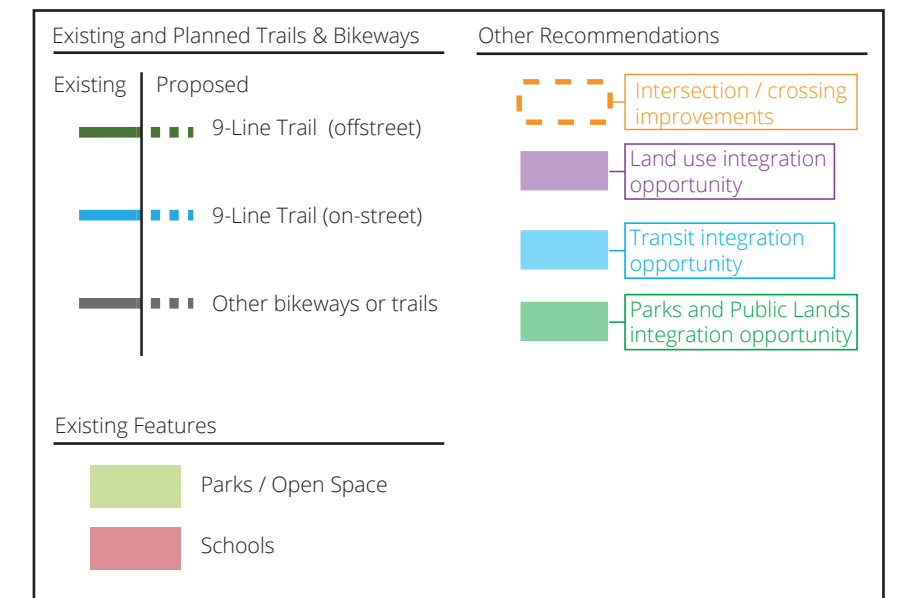
Existing desire line to Parkview Elementary School



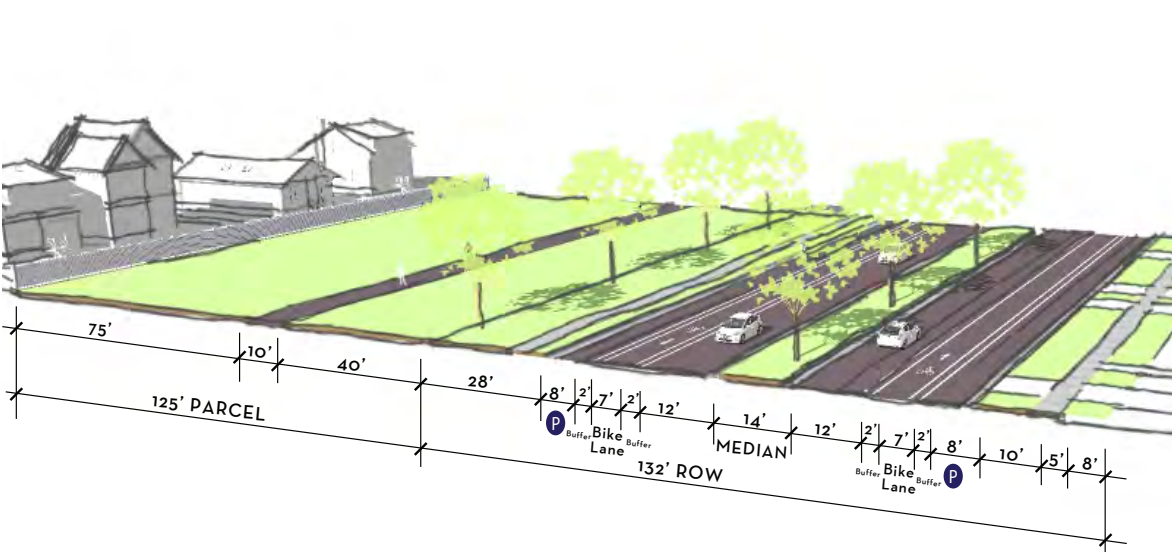
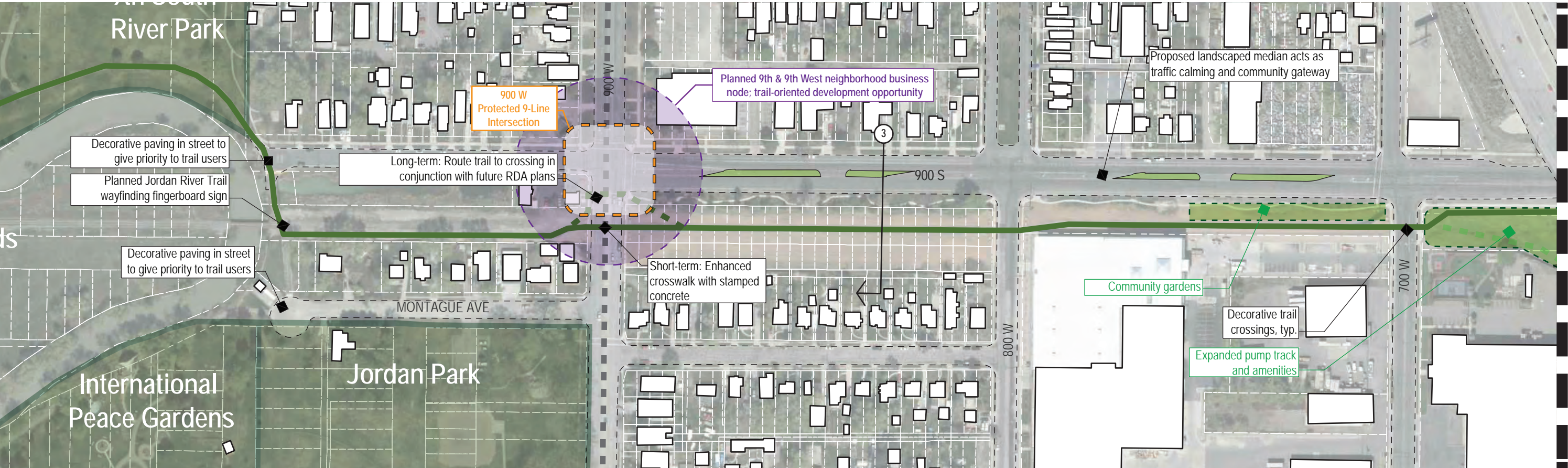
Recent 9-line tree plantings and landscape improvements



Street closure at 1100 W and 9-Line



9-LINE TRAIL WEST: JORDAN RIVER TRAIL TO 500 W



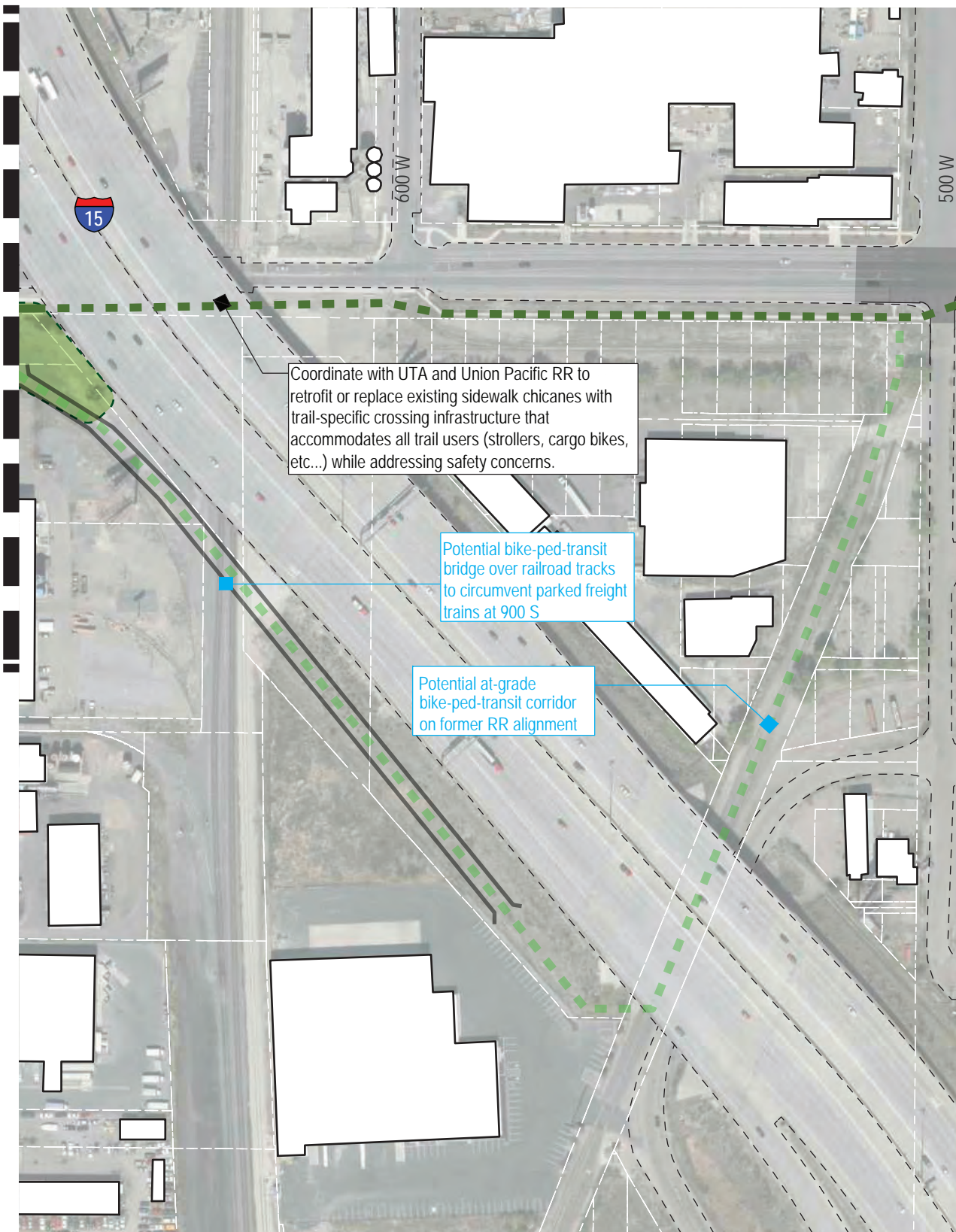
3 Proposed 900 S / 9-Line Trail
Buffered bike lanes and landscaped medians



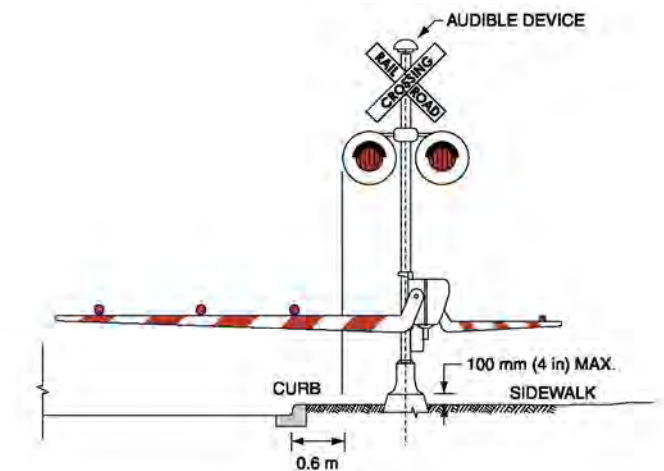
Decorative paving through the end of the 900 S hammerhead would clarify the alignment of the trail

Existing and Planned Trails & Bikeways		Other Recommendations	
Existing	Proposed		
	9-Line Trail (offstreet)	Intersection / crossing improvements	
	9-Line Trail (on-street)	Land use integration opportunity	
	Other bikeways or trails	Transit integration opportunity	
Existing Features		Parks and Public Lands integration opportunity	
Parks / Open Space			
Schools			





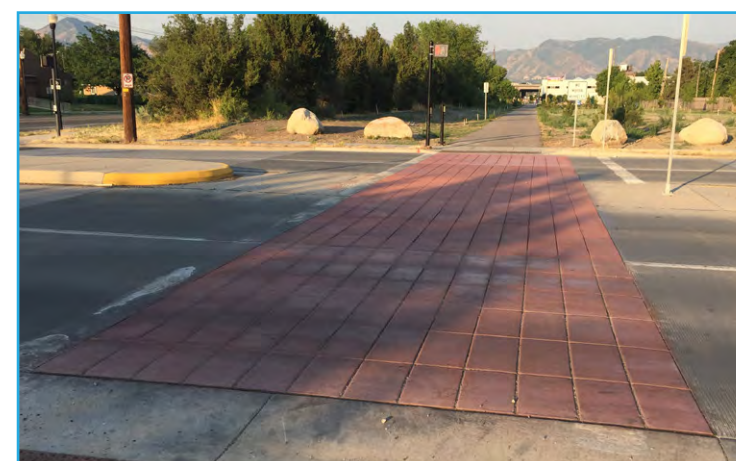
Community gardens adjacent to the 9-Line Trail



Typical pedestrian gate placement for consideration at 9-Line Trail railroad crossing (MUTCD Figure 10D-4)



Pump track improvements along the 9-Line Trail



Decorative trail crossings along the 9-Line Trail

9-LINE TRAIL: CENTRAL SEGMENT

SEGMENT OVERVIEW

The Central segment of the 9-Line Trail stretches from the 500 W through the heart of Salt Lake City to 1300 E. This trail segment crosses many established neighborhoods and links existing neighborhood business nodes at Central 9th (200 W / 900 S) and 9th & 9th East (900 E / 900 S). Due to the established neighborhoods present in this segment and the lack of opportunity trail corridors (such as active or inactive railroad lines, streams or utility corridors), this segment requires trail solutions that can be implemented within the street ROW to create a continuous east-west active transportation route.

DEVELOPMENT OF OPTIONS

Several options were explored to connect the existing 9-Line Trail through the established neighborhoods of Ball Park, Central City, Liberty Wells, and East Liberty Park. Two options utilize a lane reconfiguration to reconfigure 900 S from 4/5 lanes (two travel lanes in each direction with a center turn lane in some areas) to 3 lanes (one lane in each direction with a center turn lane). By removing a travel lane and providing a center turn lane, 900 S is likely to reduce motor vehicle crashes while making additional ROW space available for landscaping, streetscape amenities, and more comfortable bicycle and pedestrian facilities. A summary of options is found on pages 54-55. The preferred option is comprised of a lane reconfiguration on 900 S where underutilized ROW is allocated to the south side of the street to facilitate construction of a two-way bike path and streetscape amenities such as landscaping, outdoor dining, and bicycle parking. The Federal Highway Administration's Road Diet Informational Guide suggests that streets with average daily traffic counts below 20,000 vehicles per day may be good candidates for lane reconfiguration.

IMPLEMENTATION CONSIDERATIONS

TWO-WAY BIKE PATH SAFETY MEASURES

A range of safety measures support the preferred concept of a two-way bike path and help to mitigate concerns of bicyclists traveling against traffic. These measures seek to isolate and minimize bicycle and pedestrian conflicts by slow turning movements across the bike path, improving visibility, or providing queuing space for vehicles before crossing the bike lane. A toolbox of recommended safety measures can be found on pages 56 through 58. Other successful examples of two-way bike paths along two-way streets includes:

- The Hampline, Memphis, TN
- The Indianapolis Cultural Trail (portions), Indianapolis, IN
- N Street Separated Bike Lane (portions), Lincoln, NE
- Broadway Separated Bike Lane, Seattle, WA
- Victorian Avenue Separated Bike Lane, Sparks, NV

Recommendations:

- Utilize the two-way bike safety measures described on pages 56-58 when designing and engineering the central segment of the 9-Line Trail.



900 South looking east



900 S along Liberty Park



9th and 9th Business District

TRANSIT INTEGRATION OPPORTUNITIES

The Central portion of the 9-Line Trail shares the 900 S ROW and offers numerous opportunities to integrate with the transit network. These include:

- Connectivity to the 900 S TRAX station
- A potential streetcar from 400 W to 200 W (connecting to Downtown along 400 W)
- Several existing bus routes including the 9, the 213, the 228, the 313, and the 3
- The SLC Transit Master Plan recommends the development of a “frequent transit network” (FTN) route on 900 S that provides reliable, 15-minute or less service on weekdays and 30-minute service on evenings and weekends. The mode of this route could vary from bus to rail.

Recommendations:

- Partner with UTA to improve bicycle and pedestrian connections to transit along the corridor, particularly routes that are part of the FTN
- Refer to page 63 for information on how the 9-Line Trail should interface with 900 S transit stops
- The 900 S crossing of the Frontrunner and freight railroad tracks presents a barrier to active transportation users and expansion of an FTN route east along 900 S. Further study of this connection and other east/west connections should be considered by SLC, UTA, UDOT, and railroad interests.

LAND USE INTEGRATION OPPORTUNITIES

Several opportunities exist to integrate the 9-Line Trail with existing and future development. This segment of the 9-Line crosses through many RDA areas including the Granary District, the West Temple Gateway; and the tentatively planned State Street and 9-Line Community Reinvestment Area.

Recommendations:

- Work with the SLC RDA to define how new development can effectively embrace and leverage the 9-Line Trail. Consider development of design guidelines or a form-based code that requires integration between the trail and proposed development.

LANDSCAPING AND URBAN DESIGN OPPORTUNITIES

The preferred concept for the 9-Line allocates underutilized ROW space to the south side of 900 S to facilitate a new two-way bike path. In addition to the bike path, new opportunities for bicycle parking, GREENbike expansion, outdoor dining, and enhanced transit stops are possible. Page 63 illustrates how public right-of-way may be re-purposed for various urban design strategies.

Recommendations:

- Work with the SLC RDA to define how landscaping and urban design can be integrated into the 9-Line Trail through Community Reinvestment Areas. Consider development of design guidelines or a form-based code that requires integration between the trail and proposed development.
- Coordinate with SLC Streets Division, SLC Parks and Public Lands, and the Central Business District Maintenance Division to determine capacity for maintaining urban design and landscaping improvements.
- Work with SLC Parks to consider adding additional park elements along the corridor as space permits to fulfill the visions of the 1992 Open Space Plan(i.e. small playground features or passive recreation opportunities)

INTERIM IMPLEMENTATION STRATEGIES

Although the proposed infrastructure recommendations for the Central Segment of the 9-Line Trail consist of several significant capital projects, opportunities exist for the City to make incremental progress towards the larger vision. SLC should maintain an opportunistic and nimble approach to implementation.

Recommendations:

- Consider the re-striping 900 S as a 2-3 lane roadway with bike lanes or buffered bike lanes to provide an interim connection between existing facilities on the east and west ends of the study area.
- Coordinate with planned roadway reconstruction projects to implement the full vision where feasible.
- Implement wayfinding and branding recommendations as a way to build awareness of the ultimate vision.



Recent conversions from residential uses to small businesses



900 S near State Street



900 S near 400 E

9-LINE TRAIL CENTRAL OPTIONS

CORRIDOR OPTIONS

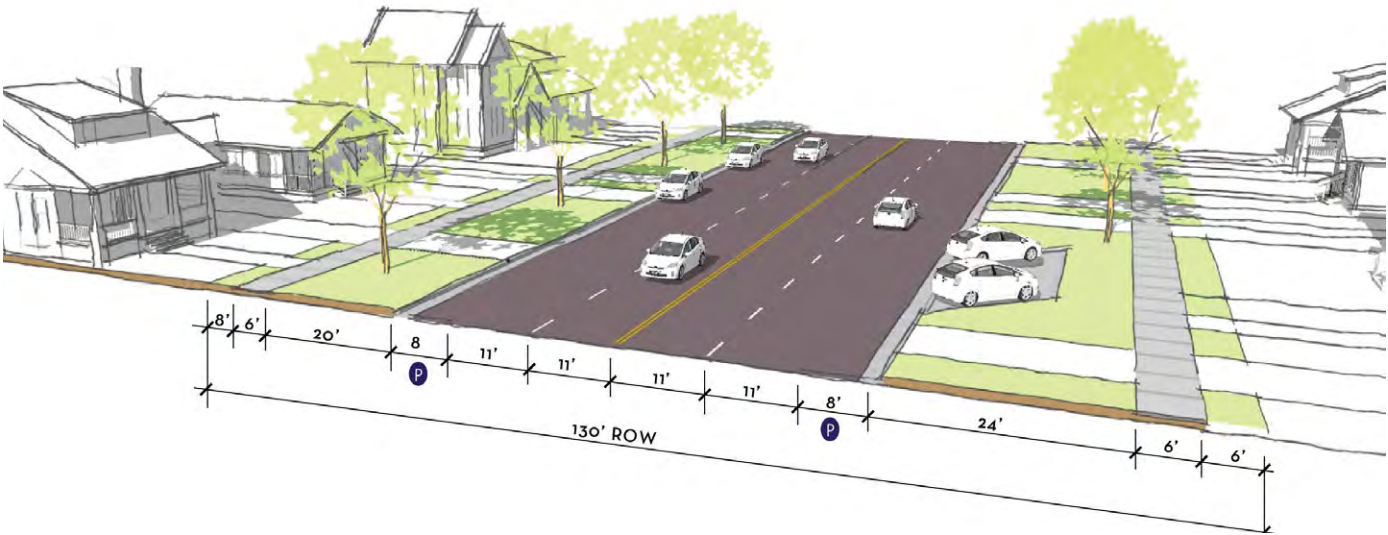
The Planning Team evaluated three different options that sought to connect the existing 9-Line Trail terminus at 600 W to the existing Sunnyside Trail on the East Bench.

These options included:

- Option A: No Build
- Option B: Lane reconfiguration proposing 3-lane cross-section and 1-way bike paths
- Option C: Lane reconfiguration proposing 3-lane cross-section and 2-way bike path

PREFERRED DESIGN: Option C, Lane reconfiguration & 2-Way Bike Path

Based upon public comment, coordination with the Project Steering Committee and the SLC Transportation Division, Option C was selected as the preferred concept design. Option C functions well with the existing 9-Line Trail west of I-15 however it does present some operational challenges in developing a 2-way bicycle and pedestrian facility along a two-way street. To mitigate these challenges, the design team developed a host of strategies to improve the safety of the two-way bike path. Pages 56-58 describe these strategies.



OPTION A: NO BUILD

The No-Build Option would leave 900 S in its current form with two travel lanes in each direction, no bicycle facilities, and an intermittent center turn lane. In order to connect from the existing 9-Line Trail to the Sunnyside Trail, bicyclists and pedestrians would be required to use the infrastructure and facilities that currently exist.

Strengths

- No disruption to the corridor
- No cost

Weaknesses

- 4/5 Lane roadway configuration is not as comfortable to bicyclists and pedestrians
- No dedicated bicycle facilities
- Higher traffic speeds than other options
- More difficult for pedestrians to cross 900 S



OPTION B: 3-LANE CROSS-SECTION WITH ONE-WAY BIKE PATHS

Option B would reconfigure 900 S from a 4/5 -lane street to a 3-lane street (one travel lane in each direction with a two-way center turn lane). Left over space from the lane reconfiguration would be allocated to the edges of the street to provide space for 6' one-way bike paths in each direction.

Strengths

- Provides comfortable bicycle facilities that accommodate all ages and abilities
- Distributes investment equally to both the north and south side of 900 S

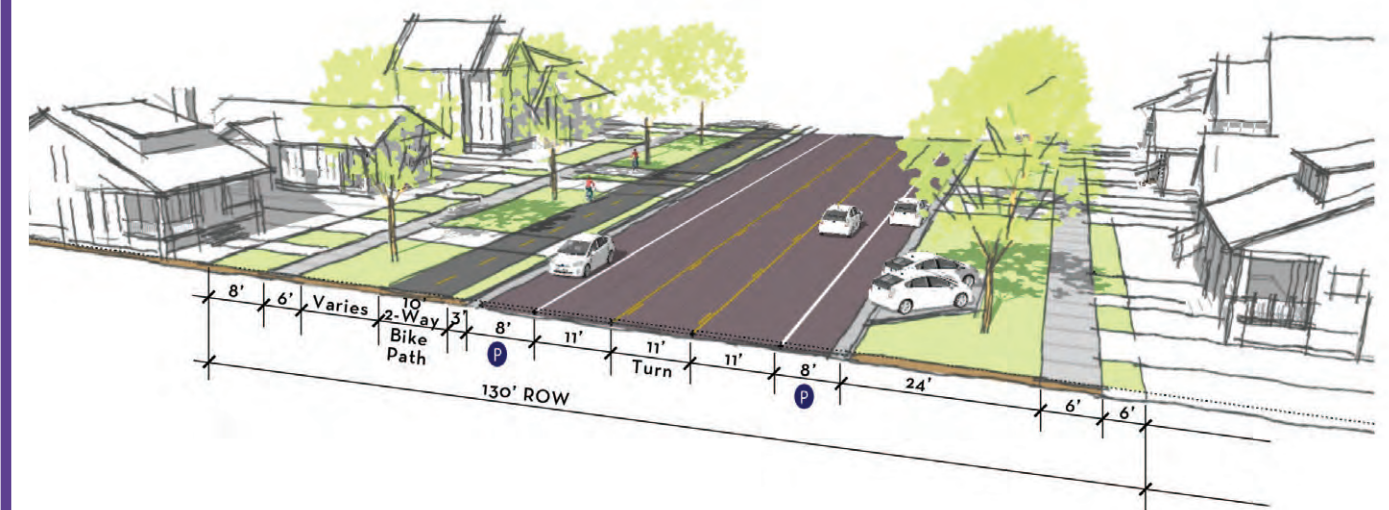
Weaknesses

- Impacts the ROW frontage for a greater number of properties
- Impacts a greater number of trees throughout the corridor
- Costs more than the option C

PREFERRED OPTION

KEY ATTRIBUTES

- MOST PUBLIC SUPPORT
- LIMITS IMPACTS TO ADJACENT RESIDENCES AND BUSINESSES WHILE MEETING THE PROJECT GOALS
- SUPPORTS LINEAR PARK CONCEPT EXPRESSED IN 1992 OPEN SPACE PLAN



OPTION C: 3-LANE CROSS-SECTION WITH TWO-WAY BIKE PATH

Option C would reconfigure 900 S from a 4/5 -lane street to a 3-lane street (one travel lane in each direction with a two-way center turn lane). Left over space from the lane reconfiguration would be allocated to the south side of 900 S to allow development of a 10' two-way bike path, landscaping, and urban design improvements.

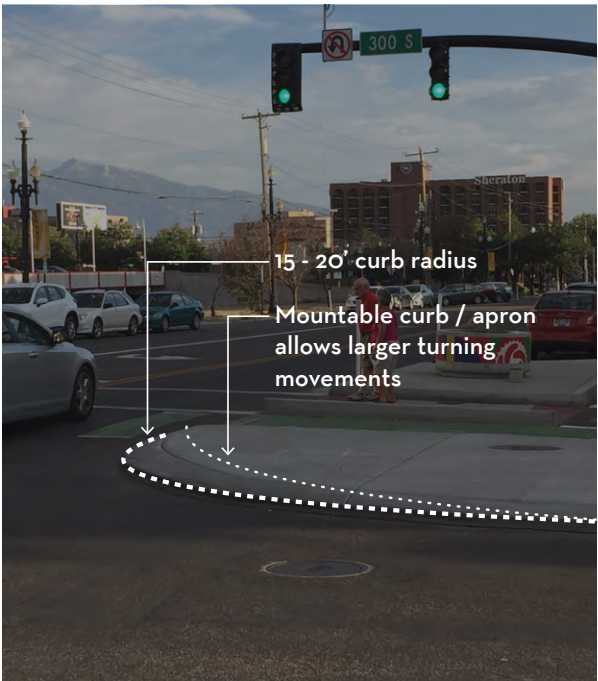
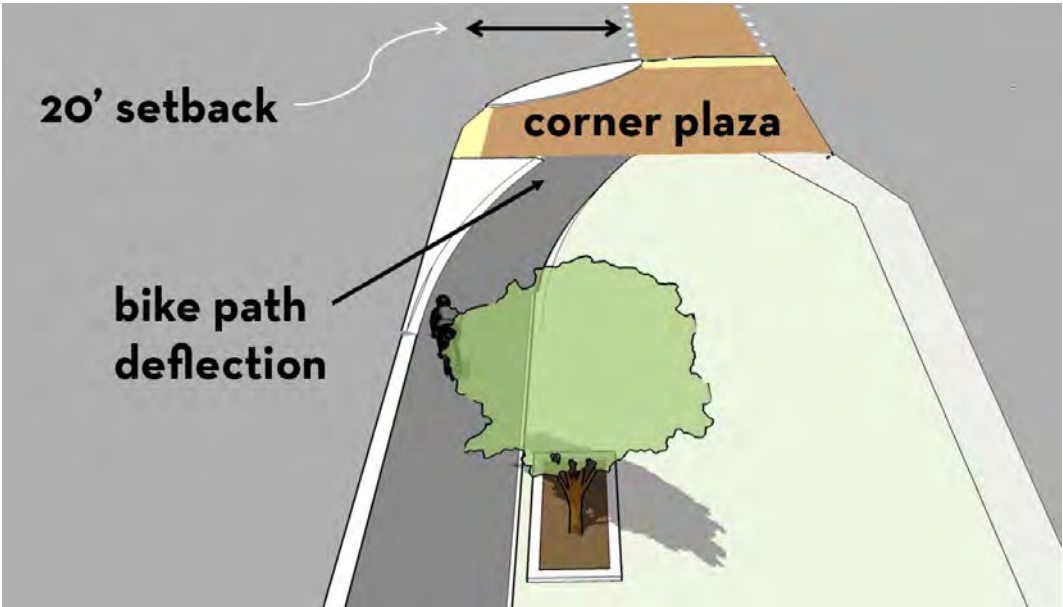
Strengths

- Provides comfortable bicycle facilities that accommodate all ages and abilities
- Supports the concept of a linear park described in the 1992 Open Space Master Plan
- Impacts fewer trees and property frontages than Option B
- Costs less than Option B

Weaknesses

- Does not function as well for people on bicycles who like to ride at higher speeds
- Does not equally distribute the investment to both sides of 900 S

TWO-WAY BIKE PATH SAFETY MEASURES



- I Treatment occurs at intersections
- M Treatment occurs mid-block & at driveways

In order to implement a two-way bike path along 900 South, a number of potential safety measures may be appropriate to help promote a safe and comfortable experience for all trail users. The following list of strategies should be considered as a basis for subsequent design efforts. Additional treatments may be warranted in some cases.

I Bend Out Intersection Design

This plan proposes bend out designs of the bike path at most intersections along the corridor. This strategy has been borrowed from the FHWA Separated Bike Lane Planning and Design Guide and utilized in other locations such as the 200 W / 300 S intersection in Salt Lake City. A preferred setback of 16.5' to 22' (20' preferred) from the edge of the intersection to the edge of the bike path would allow turning vehicles to exit the travel lane and still yield to bicyclists or pedestrians in the crosswalk.

I Corner Safety Islands & Setbacks

Often included as critical elements of protected intersections, corner safety islands are raised areas that separate the trail/corner plaza from the general purpose travel lane and define the corner radius of the intersection. The island may be mountable and provides comfort for waiting trail users and manages the speed of turning vehicles.

I M Reduced Turn Radii

Maintaining curb radii between 15'-20' promotes slower vehicular turning movements and greater yielding compliance. This also allows vehicles to cross the two-way bike path closer to 90-degrees, improving the visibility of trail users to motorists. Mountable curbs with aprons behind the curb can be used in scenarios where required by larger vehicles.

- I Treatment occurs at intersections
- M Treatment occurs mid-block & at driveways



Example: Existing 9-Line Trail crossing at 800 W



Example: Indianapolis Cultural Trail



I

High-Visibility Intersection Crossings

Improving the visibility of the bike path and sidewalk roadway crossings will improve perceived and real safety for non-motorized users. Crossings could follow Salt Lake City's existing for colored concrete crosswalks.

M

Driveway Treatments and Setback

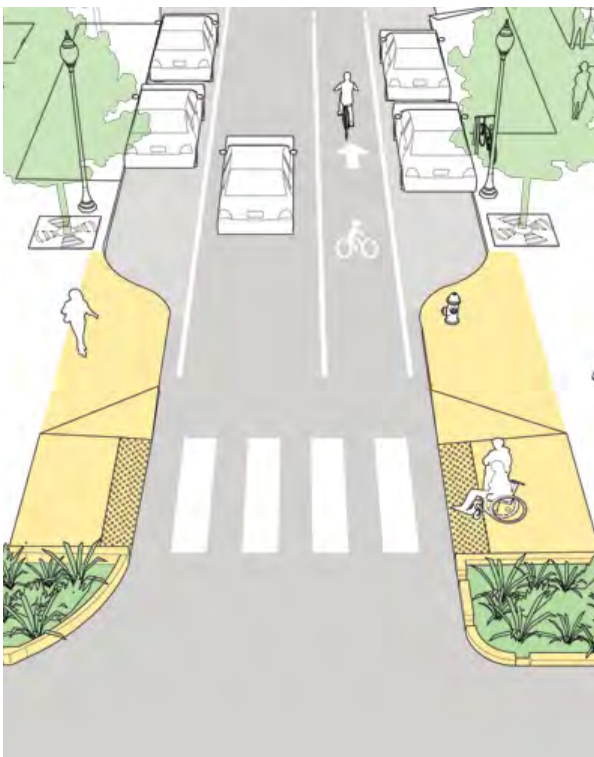
Contrasting path and sidewalk paving materials, small turn and curb radii, and short (steep) driveway apron transitions between the gutter pan and the edge of the two-way bike path will decrease motor vehicle speeds, improve perceived comfort of path users, improve visibility and awareness of the new, elevated path, and establish the priority of the path. The bike path should also be located 20' from the edge of the travel lane at commercial driveways where heavier volumes are anticipated. Lesser setbacks may be acceptable at lower volume driveways that are seldom used or access residential uses.

I M

Regular Alignment Deflection

Laterally shifting the alignment of the path (also known as deflection), at intersections (as previously discussed) and at mid-block, is often necessary to avoid utilities, trees, dining areas, and parking. Deflection can reduce bicycle speed, which may be desired in order to prevent bicycle traffic from gaining too much speed. Deflection should not be used without a specific purpose or too often. Doing so may be unwelcome on a regional trail and creates a facility that is difficult for mobility device users to navigate.

TWO-WAY BIKE PATH SAFETY MEASURES



Source: NACTO Urban Street Guide

I

Shortened Crossing Distance / Curb Extensions

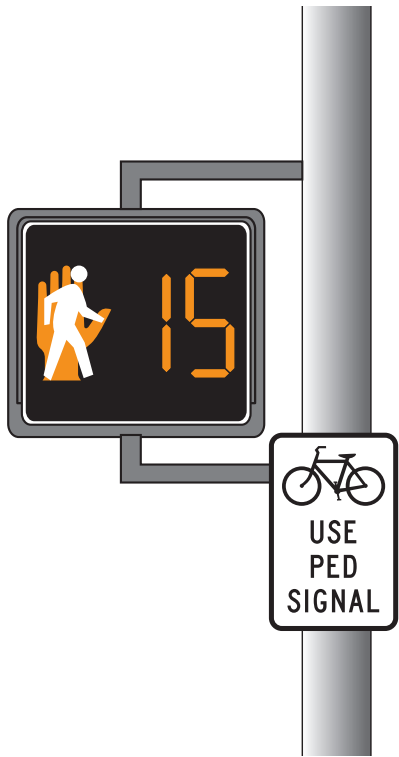
Shortening the crossing distance for path crossings limits the amount of time that path users are exposed to motorized traffic. Many streets that the proposed 9-Line Trail crosses include on-street parking or excess space beyond what is needed to route the travel lanes and/or turn lanes through the intersection. By moving the curbs inward, additional space can be gained for non-motorized users on top of the curb and shortened crossing distance can be achieved.



I M

Signage

Signs that enhance awareness and visibility of the path and its users along the corridor can take different forms. Two such forms are information signs indicating the presence of multi-modal facilities and the 9-Line Trail corridor in general as well as signs that require left- and right-turning motorists to yield to path and sidewalk users at intersections and major driveways.



I

Leading Pedestrian Intervals

Leading pedestrian intervals (LPI) give pedestrians (and other path users) a head start when entering an intersection with a corresponding green signal. This head start allows path users to establish their position in the crosswalk and improve their visibility to traffic turning across the crosswalk. LPIs have been shown to reduce pedestrian crashes by nearly 60% where they have been utilized. Typically LPIs are implemented in conjunction with prohibitions on right turns on red.

- I Treatment occurs at intersections
- M Treatment occurs mid-block & at driveways



Bicycle Signal Heads (optional)

Proposed 9-Line Trail crossings combine bicyclists and pedestrians into a single crosswalk at corner plaza areas. This strategy encourages slow bicyclist speeds at intersections. Bicycle signal heads could be utilized to give bicyclists a dedicated phase to cross the intersection. This would require signal modifications and the addition of a separate, adjacent crosswalk for pedestrians.

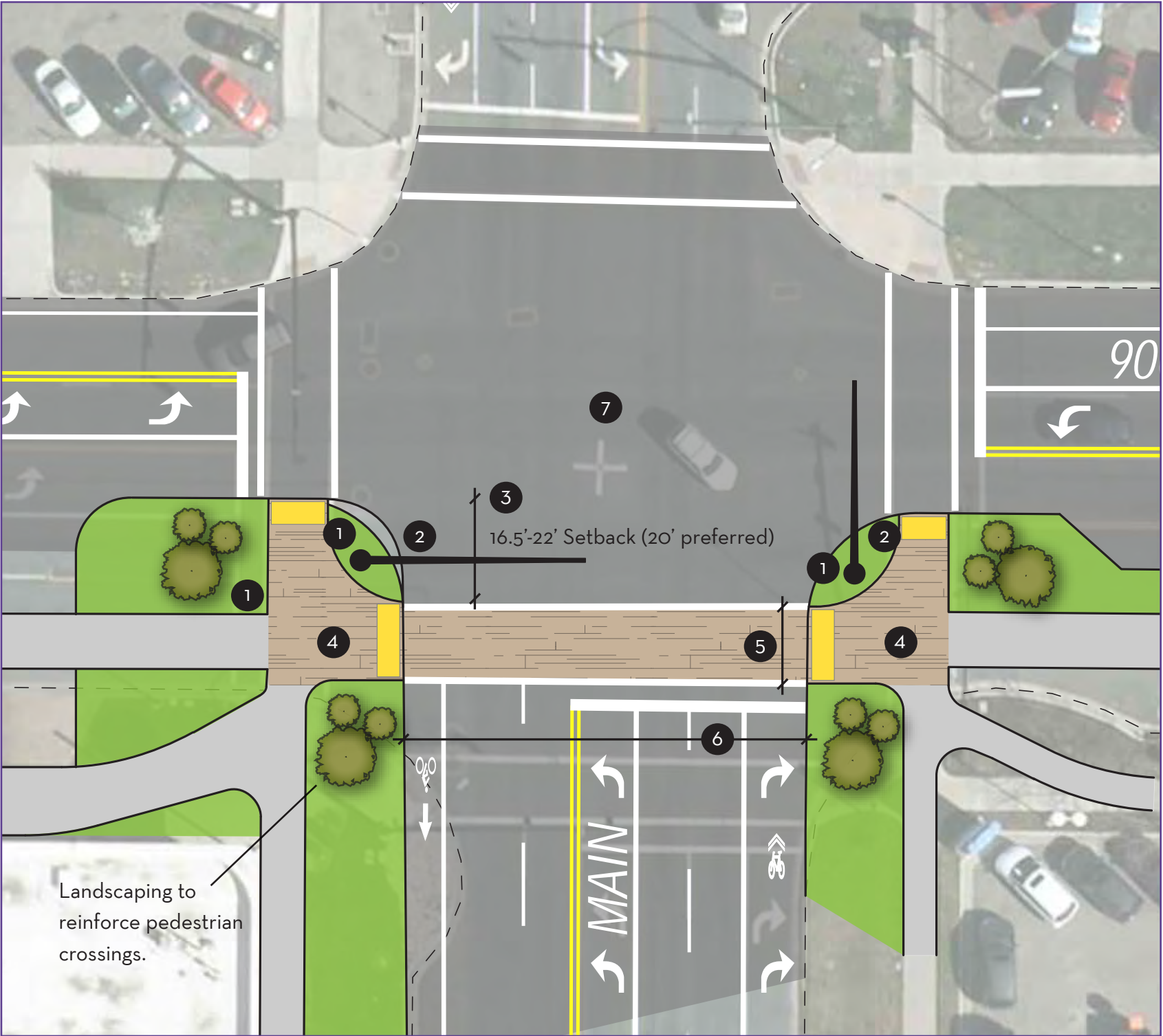
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CENTRAL 9-LINE TRAIL SIGNALIZED INTERSECTIONS (TYPICAL)

Anatomy of the 9-Line Corner Plaza

The 9-Line corner plaza makes use of many of the previously described safety measures to create a safe, comfortable, and functional trail crossing that serves both the transportation and urban design roles of the greater 9-Line Trail Extension project. The 9-Line corner plaza is anticipated to occur at all sidepath-street intersections throughout the corridor. Specific cross-street characteristics such as number of lanes, whether or not the cross-street is a UDOT facility, and absence or presence of bikeways may necessitate additional treatments, however the strategies listed below should be considered a basis for intersection design.

- 1 POTENTIAL PUBLIC ART AND LANDSCAPING LOCATIONS**
May include art, plantings, and other streetscape elements that will improve aesthetics and traffic calming, and create a sense of place.
- 2 SIGNAL POLE/MAST ARM AND PEDESTRIAN CROSSING HEAD RENOVATIONS**
Due to the lane reconfiguration, some signal pole/mast arm assemblies may need to be relocated so that they can extend over the center turn lane. This is likely to be an issue with poles mounted on the south side of the street only. It is likely that supplemental pedestrian signal pedestals and push buttons will be required to meet ADA/PROWAG requirements.
- 3 CORNER SAFETY ISLANDS**
Smaller curb radii reduce turning speeds while providing a mountable corner apron for larger vehicles. The islands will also provide the equivalent of approximately one car length between the path crossing and the travel lane, improving interactions and reaction times for all users.
- 4 CORNER PLAZA WITH DECORATIVE CONCRETE (optional)**
Patterned paving materials in the corner plaza area will visually and tactically warn path users of the upcoming crossings and create a sense of place.
- 5 PATH CROSSING AND CURB RAMPS**
The 14' wide path crossing will provide room for safe bicycle and pedestrian interactions and passing. Curb ramps will be constructed at a gentler slope to accommodate both modes.
- 6 CROSSING DISTANCE REDUCTION**
The path crossing distance should be as short as cross street travel lanes allow through lane narrowing, curb extensions, parking removal, removal of unnecessary dedicated right turn lanes, or other strategies.
- 7 MORE COMPACT INTERSECTION**
A smaller intersection overall has benefits for all users. Clearance times are reduced allowing signals to be optimized for greater efficiency.



CENTRAL 9-LINE TRAIL PROTECTED INTERSECTIONS (TYPICAL)



9-Line Protected Intersections

The typical Central 9-Line Trail Intersection (page 60) applies many principles of protected intersections to the southern leg of 9-line intersections (where the proposed 2-way bike path crosses). At locations where the 9-Line Trail crosses existing or proposed dedicated bicycle facilities (bike lanes, buffered bike lanes, or separated bike lanes) consideration should be given to extending protected intersection treatments to all legs of the intersection and creating a full protected intersection. Salt Lake City currently has one other protected intersection located at 300 S & 200 W. Although final engineering judgement should be used, protected intersections may be appropriate at the 900 W, Main Street, and 300 East.

- POTENTIAL PUBLIC ART AND LANDSCAPING LOCATIONS**
May include art, plantings, and other streetscape elements that will improve aesthetics and traffic calming, and create a sense of place.
- SIGNAL POLE/MAST ARM AND PEDESTRIAN CROSSING HEAD RENOVATIONS**
Due to the lane reconfiguration, some signal pole/mast arm assemblies may need to be relocated so that they can extend over the center turn lane. This is likely to be an issue with poles mounted on the south side of the street only. It is likely that supplemental pedestrian signal pedestals and push buttons will be required to meet ADA/PROWAG requirements.
- CORNER SAFETY ISLANDS**
Smaller curb radii reduce turning speeds while providing a mountable corner apron for larger vehicles. The islands will also provide the equivalent of approximately one car length between the path crossing and the travel lane, improving interactions and reaction times for all users.
- CORNER PLAZA WITH DECORATIVE CONCRETE (optional)**
Patterned paving materials in the corner plaza area will visually and tactically warn path users of the upcoming crossings and create a sense of place.
- PATH CROSSING AND CURB RAMPS**
The 14' wide path crossing will provide room for safe bicycle and pedestrian interactions and passing. Curb ramps will be constructed at a gentler slope to accommodate both modes.
- CROSSING DISTANCE REDUCTION**
The path crossing distance should be as short as cross street travel lanes allow through lane narrowing, curb extensions, parking removal, removal of unnecessary dedicated right turn lanes, or other strategies.
- BIKE RAMPS**
Bike ramps would allow bicyclists to travel on top of the curb and enter shared corner plazas where they could access the 9-line or travel through the intersection with the additional protection of the corner refuge island and protected intersection setbacks.
- MORE COMPACT INTERSECTION**
A smaller intersection overall has benefits for all users. Clearance times are reduced allowing signals to be optimized for greater efficiency.

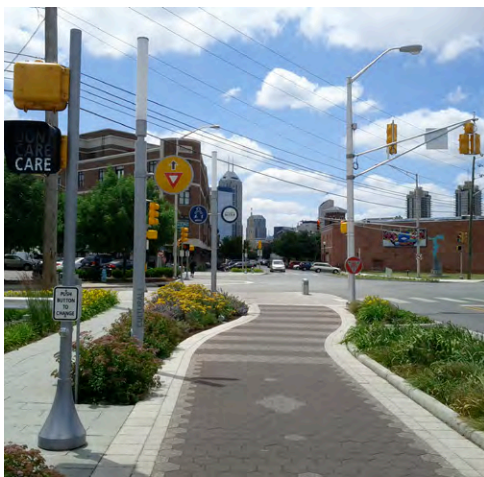
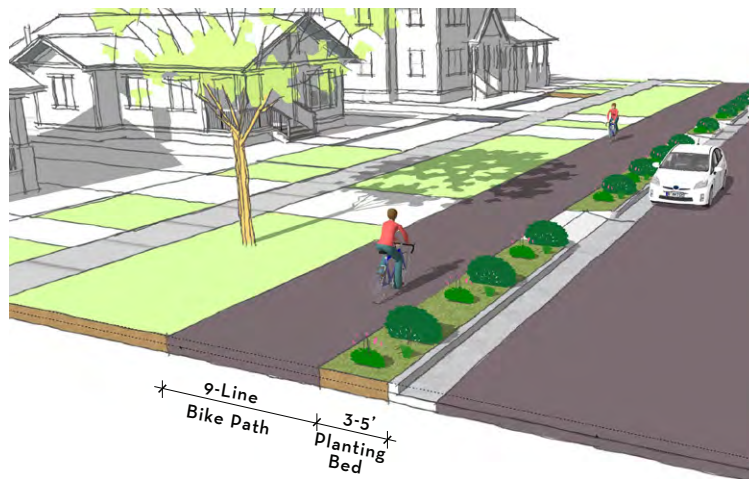
9-LINE CENTRAL: PARK STRIP TREATMENTS



Source: Ryan Gravel via ryangravel.com

Decorative Paving

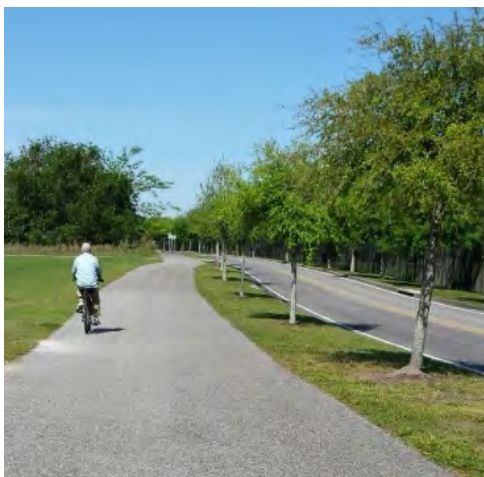
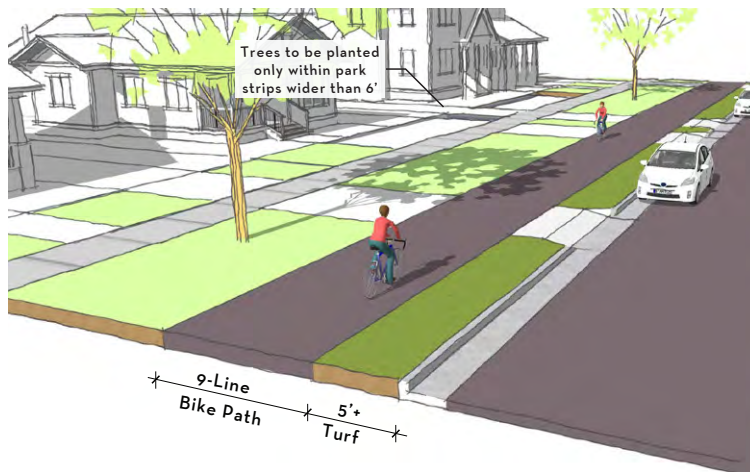
Narrow park strips occur in a few areas along the corridor such as near Liberty Park. For park strips ranging from zero to three feet in width, the preferred treatment consists of decorative paving which can add interest and character to the corridor at a low cost. A mottled running bond paving pattern with dark and light gray pavers has been recommended in the 9th Central area and can be used as precedent for the rest of the corridor.



Source: Eric Fisher via Flickr

Planting Bed

Park strips ranging from three to five feet in width may be used as planting beds and host a variety of shrubs, groundcovers, perennials and grasses. Planting beds provide an additional sense of security for trail users due to vertical separation from the road. Water-wise, urban-adapted plants for the use on planting beds are listed in Appendix B. Landscaping should not exceed 30" so as not to obscure visibility of trail users.



Turf and Trees

Park strips wider than five feet should be planted with turf for easier management. Parks strips over six feet in width can host small trees in addition to turf. This adds vertical separation from the road as well as provide shade and aesthetic value to the area. Water-wise, urban-adapted trees for the use on park strips are listed in Appendix B.

URBAN DESIGN APPLICATIONS



Source: SLC Outdoor Dining Design Guidelines



Source: Bikeorlando.net

Bicycle Parking

A widened park strip and trail on the south side of 900 S presents many opportunities for bike parking to be conveniently located near the trail and businesses. Park strips adjacent to the side walk can host a variety of features depending on the size and budget available. Bicycle parking is easy to implement and requires 2' of clearance around each rack for easy access. According to the Association of Pedestrians and Bicycle Professionals (APBP), bicycle parking can aid businesses by attracting customers and promoting sustainable transportation options.

Bicycle Share Station

The city's bike share program GREENbike SLC has progressively grown since its launch in 2013. According to 2014 GREENbike Strategic Implementation Plan, 900 S possesses numerous locations which may be suitable for GREENbike stations that would positively expand the current network. A widened park strip on the south side of 900 S would provide adequate space for bike share station footprints, while the proposed trail would provide an ideal facility for GREENbike users of all ages and abilities.

Parklets/Outdoor Dining

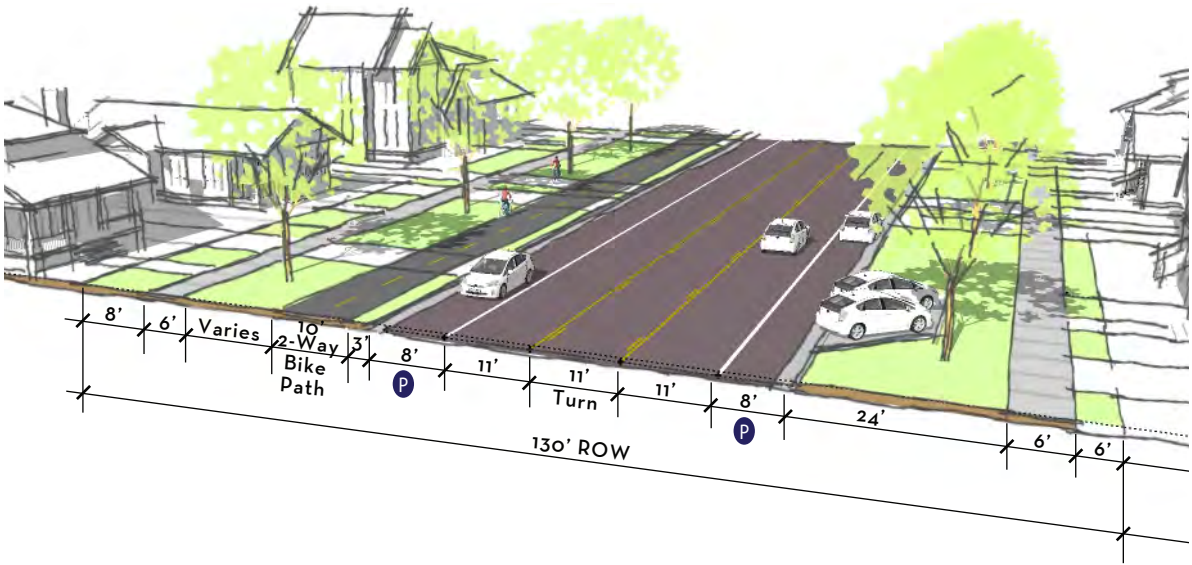
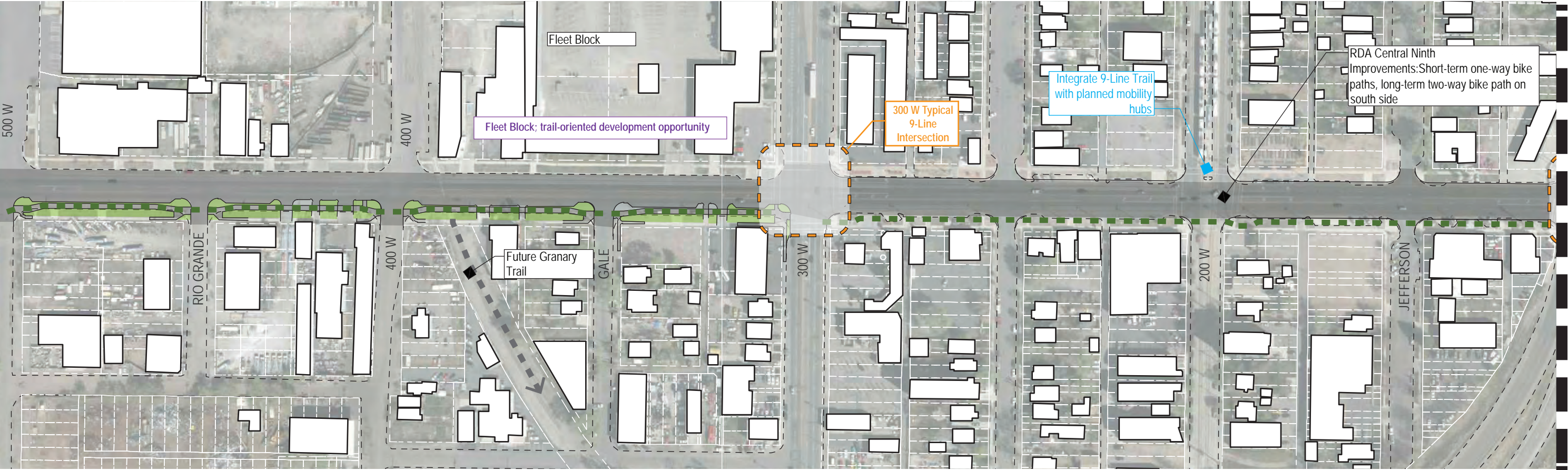
According to the National Association of Transportation Officials (NACTO) parklets can transform under-utilized areas into vibrant community spaces. Parklets may incorporate seating, greenery, and bike parking while satisfying unmet demand for public space on neighborhood retail streets or within commercial areas. Salt Lake City published "Outdoor Dining Design Guidelines" which seek to promote quality outdoor seating areas, specify appropriate use of public sidewalks, and ensure pedestrian safety. These guidelines should be adhered to when utilizing the area between the 2-way bike path and the sidewalk for outdoor dining purposes.

<http://www.slcdocs.com/planning/projects/odpf.pdf>

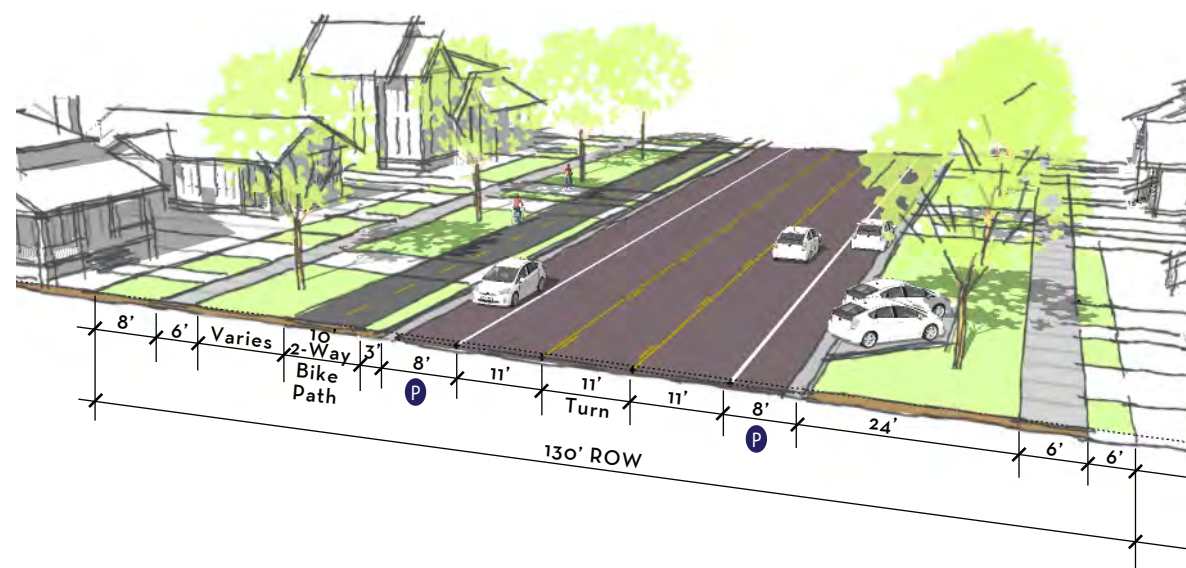
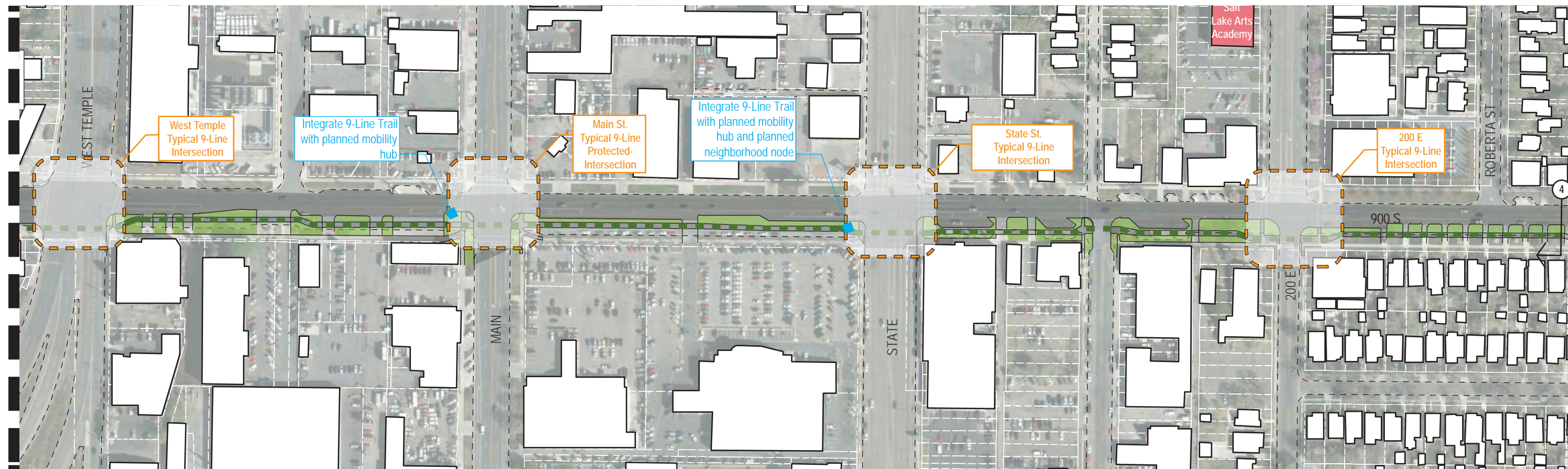
Transit Stop

Integration of bicycling, walking, and streetscape improvements with rail and bus transit service will be a critical component of the success of the 9-Line Trail. Comfortable and convenient bicycling and walking facilities and supporting infrastructure contribute to first/last mile connectivity and improve ridership. The 9-Line Trail should be routed behind transit stops where feasible to limit conflicts between boarding transit users and bike path users.

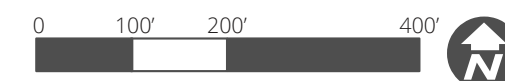
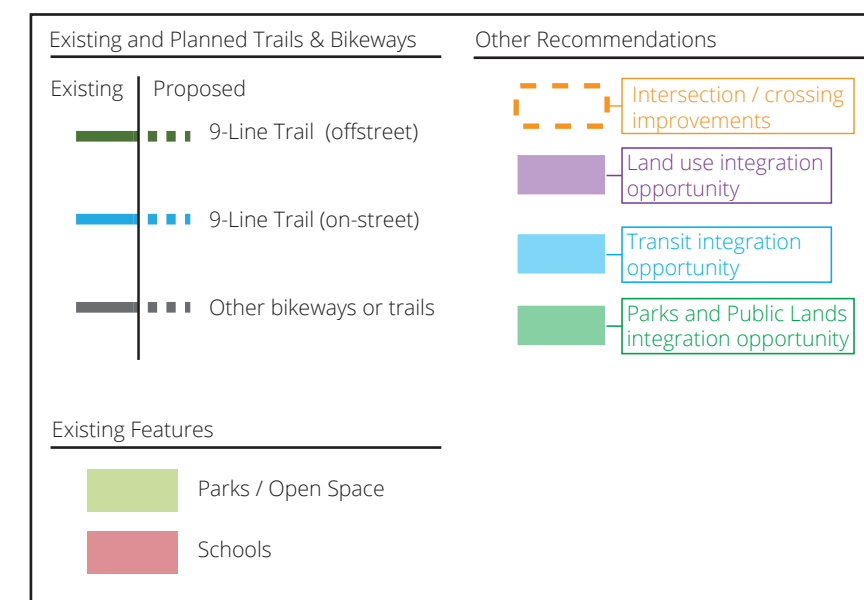
9-LINE TRAIL WEST: 500 W TO 300 E



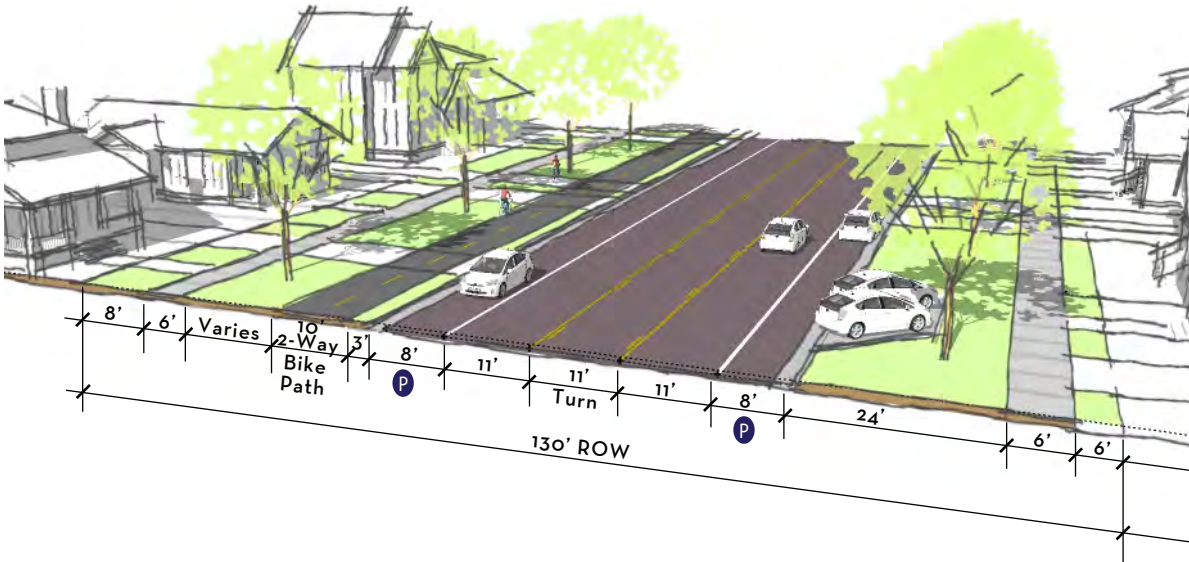
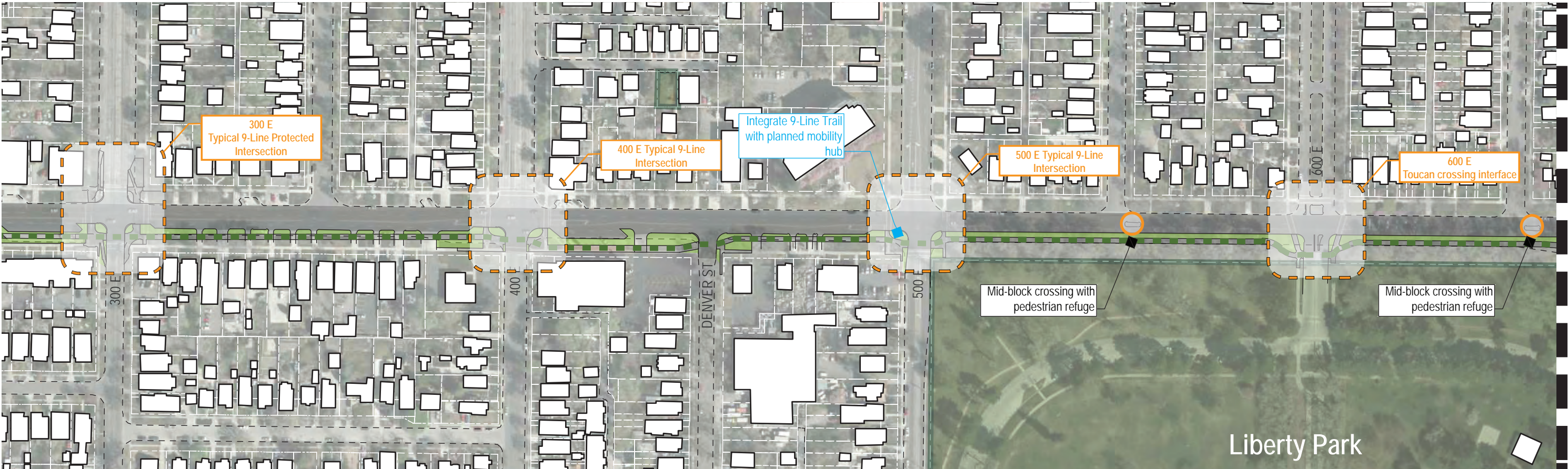
4 Proposed 900 S / 9-Line Trail
2-Way Bike Path



4 Proposed 900 S / 9-Line Trail
2-Way Bike Path

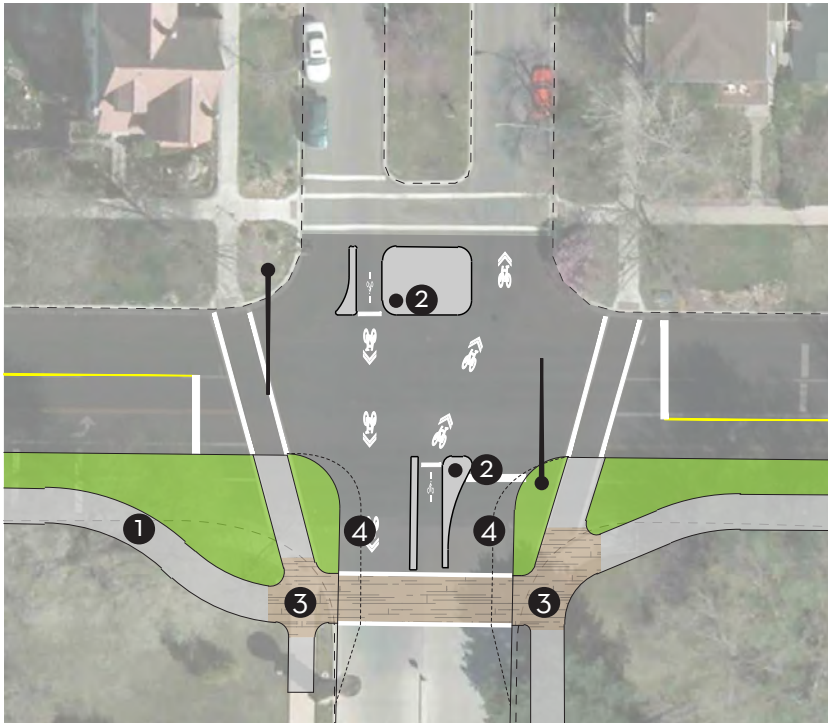


9-LINE TRAIL CENTRAL: 300 E TO LINCOLN ST.



- 4

Proposed 900 S / 9-Line Trail
2-Way Bike Path



600 E Toucan Intersection

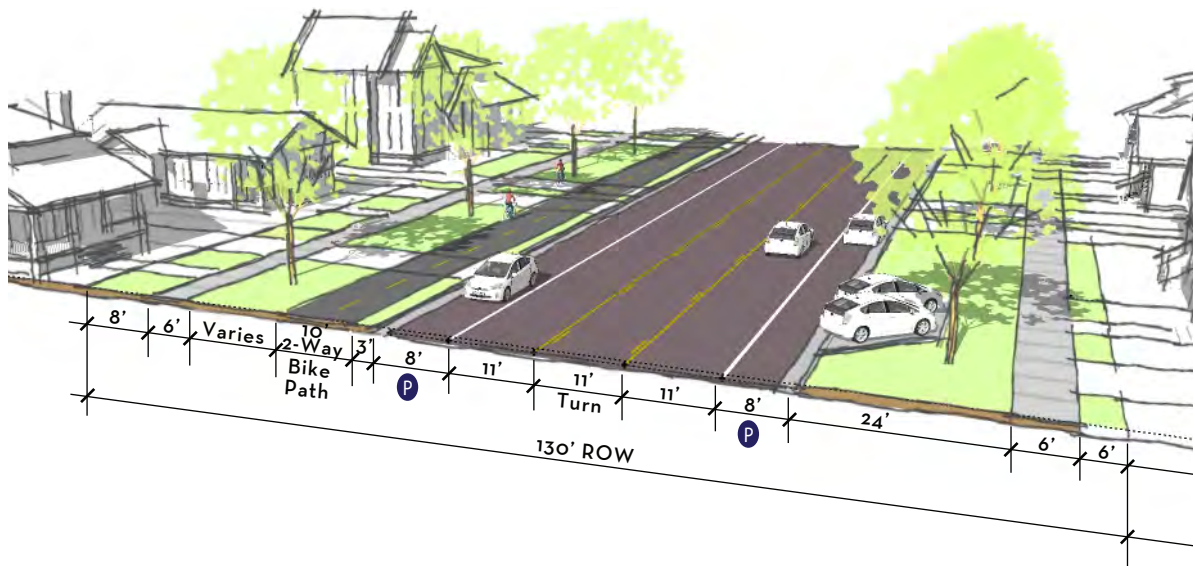
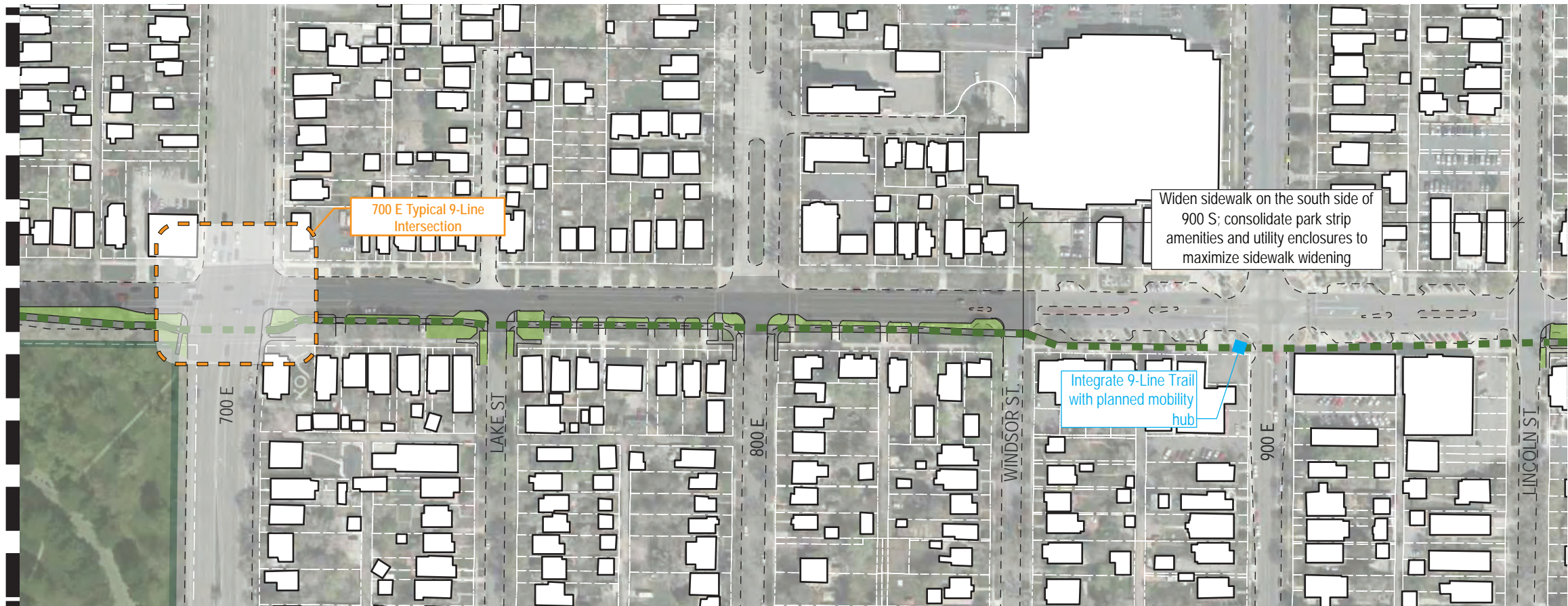
- 1

Path bends out to allow bicyclists to enter existing Toucan channel. Bend out should be routed to prevent damage to existing mature trees in Liberty Park.
- 2

Existing toucan push-button
- 3

Standard 9-line corner plaza detailing
- 4

Curb extensions to shorten crossing (optional)



4 Proposed 900 S / 9-Line Trail
2-Way Bike Path

Existing and Planned Trails & Bikeways		Other Recommendations	
Existing	Proposed		
	9-Line Trail (offstreet)	Intersection / crossing improvements	
	9-Line Trail (on-street)	Land use integration opportunity	
	Other bikeways or trails	Transit integration opportunity	
Existing Features		Parks and Public Lands integration opportunity	
	Parks / Open Space		
	Schools		



9-LINE TRAIL: EAST SEGMENT

CORRIDOR OVERVIEW

The East Segment of the 9-Line Trail climbs from Lincoln St. to the Bonneville Shoreline Trail and mouth of Emigration Canyon. In order to navigate the approximately 200' of elevation gain between 1300 E and the Sunnyside Trail, numerous alignment options have been explored that provide a more gradual slope than 900 S. Once reaching the existing Sunnyside Park Path, the trail continues east along the north side of Sunnyside Ave. Connectivity to many important institutional and cultural destinations is proposed including Research Park, This is the Place Heritage Park, and the Hogle Zoo. The 9-Line Trail is proposed to terminate at the Bonneville Shoreline Trail where numerous trailhead improvements could benefit both trail systems.

IMPLEMENTATION EFFORTS

In 2017, Salt Lake City constructed the Sunnyside Park Path from the East High ball fields past the University of Utah student housing property and up to Foothill Blvd.

IMPLEMENTATION CONSIDERATIONS

COORDINATION WITH CULTURAL DESTINATIONS

The 9-Line Trail's potential connectivity to This is the Place Heritage Park and Hogle Zoo adds yet another layer to the overall project's scope. The trail's connectivity to these destinations may allow some visitors to access these two destinations without the use of an automobile thereby reducing parking and congestion. Additionally, the addition of a landscaped median on Sunnyside Ave. could create placemaking and traffic calming opportunities.

Recommendations:

- Coordinate with This is the Place Heritage Park to acquire property or easements needed to facilitate a trail on the north side of Sunnyside Ave.
- Evaluate the two potential streetscape options shown on page 75 for future implementation.

PARKS AND PUBLIC LANDS INTEGRATION

The east segment of the 9-Line Trail offers many benefits to Salt Lake City's Parks and Public Lands system. First, the trail offers connectivity to Emigration Canyon, a popular regional walking and road cycling destination. Additionally, Salt Lake City Parks and Public Lands has initiated a master plan for the Bonneville Shoreline Trail and associated foothill trails between Emigration Canyon and Ensign Peak. Planned improvements to the Foothills Trail System will place further emphasis on the 9-Line Trail's role as a critical connection to these recreational amenities.

Recommendations:

- Partner with SLC Parks and Public Lands to improve trailhead infrastructure that will serve both BST trail users and 9-Line Trail users
- Evaluate a trail undercrossing and trail extension into Rotary Glen Park. Also evaluate a soft-surface trail connecting from Rotary Glen Park to Donner Trail Park to provide a logical extension of the BST.

LAND USE INTEGRATION

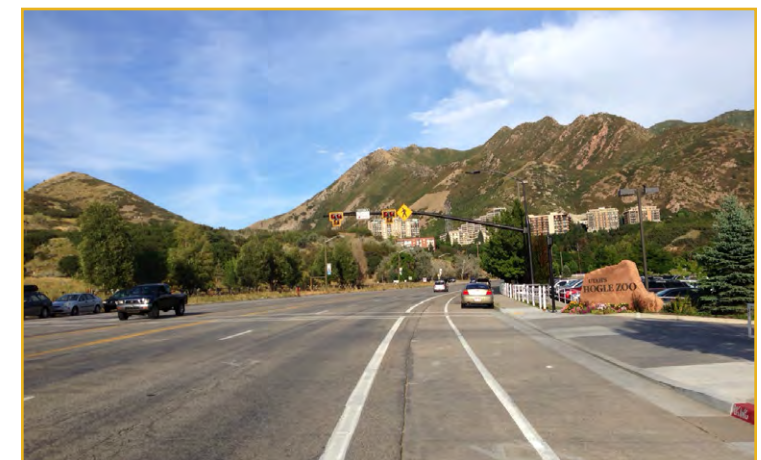
The east segment of the 9-Line Trail offers a couple of key opportunities to integrate the trail with surrounding development. The existing University of Utah student housing at the northwest corner of Foothill Drive and Sunnyside Ave. has substantial redevelopment potential. Although the University has not expressed any definitive plans as of January 2018, the property's proximity to the trail holds unique value for trail-oriented development. Similarly, Research Park leadership has expressed interest in making the 9-Line Trail an integral part of their long-term redevelopment plans, specifically along Sunnyside Ave.

Recommendation:

- Work closely with the University of Utah to promote redevelopment of their properties in a way that integrates and leverages the 9-Line Trail



Potential median improvements and pedestrian crossing at Hogle Zoo (Source: East Bench Master Plan)



Existing pedestrian hybrid beacon near Hogle Zoo



Bicyclists near the upper Bonneville Shoreline Trailhead

EAST BENCH TRAVERSE OVERVIEW

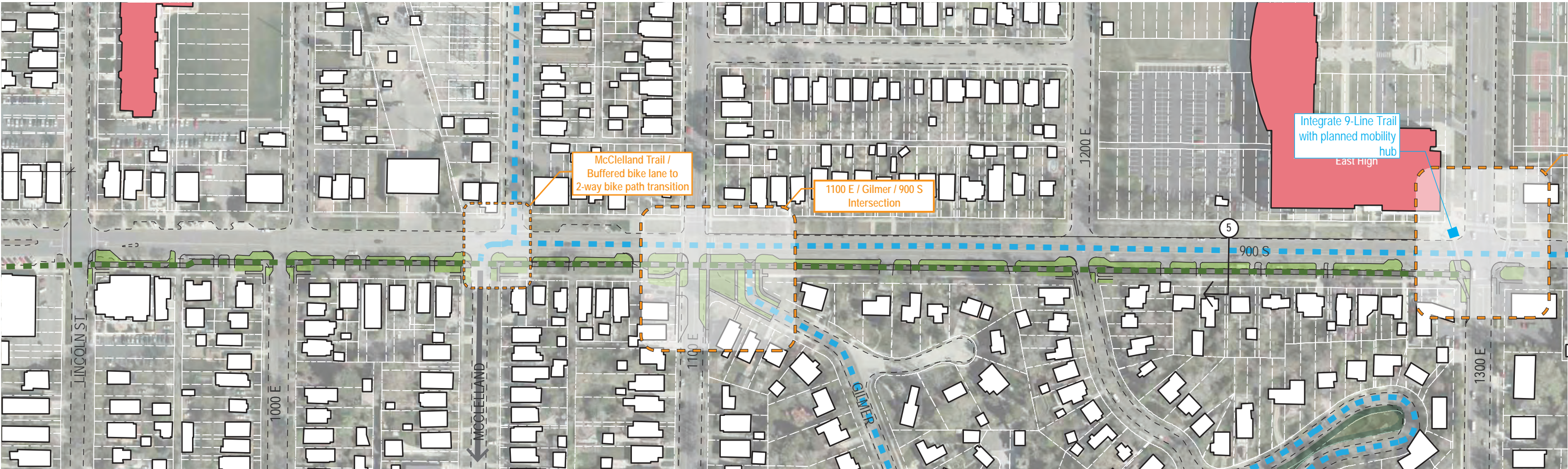
NAVIGATING THE EAST BENCH

The East Bench represents a natural barrier for many prospective 9-Line Trail users. Approximately 275' of elevation separate the Guardsman Way intersection from the 900 S / McClelland St intersection. This study has defined three different alignments to navigate the east bench topography ranging in difficulty and experience. These options have been classified easy, intermediate, and "short and steep". Ski trail symbology should be utilized to communicate level of difficulty as was done on the U to Downtown Bikeway.

- **Easy:** Gilmer to 1500 E to Guardsman- This route is the gentlest route and predominantly follows local streets to connect trail users to the existing Sunnyside Trail.
- **Intermediate:** McClelland Trail Extension: This route has a similar profile to the "easy" alignment. A short section along and crossing 800 S elevates this route to medium difficulty.
- ◆ **Short and Steep:** 900 S to Amanda Ave- This route is the steepest but most direct. Grades approach 15% on portions of 900 S.



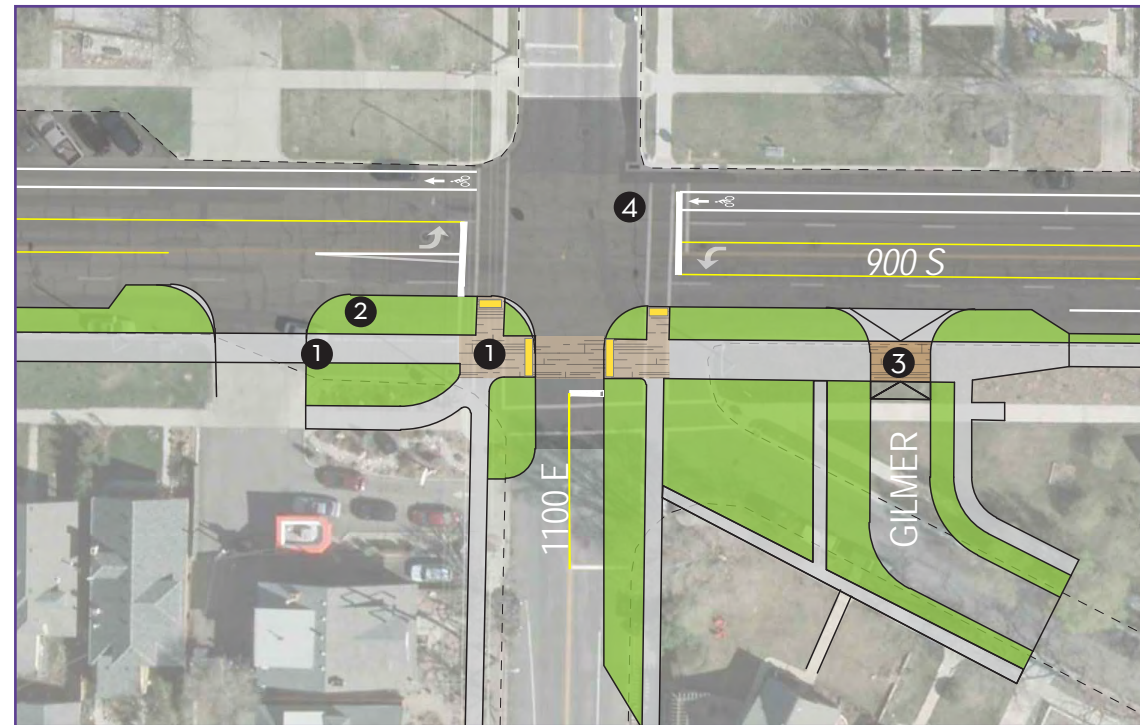
9-LINE TRAIL CENTRAL: LINCOLN TO 1300 E



5 Proposed 1200 East / 9-Line Trail
2-Way bike path with downhill bike lane

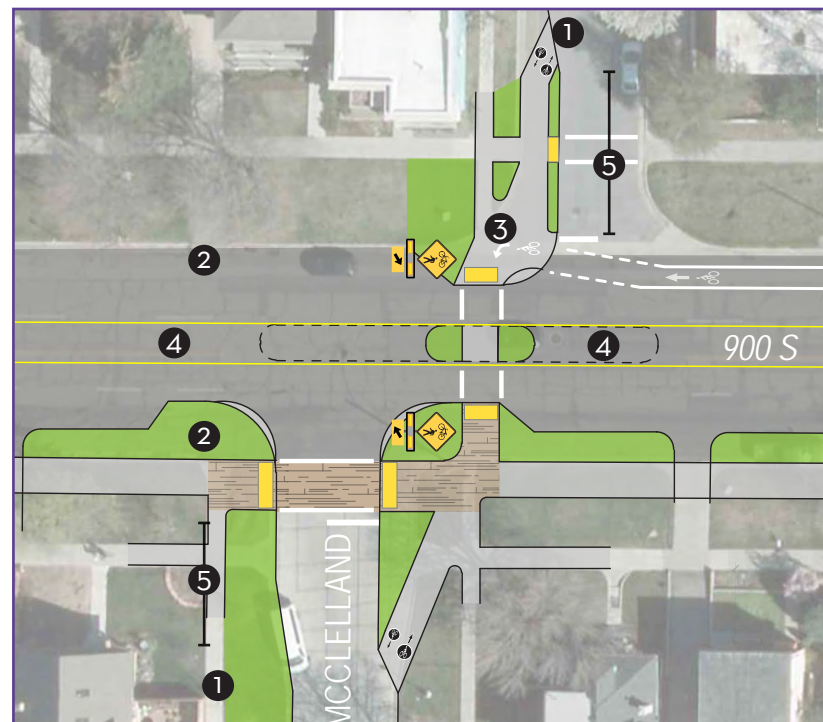
Existing and Planned Trails & Bikeways		Other Recommendations	
Existing	Proposed		
	9-Line Trail (offstreet)		Intersection / crossing improvements
	9-Line Trail (on-street)		Land use integration opportunity
	Other bikeways or trails		Transit integration opportunity
			Parks and Public Lands integration opportunity
Existing Features			
	Parks / Open Space		
	Schools		





1100 E / 900 S / Gilmer Intersection

- ① Typical 9-Line corner plaza
- ② Corner refuge island
- ③ Raised trail crossing at re-aligned Gilmer St.
- ④ Downhill bike lane



McClelland Intersection

- ① Crossover ramp allows McClelland Trail users to access improved crossing between offset intersection legs
- ② Rectangular rapid flashing beacon (RRFB) improves yield compliance at crossing
- ③ Curb extension and turn queue allows downhill bike lane users to utilize crossing to transition to two-way bike path on south side of 900 S
- ④ Potential median extensions could further calm the crossing by restricting left turns onto McClelland
- ⑤ Crossover ramps should be set back far enough from stop bar to allow queuing for two cars



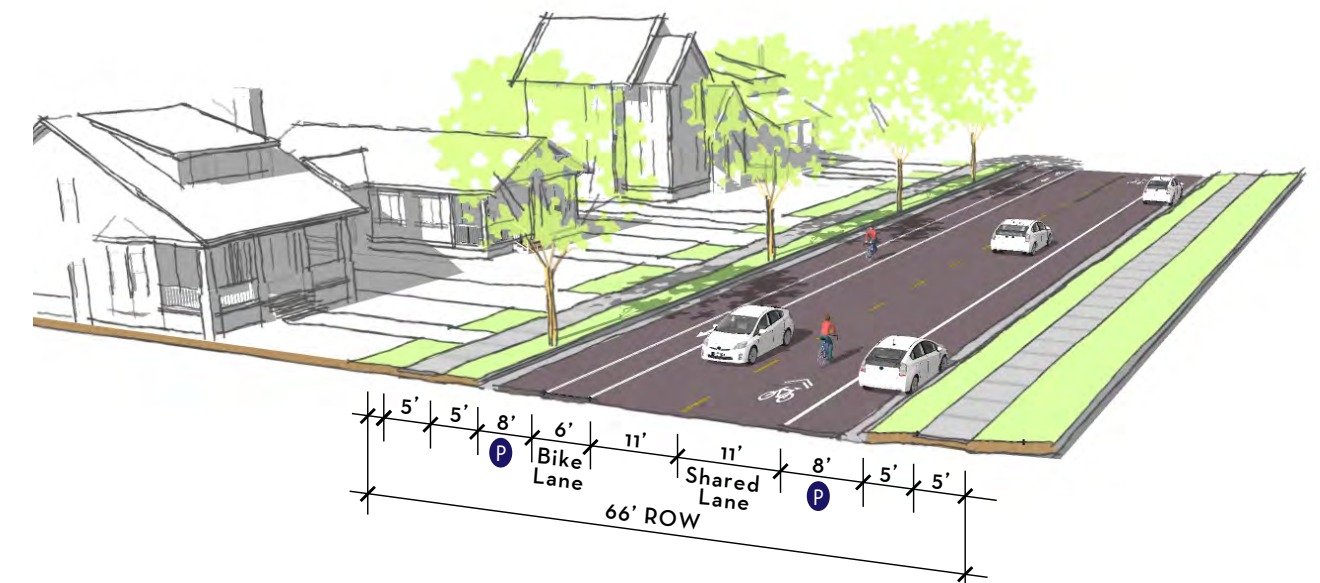
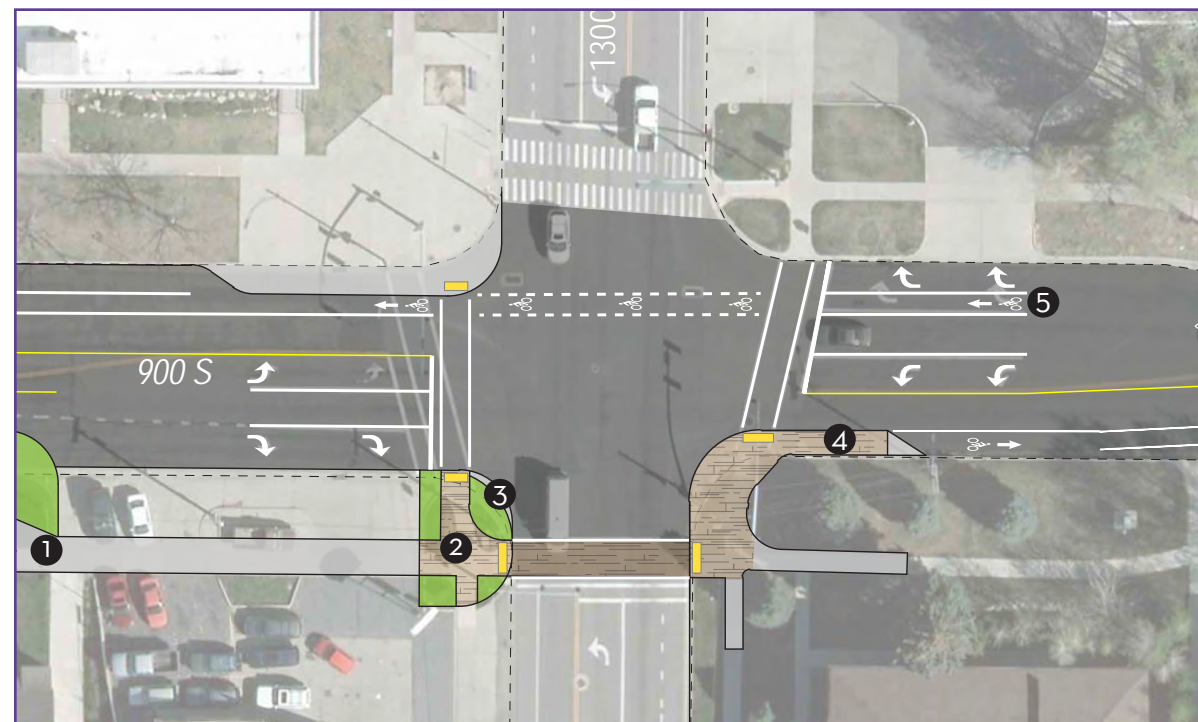
Example of two-way bike crossing and crossover in Tuscon, AZ

9-LINE TRAIL EAST: 1300 E TO 1900 E

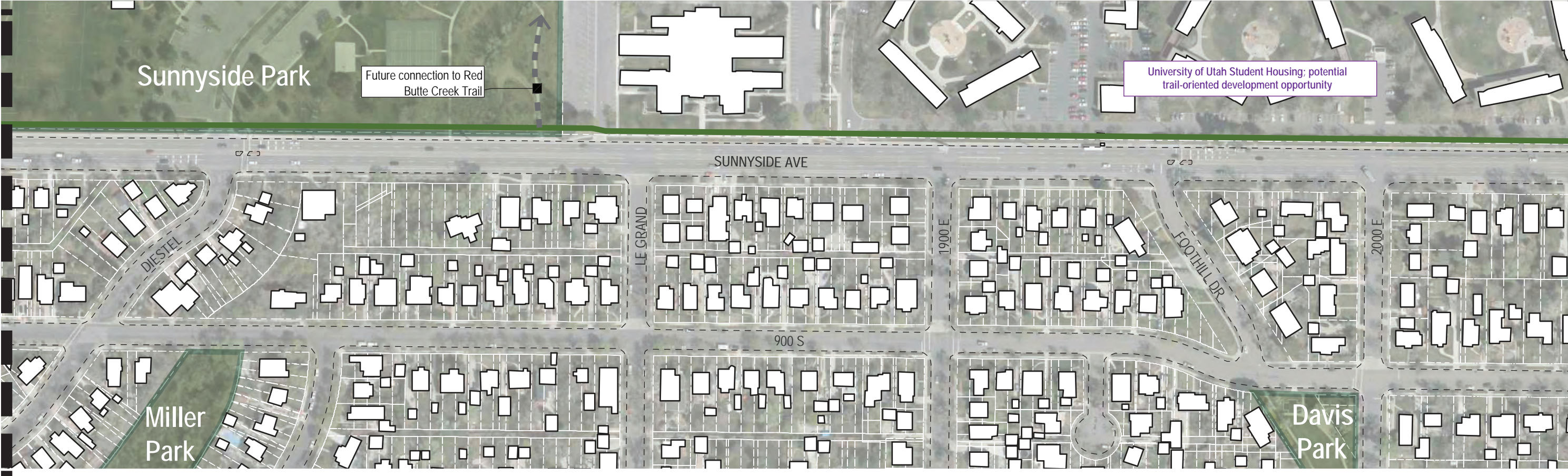


1300 East Intersection

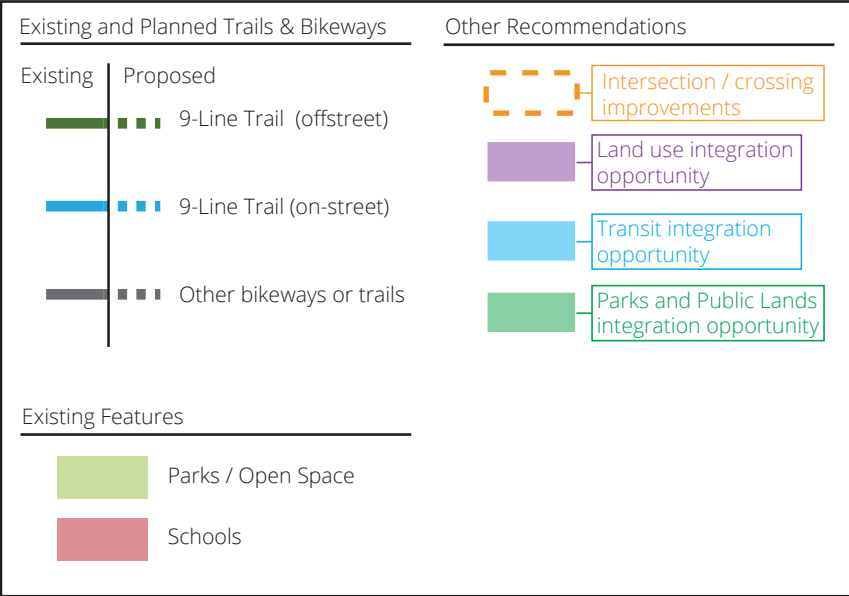
- 1 Sidewalk and 2-way bike path join prior to driveway
- 2 Typical 9-Line corner plaza
- 3 Corner refuge island
- 4 Bike ramp for bicyclists continuing eastward via uphill bike lane
- 5 Thru bike lane with intersection lane extension



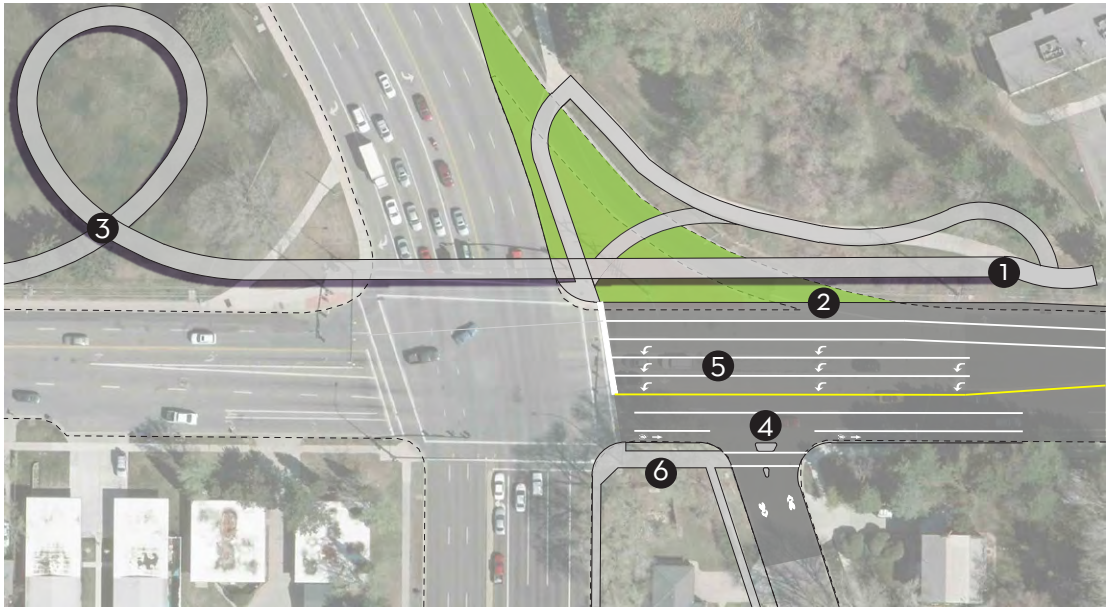
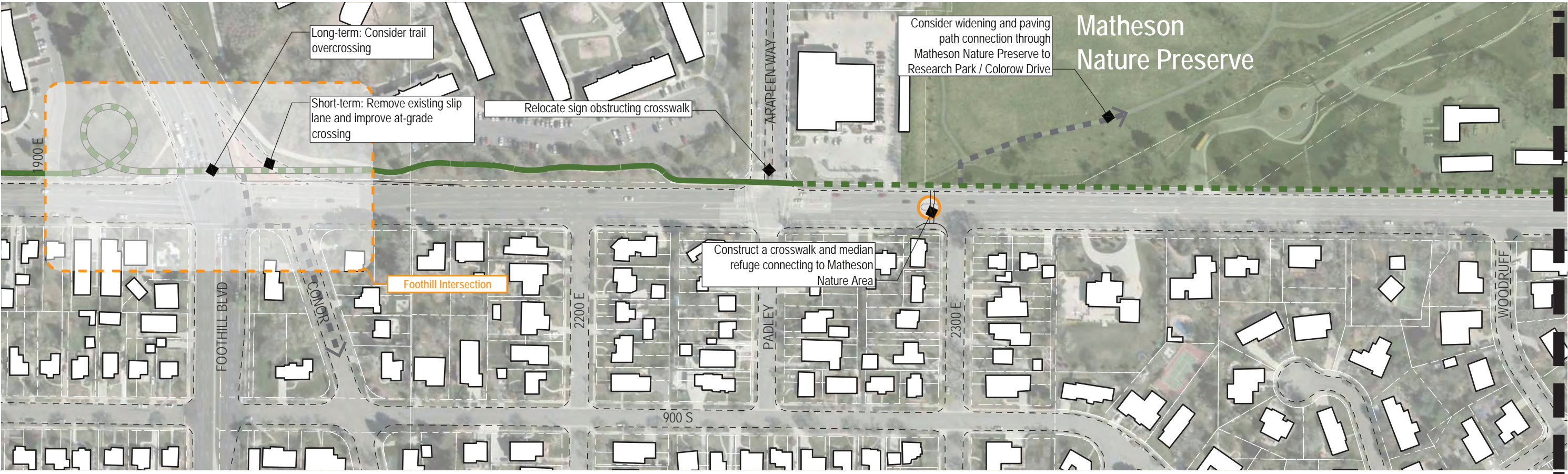
6 9-Line / 900 S On-street
Uphill bike lane / downhill shared lane



Existing Sunnyside Park Path

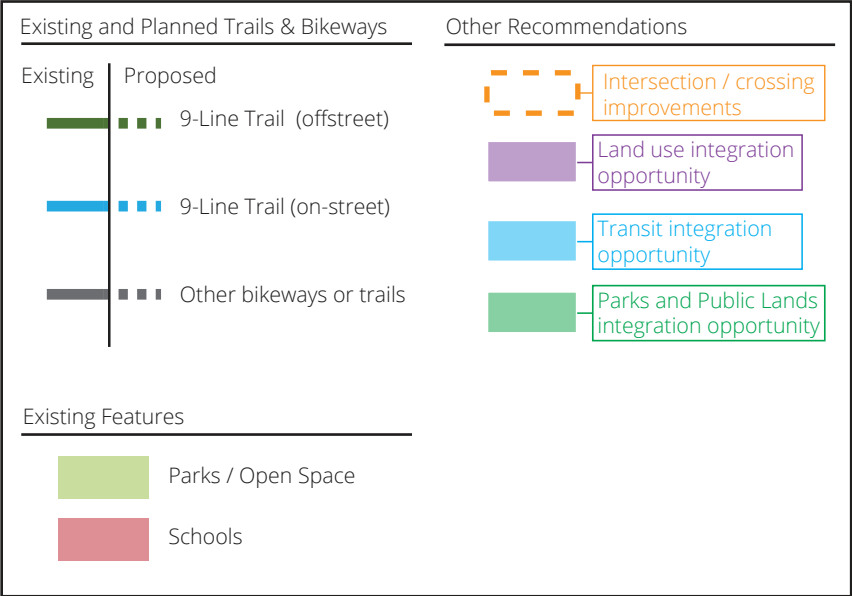


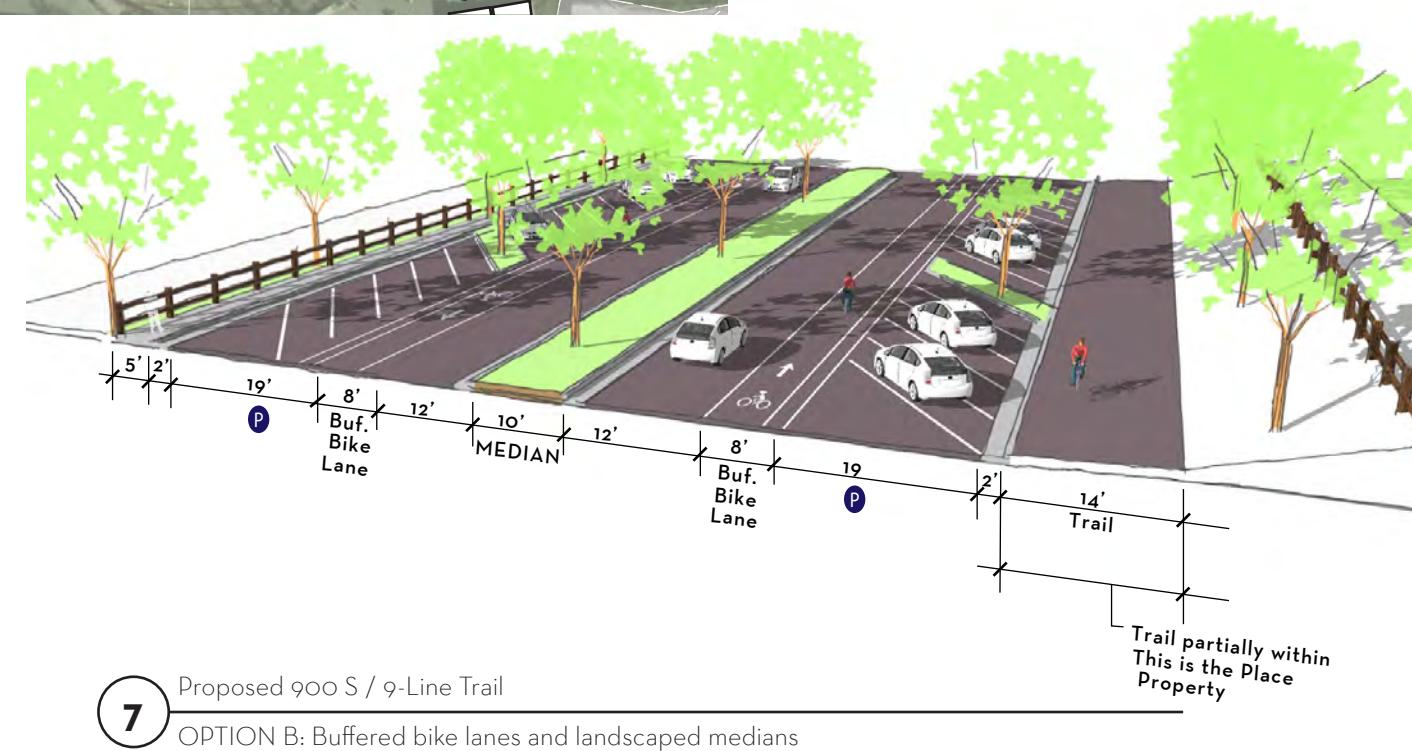
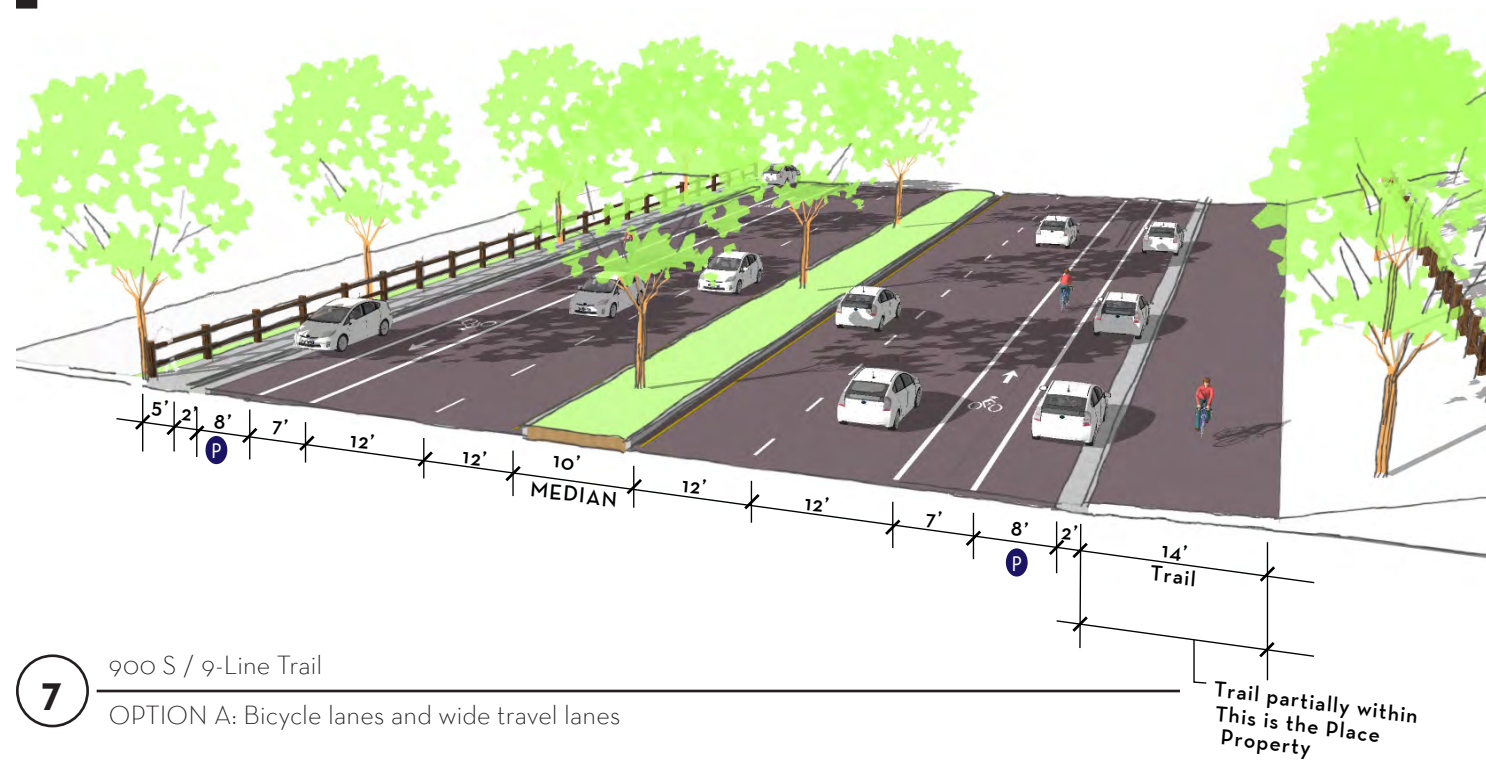
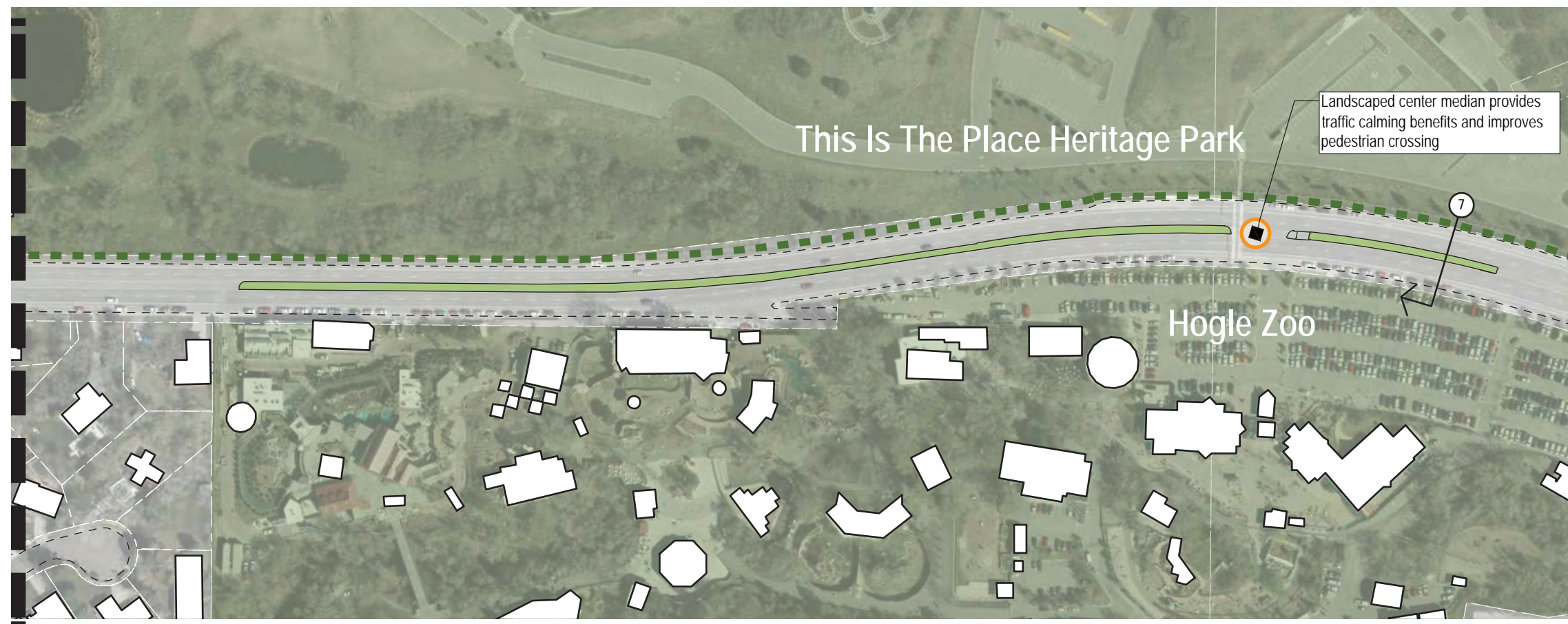
9-LINE TRAIL CENTRAL: 1900 E TO CRESTVIEW DR



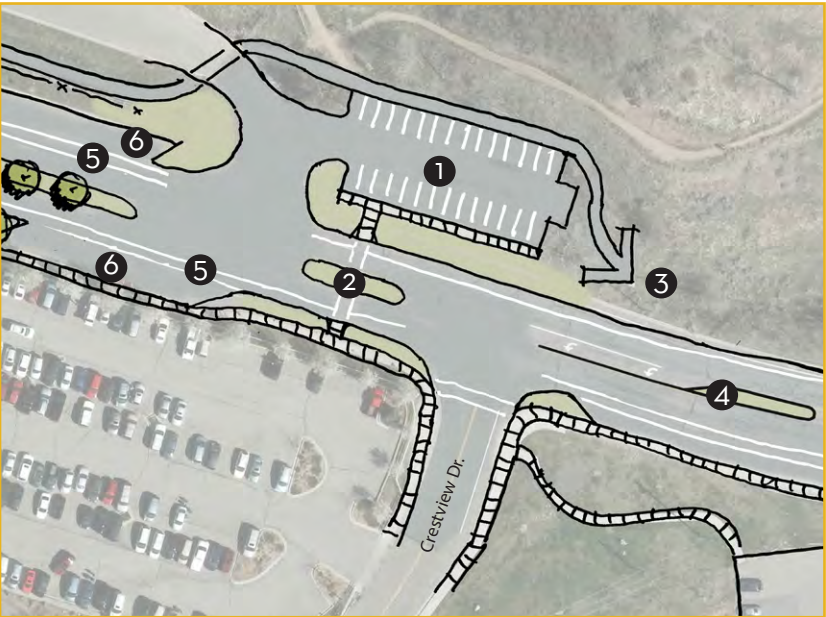
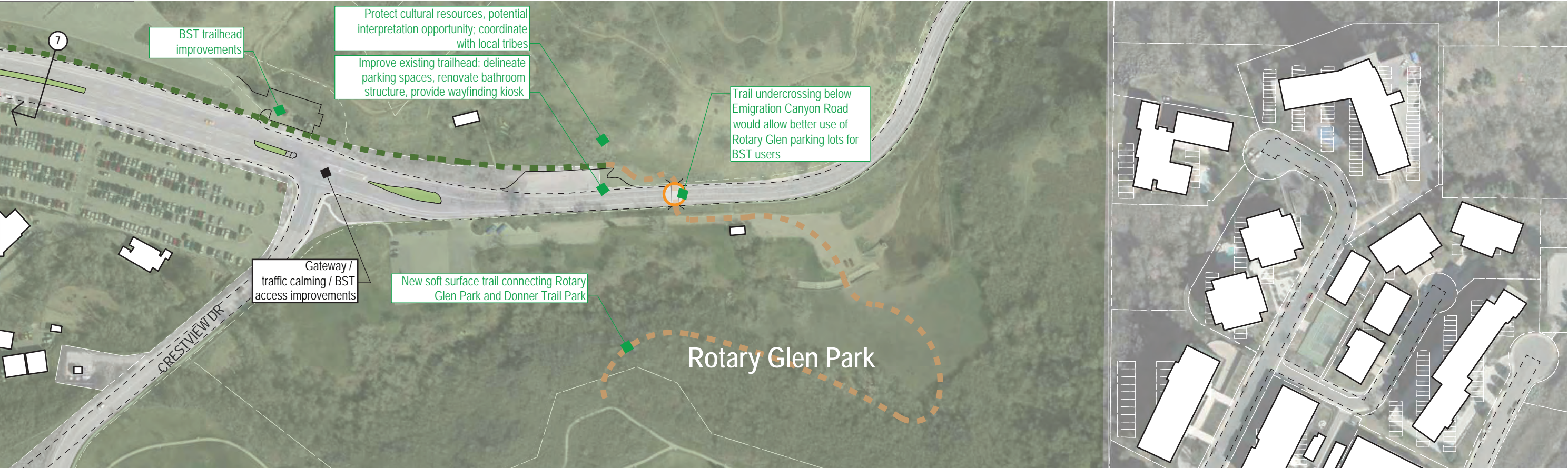
Foothill Drive Intersection

- 1 Long-term recommendation: Bicycle/pedestrian bridge over Foothill Dr.
- 2 Short-term recommendation: Close existing northbound slip lane and improve at-grade 9-Line Trail crossing of Foothill Dr.
- 3 Ramping structure needed on northwest corner of Sunnyside and Foothill.
- 4 Right turn median on Connor St. makes it easier for bicyclists coming from the future Bonneville Golf Course trail to navigate to the 9-Line
- 5 Triple left turn lanes reflect near-term recommendations from the Foothill Drive Implementation Study
- 6 10' sidepath from Connor St. to Foothill Dr. intersection crosswalk allowing access to the proposed 9-Line



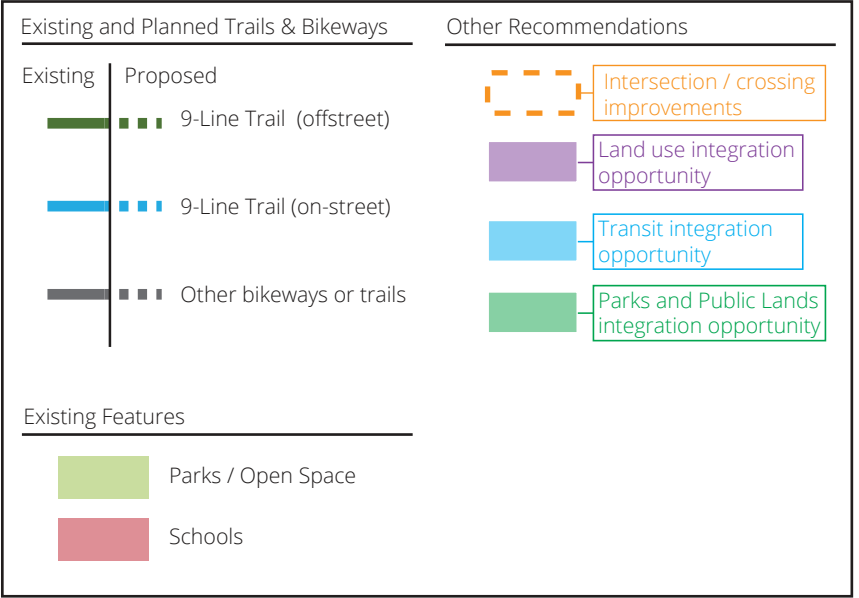


9-LINE TRAIL EAST: CRESTVIEW DR TO ROTARY GLEN PARK



BST Trailhead / Crestview Dr. Improvements

- 1 Paved and striped expansion to BST parking clearly delineates circulation.
- 2 New marked crosswalk and pedestrian refuge slows down-canyon traffic and could serve as a gateway to Salt Lake City.
- 3 The 9-Line Trail could be extended to the upper BST parking lot. Connecting parking lots would benefit zoo visitors those traveling to recreate in the Foothills.
- 4 Traffic calming island to slow down-canyon traffic.
- 5 Bike lanes or buffered bike lanes (see options A and B, page 75).
- 6 Reverse angle parking (optional, see page 75).



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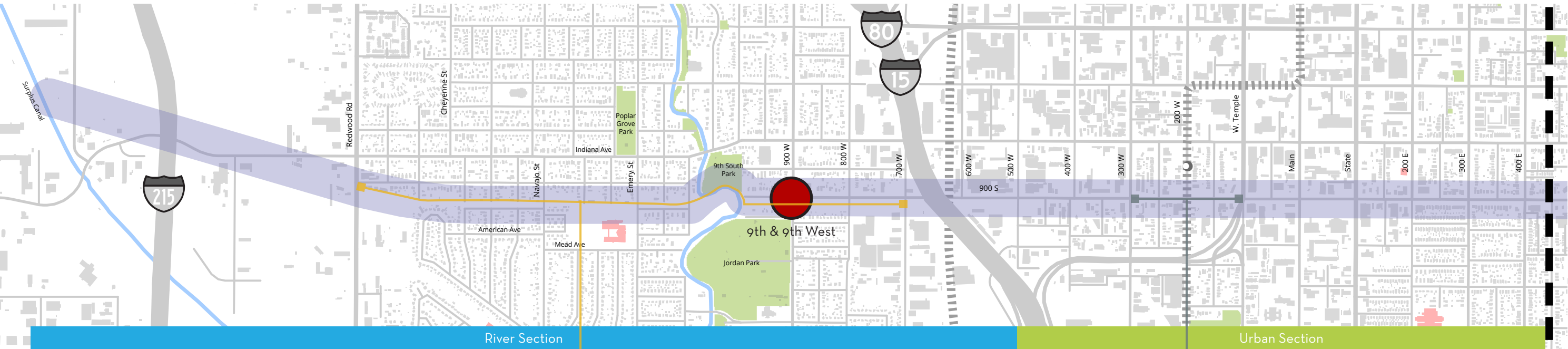
WAYFINDING CONCEPT DESIGN

Wayfinding Development Process

In order to develop a recognizable and intuitive wayfinding system for the 9-Line Trail, the Design Team conducted a number of iterative processes:

- Research of existing branding and wayfinding in place throughout the corridor
- Distribution and analysis of visual preference surveys provided to the Steering Committee
- Solicitation of public feedback and voting on draft wayfinding concepts
- Refinement of the preferred concept and development of a placement plan

Existing Branding

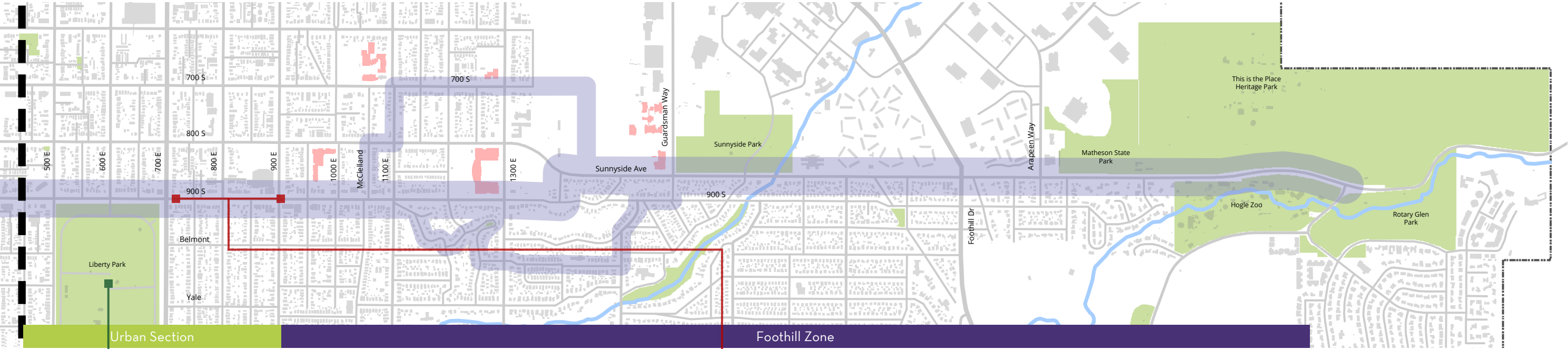


9-Line Trail existing branding



Central 9th- Branding & character

Existing Branding

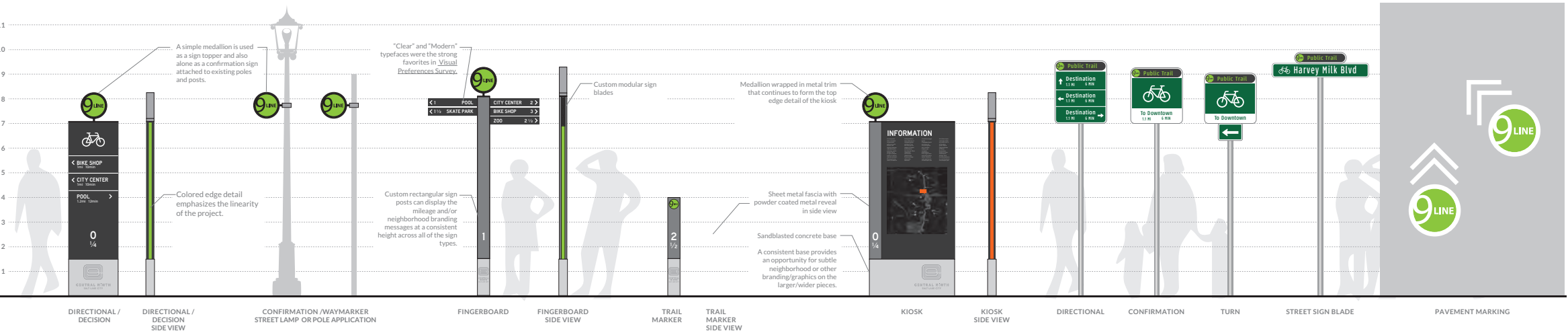


Liberty Park- Branding/Wayfinding/Site Furnishings

9th & 9th existing branding and character



WAYFINDING CONCEPTS

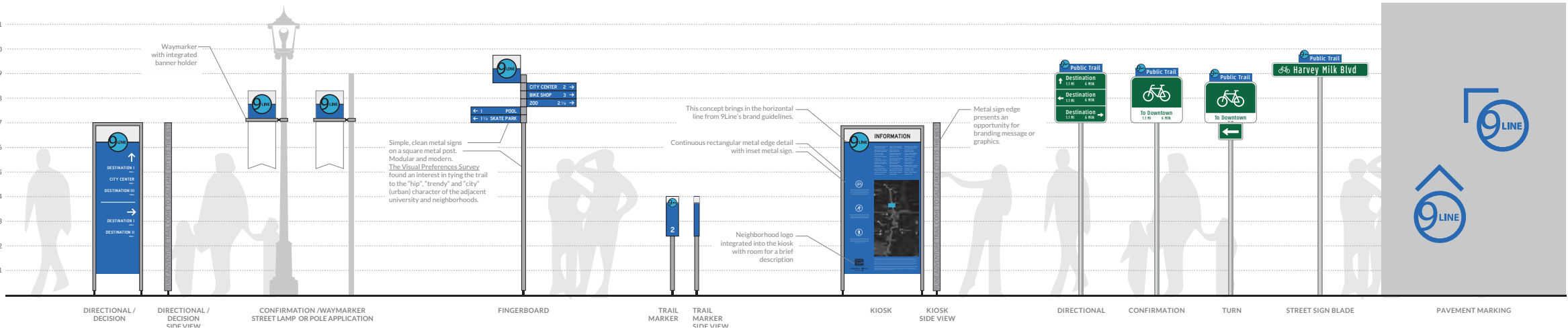


WAYFINDING CONCEPT 1: CONTEMPORARY

Public Support ●●○○○

The first concept uses colors of dark gray, bright green and orange in order to create a modern and lively wayfinding family. All wayfinding elements hold space to display mileage and/or neighborhood branding messages at a consistent height across all of the sign types. Elements emphasize the linearity of the corridor and include materials such as sand-blasted concrete and unpainted aluminum.

Color Palette & Materials

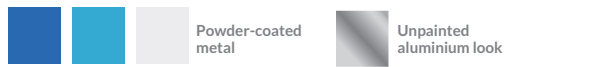


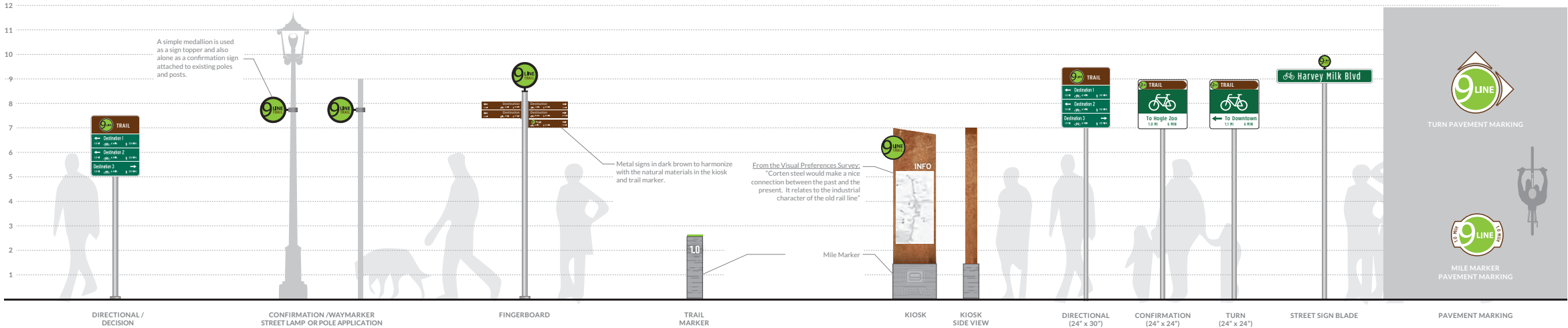
WAYFINDING CONCEPT 2: BRIGHT & CLEAN

Public Support ●●●○○

This concept represents a more traditional-looking wayfinding family, containing simple and clean elements. Waymarker applications can integrate banner holder to display local events and branding. Neighborhood logos can be integrated into the kiosks with room for a brief description. This simple and clean design allows for easy integration across the many diverse neighborhoods in Salt Lake City. Materials used include power-coated metal and unpainted aluminum.

Color Palette & Materials









CONCEPT 3: NATURAL MATERIALS

Public Support ●●●●●

Concept 3 utilizes earth-tones and natural-looking materials in order to reflect appreciation for the natural surroundings of Emigration Canyon. Materials include corten steel, which makes a connection with the area's industrial past, and distressed/recycled wood, adding a natural look. The simplicity of this concept makes it timeless so that it maintains relevance over time, and outlasts momentary trends.

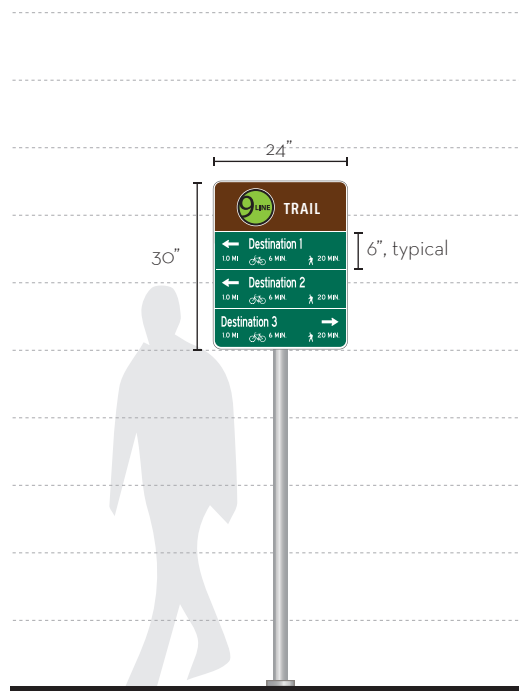
Color Palette & Materials

Powder-coated metal		Corten steel	Board-formed concrete
			
C-38	C-50		
M-75	M-0		
Y-100	Y-100		
K-48	K-0		

Wayfinding Refinement

The three wayfinding concepts shown on pages 82 & 83 were presented to the public via the City's online public engagement site, Open City Hall. Wayfinding option #3 (natural materials) was the highest rated concept based on public feedback receiving 57% of the vote. Concepts 1 and 2 received 17% and 25% of the votes respectively. In accordance with the public feedback, the Planning Team moved forward with Option 3 and developed a schematic placement plan and placement guidance for each wayfinding element.

WAYFINDING PLACEMENT GUIDANCE

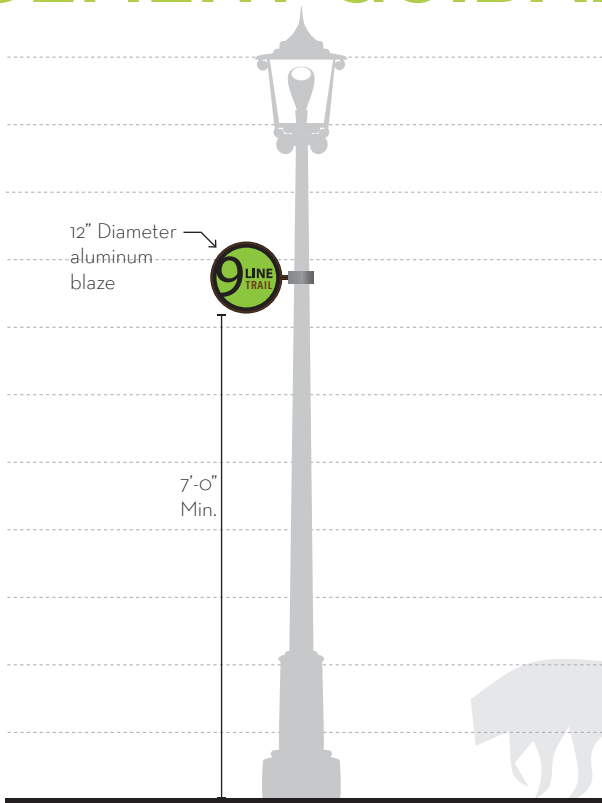


Decision Sign Placement

Decision signs clarify route options at intersections of active transportation routes. Proposed signs include 9-Line branding and space for up to three destinations. Proposed 9-Line signage also includes distance in miles and travel time for both bicyclists and pedestrians, similar to signs placed along the Jordan River Trail in 2017.

Placement-

- Place ~50' in advance of intersections with bikeways or trails
- In areas where pedestrians will walk around or under signs, place plaques 7'-0" above the surround grade
- Where the 9-Line Trail crosses through open space areas and does not present potential conflicts with pedestrians, signs may be located 5'-0" above the surrounding grade

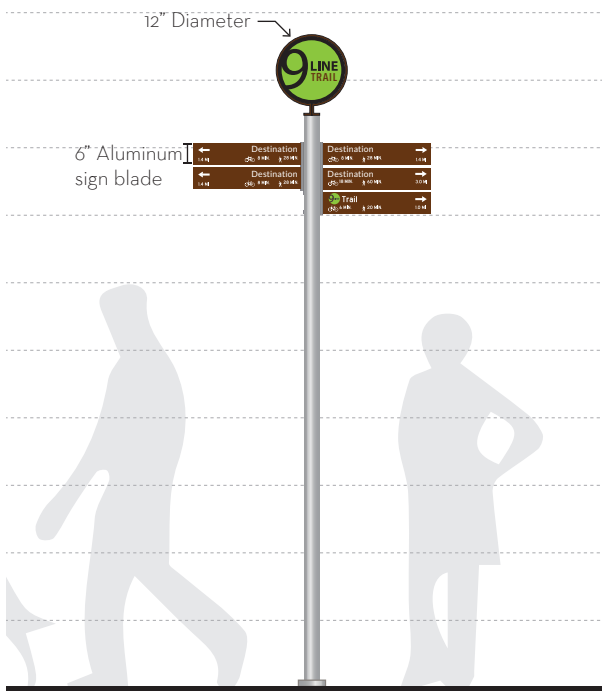


9-Line Branding Plaque

Throughout the Central portion of the proposed 9-Line, pedestrian-scaled street lighting exists. Street light posts present an opportunity to locate 9-Line branding plaques that contribute to the overall theme and character of the corridor.

Placement Guidance

- Place on every other street light throughout the central part of the corridor. Mounting height should be set at 8'-0" above the adjacent grade to the bottom of the plaque.

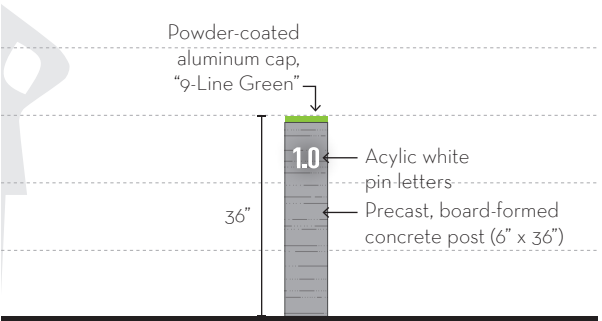


Fingerboard Sign

Fingerboard signs communicate destination information at intersections where multiple destinations exist.

Placement Guidance

- Place fingerboard signs at intersections with major city trails such as the Jordan River Trail and the McClelland Trail.
- Place fingerboards in a location where trail users can observe information without obstructing trail traffic.



Mile Marker Post

Mile marker posts communicate mileage location for 9-Line Trail users in open space or park-owned land. Mile marker numbering should begin at the 9-Line's intersection with the Bonneville Shoreline Trail and continue westward. Installation of mile markers may be delayed until a significant continuous section of the corridor can be constructed.

Placement Guidance

- Place a minimum of 2'-0" from the edge of trail.
- Place at full mile and half-mile increments.
- Suggest locating zero-mile post at the intersection of the BST and 9-Line and numbering east to west.
- Do not locate in areas that may pose hazards to automobiles, bicyclists, or pedestrians. Utilize pavement mile markers (page 83) in these scenarios.

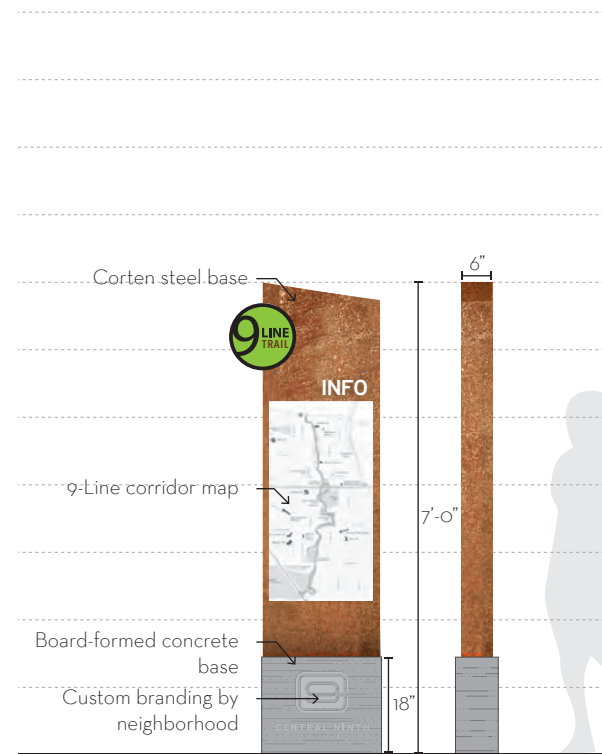


Pavement Mile Marker

Custom thermoplastic pavement mile markers communicate mileage information in areas where the 9-Line runs within the public street ROW. Mile marker numbering should begin at the 9-Line's intersection with the Bonneville Shoreline Trail and continue westward. Installation of mile markers may be delayed until a significant continuous section of the corridor can be constructed.

Placement Guidance

- Markings should be centered within the trail and oriented parallel with the center line of the trail.
- When facing north, the 9-line branding should read from left to right.

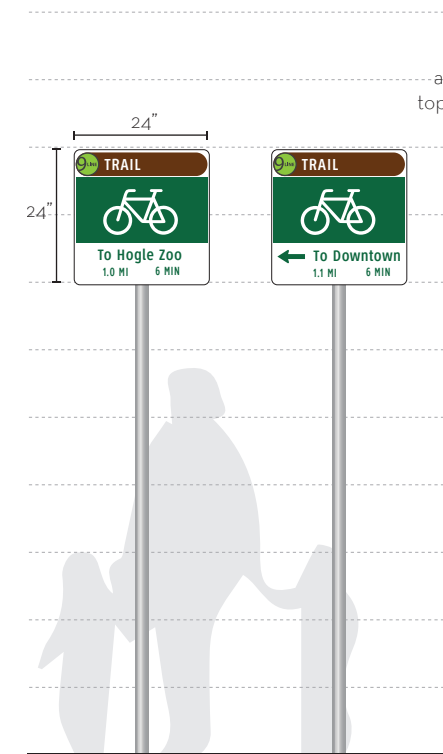


Kiosk Map

Kiosks that include area or regional maps provide helpful navigational information, especially where users may be stopping long enough to digest more information (i.e., transit stations or stops, busy intersections, trailheads). Kiosks should be located in conspicuous areas along the primary route from parking areas to the trail. Sufficient space should be provided around the kiosk to allow people to observe the information without obstructing adjacent walkways and meet ADA clear zone requirements.

Placement Guidance

- Place turn signs 50-75' prior to turn
- Place confirmation signs- 50 - 75' following the turn.

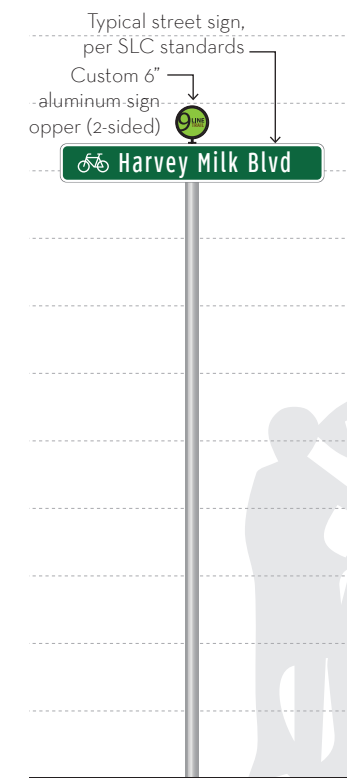


Confirmation / Turn Signs

Turn signs clarify a specific route at changes in direction when only one route option is available. These signs may include a 9-Line landmark and directional arrow. Following a turn, a confirmation sign may be utilized to reinforce to users that they are on the correct route.

Placement Guidance

- Place turn signs 50-75' prior to turn
- Place confirmation signs- 50 - 75' following the turn.



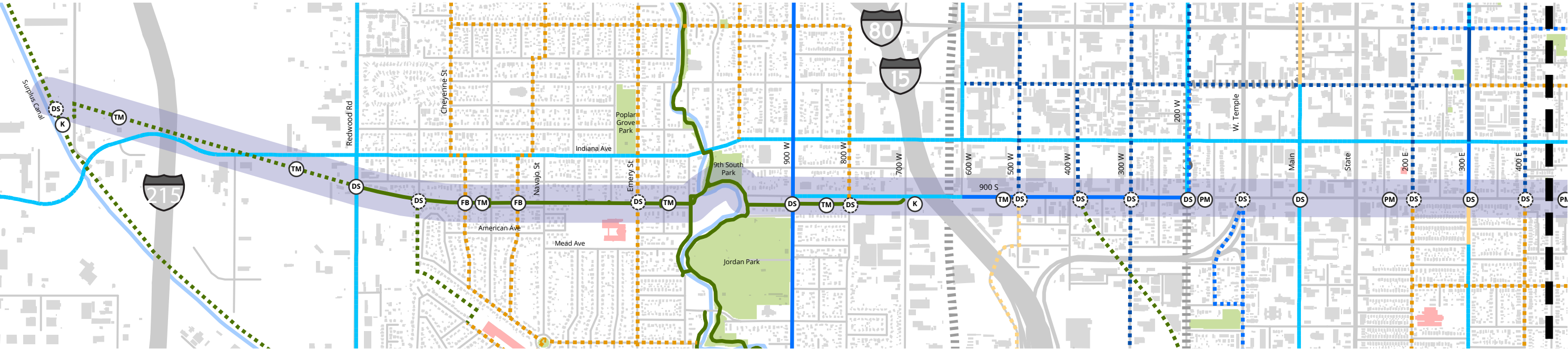
Street Sign Topper

Custom street sign toppers contribute to the broader branding and placemaking goals of the 9-Line. They may be fabricated by a local sign shop and installed on all local street signs along the route.

Placement Guidance

- Place on all street signs along the primary 900 S and Sunnyside Avenue route

SCHEMATIC WAYFINDING PLACEMENT PLAN

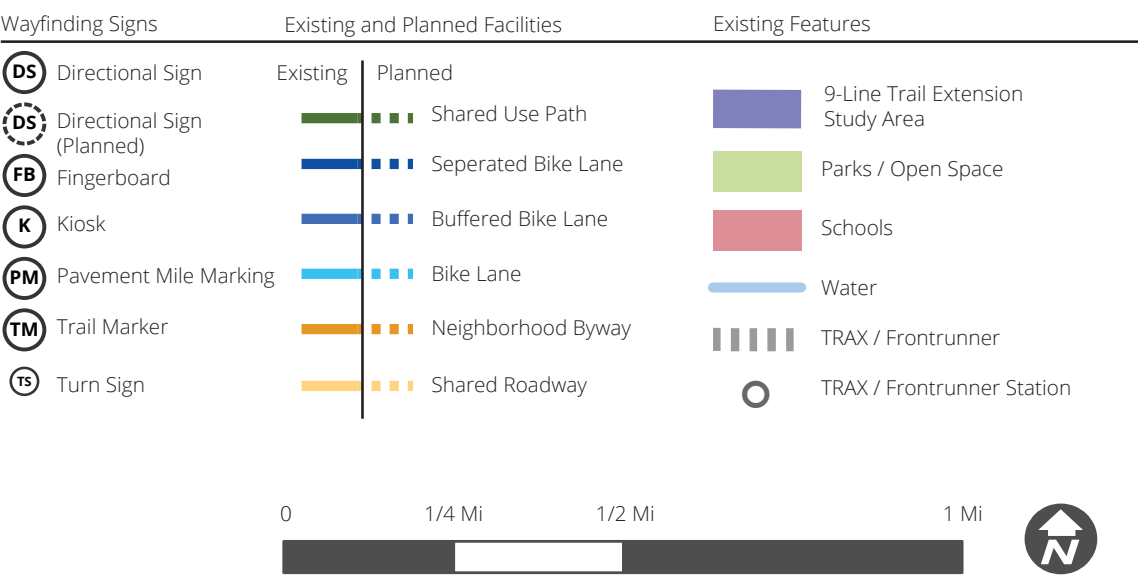


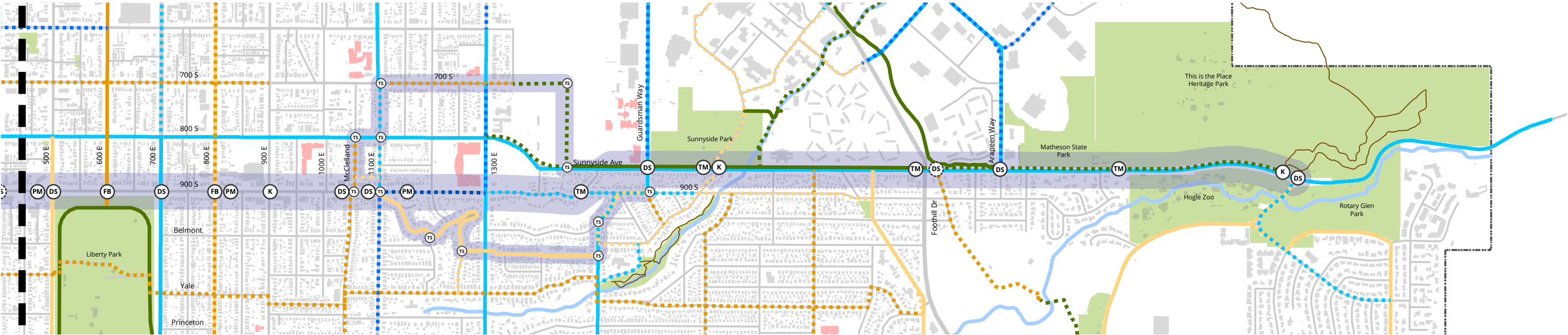
OVERALL SIGN QUANTITIES

Sign Type	Quantity
Confirmation Sign	26
Confirmation Pole Application	50+
Direction Sign	8
Direction Sign (Planned)	14
Fingerboard	4
Kiosk	5
Pavement Mile Marking	5
Street Sign Blade Topper	48
Trail Marker	10
Turn Sign	26

DIRECTIONAL SIGN LOCATIONS

Main Corridor	Cross-Street/Corridor	Planned or Existing Route	Main Corridor	Cross-Street/Corridor	Planned or Existing Route
9Line	Redwood Rd	Existing	900 S	200 E	Planned
9Line	Surplus Canal Trail	Planned	900 S	300 E	Existing
9Line	Glendale Plaza Trail	Planned	900 S	400 E	Planned
9Line	Emery St	Planned	900 S	500 E	Existing
9Line	800 W	Planned	900 S	700 E	Existing
900 S	500 W	Planned	900 S	McClelland St	Planned
900 S	400 W Rail Corridor Path	Planned	Gilmer Dr	1100 E	Planned
900 S	300 w	Planned	Sunnyside Ave	Guardsman Way	Existing
900 S	200 W	Existing	Sunnyside Ave	Connor St	Planned
900 S	West Temple	Planned	Sunnyside Ave	Arapeen Dr	Existing
900 S	Main St	Existing	Sunnyside Ave	Crestview Dr	Planned





FINGERBOARD LOCATIONS

Main Corridor	Cross-Street/ Corridor
9Line	1500 W
9Line	1400 W
900 S	600 E
900 S	800 E

KIOSK LOCATIONS

Main Corridor	Cross-Street/ Corridor
9Line	Surplus Canal Trail
9Line	900 W
900 S	900 E
Sunnyside Ave	Red Butte Creek Trail
Sunnyside Ave	Bonneville Shoreline Trail Trailhead

TURN SIGN LOCATIONS

Main Corridor	Cross-Street/ Corridor
700 S	1100 E
800 S	1100 E
800 S	McClelland St
900 S	McClelland St
Gilmer Dr	1100 E
Gilmer Dr	1200 W
Gilmer Dr	Douglas St
Gilmer Dr	1500 E
Michigan Ave	1500 E
900 S	1500 E
900 S	Greenwood Terrace
Sunnyside Ave	East High School Stadium Path (Planned)
East Ave	East High School Stadium Path (Planned)

CHAPTER 5

IMPLEMENTATION PLAN



REALIZING THE 9-LINE VISION

Although the costs and timeline associated with constructing the assortment of projects that constitute the overall 9-Line vision may seem daunting, Salt Lake City has an established track record of building world-class trail infrastructure. Visionary projects such as the Jordan River Trail, S-Line Trail, and Parley’s Trail are a testament to the resourcefulness and resolve of Salt Lake City advocates, residents, and leaders. The 9-Line represents the opportunity to become Salt Lake City’s next great trail.

The following pages outline a broad strategy for overall implementation of the 9-Line from the Surplus Canal to Emigration Canyon. Although implementation is likely to require a long-term commitment by the City, incremental and opportunistic investment can achieve significant progress over time. Creative partnerships with the projects diverse stakeholders will be necessary in developing capital projects and in structuring long-term maintenance.

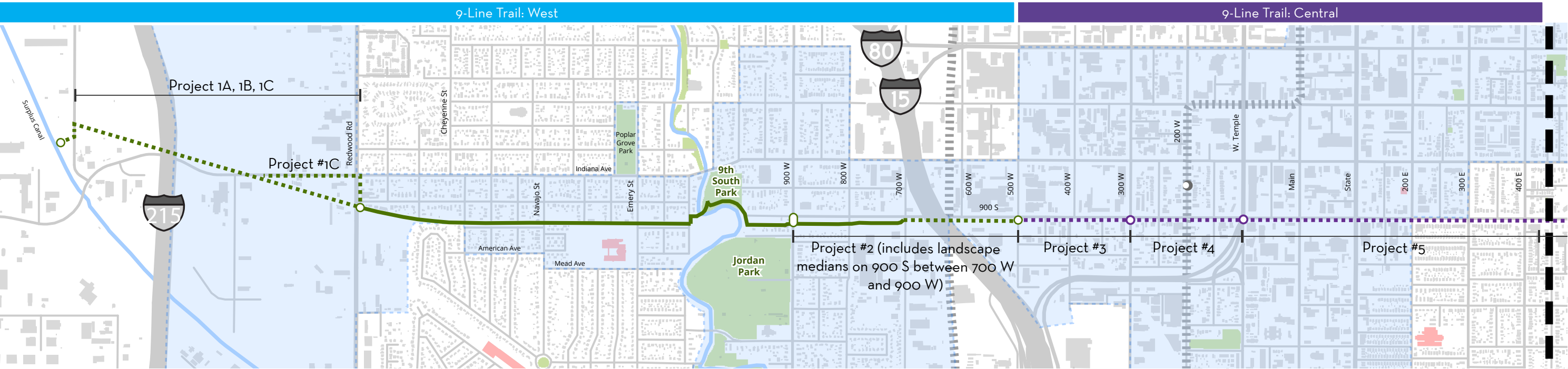
Regarding the proposed design of the 1100 East & 900 South intersection: “Yes! We need this; have for a long time.”

“We support the 9-line concept. We would love bike/walking separated from roads”

“I love the 2-way separated path on the south side. I would definitely use it daily.”

*Select comments from public outreach

POTENTIAL PHASING AND CAPITAL COSTS



PHASED IMPLEMENTATION

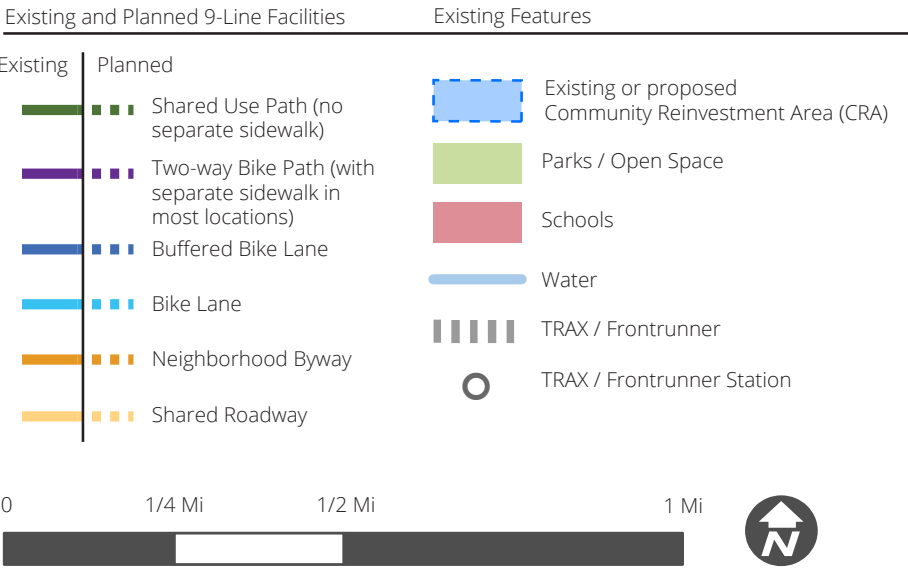
Phased construction of the 9-Line Trail Extension Study will be necessary based upon the anticipated costs and varying conditions of the proposed trail alignment. Proposed improvements have been delineated into specific project segments based upon the context and constraints surrounding the corridor. Planning-level opinions of cost were generated to facilitate subsequent planning, design efforts, and grant writing. The opinions of cost shown on page 89 reflect a number of assumptions including:

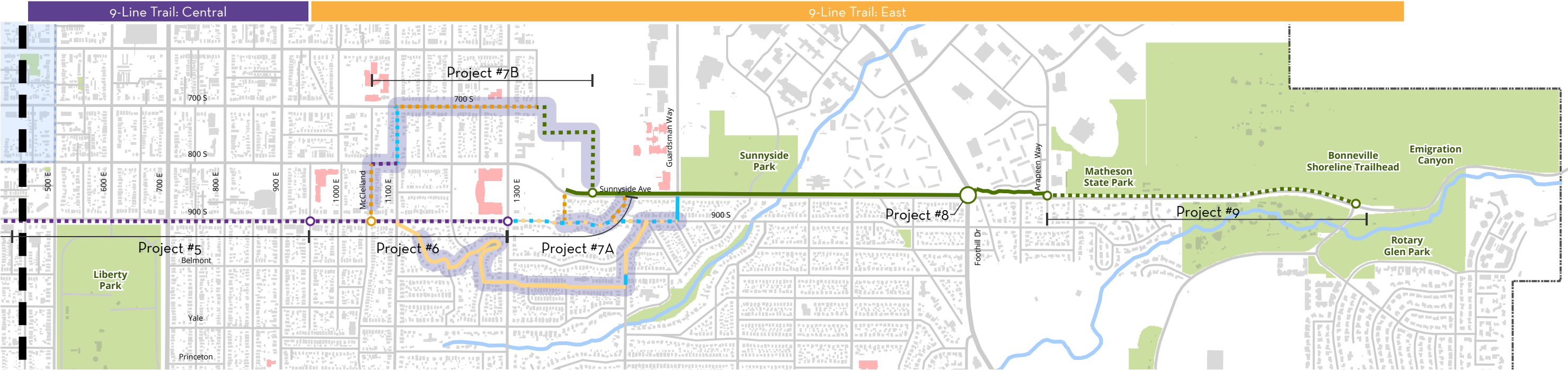
- Costs assume implementation with federal funds and associated procurement requirements (implementation with local funds that are not subject to federal procurement standards may result in savings).
- Costs provided are for 2018 construction.
- Costs do not include land acquisition.

Due to uncertainties in grant funding and complexities of implementation, this plan does not recommend a sequential order for implementation of the 9-Line. Opportunistic implementation that leverages funding and takes advantage of potential partnerships should be prioritized over rigid phasing schemes, however, existing segments of trail on the West side (current 9-Line) and along Sunnyside Ave. (Sunnyside Path) provide logical

starting points on which to extend out from. Other short term opportunities which could influence the sequence of 9-Line implementation include:

- Development and approval of the 9-Line and State Street CRA.
- Investment in the Foothills Natural Area by Salt Lake City Parks and Public Lands.
- Ongoing street reconstruction or resurfacing projects.
- Future development or redevelopment efforts along the corridor.





PROPOSED PROJECT SEGMENTS AND PLANNING-LEVEL COSTS

Proposed Project Segment		Description	Limit 1 (West)	Limit 2 (East)	Planning Level Opinion of Cost
1A		Shared use path along historic rail corridor (hybrid beacon trail crossing at Redwood Rd.)	Surplus Canal	Redwood Road	\$772,000
	1B (Alternate)	Shared use path along historic rail corridor (trail undercrossing at Redwood Rd.)	Surplus Canal	Redwood Road	\$1,500,000
	1C (Alternate)	Shared use path, cross Redwood Road at Indiana	Surplus Canal	Redwood Road	\$1,855,000
2		Landscaped medians from 900 W to 700 W; extend existing 9-Line from bike park to 500 W	900 W	500 W	\$986,000
3		Two-way bike path along the south side of the street with curb and intersection adjustments	500 W	300 W	\$986,000
4		Planned RDA Central 9th Streetscape Project; includes medians,landscape improvements and bike path. Funding has been appropriated pending compliance with City conditions for release of funds.	300 W	West Temple	\$3,600,000
5		Two-way bike path along the south side of the street with curb and intersection adjustments	West Temple	Lincoln St.	\$4,000,000
6		One-way uphill bike path with downhill bike lane	Lincoln St	1300 E	\$923,000
	6.1 (optional intersection Improvement)	Re-align Gilmer Ave to clean up intersection movements at 1100 E / 900 S / Gilmer intersection	Gilmer	900 S	\$126,000
7A		Uphill bike lane, downhill shared lane with hybrid beacon trail crossing at Amanda Ave / Sunnyside	1300 E	Amanda Ave.	\$247,000
7B		Connection from 900 S through Mt. Olivet Cemetery to Sunnyside path. New 2-way separated bike lane on 800 S and new rectangular rapid flashing beacon crossing.*	McClelland	Amanda Ave.	\$184,000
8		Construct a bicycle and pedestrian bridge over Foothill Blvd.	Foothill Blvd (northwest leg)	Foothill Blvd (northeast leg)	\$3,900,000
9		Construct a two-way bike path along the north side of Sunnyside Avenue from Arapeen to the upper Emigration Canyon parking lot near the BST. Trailhead and parking improvements at the two existing BST trailheads. Construct an undercrossing below Emigration Canyon Rd to connect the BST to Rotary Glen Park.	Arapeen Dr	Upper Emigration Canyon parking lot	\$1,735,000

IMPLEMENTATION STRATEGIES

Capital Funding Sources

Although the 9-Line Trail boasts a substantial price tag, a number of federal and local funding sources exist to assist with implementation. An overview of the most relevant funding programs are shown on page 93. In particular the 9-Line is especially suited for the TIGER (Transportation Investment Generating Economic Recovery) program criteria. Although TIGER grants are very competitive, the 9-Line possesses a number of key traits that would contribute to a strong grant application. These include:

- Improving access to reliable, safe, and affordable transportation (active transportation)
- Improving access to transit
- Providing ladders of opportunity to underserved populations
- Promoting improved public health

Local funding sources also provide a vehicle to assist in implementation of the 9-Line. Some sources such as SLCo’s CATNIP are already in place, while others such as development of a local bond would have to be put on the ballot.

Interim Strategies

Although some portions of the 9-Line will require significant capital investments, interim strategies do exist which would allow the City to make incremental and less expensive improvements in support of the 9-Line’s overall vision. However, these interim solutions should not become the defacto long-term condition.

ROAD DIETS AND STRIPING OF ON-STREET BIKE LANES

Although the recommended configuration for the 9-line from 500 W to 1300 E includes the relocation of curbs (south side only) and a shared use path on the south side of the street, other interim solutions are feasible. Adjusting 900 S from a 4-lane (and sometimes 5-lane street) cross-section to a 3-lane configuration would likely maintain similar levels of service for 900 S motorists while creating the opportunity to construct a continuous two-way left turn lane and bike lanes. This interim configuration could provide a less expensive way to test out a road diet on 900 S while providing a continuous east-west bikeway between 9th & 9th West and 9th and 9th East. Although this configuration does provide improvements to active transportation, it should not be considered as a permanent solution for a couple of primary reasons:

1. Standard bike lanes do not meet the intent of a high-comfort bikeway as identified in the SLC Pedestrian and Bicycle Master Plan.
2. On-street bike lanes alone do not significantly address the open space, placemaking, and economic development goals of the project.

CONSIDER SPEED LIMIT REDUCTIONS TO 25 MPH

Instituting a maximum speed limit of 25 mph along all 900 S would improve bicycle and pedestrian comfort along the corridor. Currently a 25 mph speed limit zone exists around 9th and 9th (east) while the rest of the corridor possesses a speed limit of 30 mph. In order to reduce actual vehicular speeds along the corridor,

reductions in the speed limit should be paired with infrastructure improvements such the road diet previously discussed in this section.

BRANDING AND WAYFINDING

Branding and some wayfinding efforts could be implemented in advance of major infrastructure improvements. Wayfinding and branding could help bring awareness to the corridor and the project while also helping active transportation users utilize the corridor as a transportation asset. Wayfinding infrastructure such as signs and pavement markings provides a relatively affordable way (in relation to infrastructure improvements) to promote bicycling and walking along the future 9-Line.



Recent wayfinding improvements along the Jordan River Trail provide an economically efficient way to promote active transportation.

FEDERAL FUNDING OPPORTUNITIES

Federal Program	Program Description	Agency	Match	Funding Amount	Eligible Activities	On-street bikeways	Shared use paths	Land acquisition	Trailheads	Park Amenities	Planning/ Design
Transportation Investment Generating Economic Recovery (TIGER)	TIGER discretionary grants seek to provide desirable long-term impacts on transportation facilities and systems, economic benefits, quality of life, environmental sustainability and safety. Similar trail projects such as the Indianapolis Cultural Trail have received funding in the past.	FHWA	20% with exceptions	\$550 million total for the program for FY2018	Construction of trails that are not on federal lands and meet program goals relating to transportation, economic benefits and quality of life.	Yes	Yes	Yes	No	Yes	No
Transportation Alternatives Program (TAP)	As a form of set aside funds from the Surface Transportation Block Grant Program, this funding source encompasses transportation enhancements, recreational trails, pedestrian and bicycle facilities. Project must be listed in the Statewide Transportation Improvement Plan (STIP)	FHWA through WFRC	20% in most cases	\$800-900K available for the Salt Lake / West Valley urbanized area	Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation.	Yes	Yes	Yes	Yes	No	Yes
Recreational Trails Program	The Recreational Trails Program (RTP) provides funding to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Funds are administered by their respective states and requirements vary. Projects must be listed within the Statewide Transportation Improvement Plan (STIP) to qualify.	FHWA Utah State Parks	50%	\$100,000 project cap	Maintenance, restoration, construction and property acquisition related to trail construction. Improvements to the BST/9-Line Trailhead may be a strong candidate.	No	Yes	Yes	Yes	No	No
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Provides a flexible funding source to State and local governments for transportation projects and programs to help improve air quality. Projects must demonstrate significant improvements to air quality to qualify and/or be competitive.	FHWA through NMDOT	20%	About \$5.0 million total for Salt Lake / West Valley urbanized area	Projects that improve air quality, including on and off-street bikeways that help reduce vehicle trips. Other eligible projects include planning, intersection improvements, roundabouts, park and ride facilities.	Yes	Yes	No	No	No	Yes
Land and Water Conservation Fund (LWCF)	Provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities.	FHWA through Utah State Parks	50%	Varies	Planning and construction of bicycle and pedestrian paths and trails, or acquisition of land for these facilities.	Yes	Yes	Yes	Yes	Yes	Yes

LOCAL FUNDING OPPORTUNITIES

Local Program	Program Description	Agency	Match	Funding Amount	Eligible Activities	On-street bikeways	Shared use paths	Land acquisition	Trailheads	Park Amenities	Planning/ Design
Salt Lake County CATNIP (County Active Transportation Network Improvement Program) Grants	CATNIP funding grants assist communities with implementing bikeway improvements within the street roadway. Funding is available to projects identified on the County's Active Transportation Implementation Plan (ATIP) which includes the 9-Line.	Salt Lake County	None required	Varies, approx. \$500K available for 2017	Trails or pathways within their own rights-of-way are not eligible for funding. Intersection improvements, however, where trails cross street rights-of-way ARE eligible. Funds may be used for construction or for design activities that are expected to result in eventual construction. Grants cannot be used for solely planning purposes such as city bicycle master plans.	Yes	In street ROW only	No	No	No	Yes
Local bond (for future consideration)	SLC could develop a local bond proposal to address either transportation improvments or open space improvements. The 9-Line project could have widespread appeal based on its connection to numerous council districts and neighborhoods.	FHWA through WFRC	20% in most cases	\$800-900K available for the Salt Lake / West Valley urbanized area	Construction, planning, and design of on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation.	Yes	Yes	Yes	Yes	Yes	Yes
Special use tax (for future consideration)	Salt Lake County could elect to institute a special-use tax for funding of transportation or parks/open space improvements.	FHWA Utah State Parks	20%	\$5000-\$100,000	Maintenance, restoration, construction and property acquisition related to trail construction on city, county, state or federally managed land.	Yes	Yes	Yes	Yes	Yes	Yes

MAINTENANCE & MANAGEMENT PROGRAM

Streetscape and active transportation projects such as the 9-Line require annual maintenance to provide a quality experience to users and maintain their attractiveness. Maintenance activities can generally be categorized into one of two types: **routine maintenance**, which is done annually or more frequently, and **major or capital maintenance**, which involves more intensive activity at a less than annual frequency.

ROUTINE MAINTENANCE

Bike path maintenance will vary considerably throughout the 9-Line. Recently installed segments such as the Sunnyside Path, which was constructed out of concrete, will require minimal maintenance while other areas such as the existing 9-Line, which was constructed out of asphalt, will require sealcoating to preserve the longevity of the trail. Additional routine activities such as sweeping, trash removal, and snow removal also contribute to the overall maintenance program.

In addition to the maintenance of the bike path itself, landscaping and amenities will also contribute to the overall 9-line maintenance program. Salt Lake City Parks and Public Lands maintains the existing 9-Line open space occupied by the previous railroad corridor. Adding new landscape areas, such as medians, will require additional maintenance funds for Salt Lake City Parks and Public Lands.

SHARED USE PATH CAPITAL MAINTENANCE

Major or capital maintenance activities typically involve more intensive maintenance repairs such as pavement seal coating, pavement overlays, pavement reconstruction, or other structural rehabilitations. Needs can vary widely based upon environmental factors, such as soil conditions, drainage, quality of initial construction, and whether the path was constructed out of concrete or asphalt. Any paved path surface will deteriorate over time with asphalt surfaces dropping in quality rapidly after 10 years. Preservation efforts such as seal coating extend the life of asphalt efficiently and at a lower cost than waiting for the surface to fail requiring expensive reconstruction. Overlays may be needed after multiple seal coats or at approximately 30 years of service. A full

ROUTINE ASPHALT PATH MAINTENANCE ACTIVITIES AND ESTIMATED COSTS

Routine Maintenance Activity	Function	Frequency	Est. Annual Cost (per mi.)
Path sweeping	Keep paved surfaces debris free	Twice annually (once in spring and once in fall)	\$140 (x2)
Litter and trash removal	Keep path clean and maintain consistent quality of experience for users	Annually, or as needed	\$70
Mowing path shoulders (native open space areas)	Increases the effective width of the path corridor and helps protect encroachment	Twice annually, in late spring and mid to late summer	\$100 (x2)
Tree and brush trimming	Eliminate encroachments into path corridor and open up sight lines	Annually, or less frequently as needed	\$100
Weed abatement	Manage existence and/or spread of noxious weeds, if present	Twice annually, in late spring and mid to late summer	\$140 (x2)
Safety Inspections	Inspect path tread, slope stability, and bridges or other structures	Annually	\$20
Snow removal	Generally limited to urban sections of the path where year-round bike access is desired	As needed (assume 8 events)	\$120 (x8)
Sign and other amenity inspection/replacement	Identify and replace damaged infrastructure	Annually (assume 2 sign replacements)	\$100
Crack sealing and repair	Seal cracks in asphalt to reduce long term damage	Annually	\$250
Estimated Annual Cost			\$2,260*

* Path maintenance assumes a standard asphalt shared use path. Decorative paving treatments or landscaping may necessitate additional maintenance costs.

CAPITAL ASPHALT PATH MAINTENANCE- 5 YEAR SEALCOAT FREQUENCY

Activity	Frequency	Cost / SF	Cost / LF	Cost / Mile
Seal coat	Year 5	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 10	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 15	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 20	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 25	\$0.19	\$1.90	\$10,032.00
Overlay	Year 30	\$2.00	\$20.00	\$105,600.00
Seal coat	Year 35	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 40	\$0.19	\$1.90	\$10,032.00
Seal coat	Year 45	\$0.19	\$1.90	\$10,032.00
Reconstruct	Year 50	\$6.50	\$65.00	\$343,200.00

reconstruction could be required when needed, typically at 50 years if the seal coat and overlay have been provided.

Concrete paths will require significantly less capital maintenance than asphalt paths. Although they may require isolated jacking or replacement, generally limited capital maintenance expenditures can be expected for upwards of 50 years.

Financial planning for major or capital maintenance can be challenging to budget for. Typically asphalt shared-use paths require greater capital maintenance activities with age and ultimately require full reconstruction at some point. Some jurisdictions stay focused on eventual reconstruction and treat this as a maintenance item to be budgeted for, whereas some treat this as a separate capital project to be considered at a later date in the future. Depending on the existing age and the level of effort, major or capital maintenance can run require an average budget of between \$2,000 and \$7,000 per mile. Some years may require more expensive maintenance with others requiring none.

Management Framework

Although the 9-Line Trail Extension Study identifies an amazing opportunity to develop a world-class urban trail, one of the primary implementation challenges that exists is long-term management and maintenance. As noted in the previous sections, routine and capital maintenance is necessary to ensure the functionality and attractiveness of the corridor over time. Although there is no perfect solution, a number of options do exist for development of an adequate and reliable maintenance program.

One option could simply consist of dedicated maintenance funding established in the City budget for maintenance of 9-Line facilities. With sufficient and dedicated funding, the CBD and/or SLC Parks and Public Lands could be responsible for 9-Line maintenance. One drawback for this structure would be that long-term maintenance levels are not guaranteed and could be subject to changes in elected leadership over time.

Another option would be to simply rely on standard maintenance by the SLC Streets Division. However, this option would likely not address many critical components of the project that would require maintenance such as off-street trail infrastructure, wayfinding signage, landscaping, and public art.

NON-PROFIT MANAGING ENTITY

One additional option that warrants consideration is the formation of a non-profit managing entity. This structure could mimic the relationship between Indianapolis Cultural Trail, Inc. and the City of Indianapolis. In this scenario, a non-profit entity would be formed to both shepherd and provide input on the development of the 9-Line, but also to participate in some maintenance functions. Diverse participation from stakeholders throughout the corridor would ensure that all areas of the 9-Line receive similar attention while promoting partnerships and shared fundraising among many entities. Potential stakeholders to comprise the non-profit board could include:

- The Foothills Cultural District
- University of Utah / Research Park
- 9th & 9th Business District
- Neighborhood Council representatives
- UTA

Pros:

- Non-profit managing entity could fundraise and perform certain maintenance activities such as landscape maintenance or maintenance of “betterments”
- Non-profit managing entity could take on additional roles if they choose such as encouragement, promotion of the trail, and capital fundraising

Cons

- Initial formalization of a core group of stakeholders to file for non-profit status may be challenging

CASE STUDY: INDIANAPOLIS CULTURAL TRAIL INC.

Indianapolis Cultural Trail, Inc. (ICT) manages, maintains, and promotes the Indianapolis Cultural Trail. ICT hosts a number of public events on the Cultural Trail each year, maintains certain elements of the physical infrastructure including lighting and paving, manages the Pacers Bike Share system, organizes volunteer clean-up days, and manages the numerous art installations along the trail.