128th Avenue
I-25 to York Street

Huron Street
84th Avenue to 88th Avenue

Pecos Street
Milky Way to 92nd Avenue/
Thornton Parkway

Thornton Protected Bike Facility Study

JUNE 2025

Acknowledgments

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Thank you to all the residents and community members who provided feedback throughout each stage of the planning process.

Contents

The information contained in this document is for planning purposes and should not be relied upon for final design of any project. Readers are cautioned that this is a preliminary report and that all results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data available at the time of preparation. Further engineering analysis and design are necessary prior to implementing any of the recommendations contained herein.

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Study Background

The Thornton Protected Bike Facility Study ("the Study") is a critical step toward transforming the City of Thornton into a safer, more accessible place for people of all ages and abilities. Many parts of the city's existing multimodal network (e.g., bike lanes on high-speed, high-volume arterial roads) are currently "high-stress" environments for people bicycling or walking. Aligned with the city's goal of creating an interconnected multimodal transportation network accessible to all people, this Study focuses on addressing the city's multimodal mobility needs on three corridors:

- 128th Avenue from I-25 to York Street
- Huron Street from 84th Avenue to 88th Avenue
- Pecos Street from Milky Way to Thornton Parkway

The 2022 Thornton Transportation Mobility Master Plan (TMMP) determined that busy streets with inadequate or disconnected bike facilities were the top barriers to bicycling, and the TMMP highlights 128th Avenue, Huron Street, and Pecos Street as priority corridors to address these gaps.

This Study developed options and evaluated the feasibility of installing protected bike facilities along these three corridors, with a comprehensive approach that included data collection, community outreach, operational analysis, and the evaluation of various design solutions. Funded through the Denver Regional Council of Governments (DRCOG) Transportation Improvement Program (TIP), this effort aims to create safer and more comfortable bicycling conditions and to support the city's Complete Streets policy, which prioritizes bicycle, pedestrian, and transit facilities in infrastructure projects.

By focusing on 128th Avenue, Huron Street, and Pecos Street, which the TMMP identified as short-range priorities, this Study responds to both existing and latent demand for bicycling infrastructure and lays the groundwork for the development of a safer, more connected bicycle network in Thornton.

Families bike in Thornton.

1.1 Thornton Bike Facility Study Facts

What is a protected bike facility?

A protected bike facility is a bikeway that is physically separated from motor vehicle traffic. Also known as separated bike facilities, protected bike facility types include street-level protected bike lanes, which are separated by barriers like curbs or posts; raised bike lanes, which are located at sidewalk level; and shared-use paths, which accommodate travel for pedestrians and bicyclists and are typically located within roadway rights-of-way adjacent to the roadway. These facilities provide safer and more comfortable spaces for bicyclists when compared to conventional on-street bike lanes along arterial streets.

Why do we need protected bike facilities?

To achieve the city's goals, it is essential to offer safe and comfortable bicycling options for more people. Research from the National Association of City Transportation Officials (NACTO) has shown that protected bike facilities yield the highest return on investment in terms of increasing ridership.[1] Additionally, the Federal Highway Administration (FHWA) Bikeway Selection Guide recommends protected bike lanes for streets with traffic volumes exceeding 6,000 vehicles per day (vpd) or speeds over 30 mph.[2] In June 2024, FHWA published Separated Bike Lanes on Higher Speed Roadways: a Toolkit and Guide.[3]

1 https://nacto.org/latest/high-quality-bike-facilities-increase-ridership-make-biking-safer/#:~:text=More%20people%20ride%20when%20cities,from%2021%25%20to%20171%25.

2 https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

3 https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bike_lanes/

What is the purpose of the Thornton Protected Bike Facility Study?

The Thornton Protected Bike Facility Study seeks to identify the capital improvements needed to install protected bike facilities, the associated costs, and a phased approach to implement such improvements. The Study's goals include:

- Determining the most appropriate protected bicycle facility type and implementation type
- Developing initial conceptual designs
- Positioning the City to secure funding for full design and construction
- Setting a precedent for studying other protected bicycle facilities

Why 128th Avenue, Huron Street, and Pecos Street?

Data suggests high bicycle ridership on 128th Avenue, and Huron Street and Pecos Street may be areas of latent demand. In other words, demographics suggest that community members may choose to bicycle to nearby destinations (e.g., Water World, schools, parks and open spaces, and trails) if they deemed bicycling to be safe and comfortable. Additionally, the TMMP establishes a goal to provide an interconnected multimodal transportation network accessible to all people, and it identified 128th Avenue, Huron Street, and Pecos Street as short-range priorities for protected bike facilities.

FIGURE 1 128th Avenue study area

FIGURE 2 Huron Street and Pecos Street study areas

02

Study Process

The Study process launched in January 2024 and unfolded over three phases: an evaluation of existing conditions, development of concept design options, and advancing recommended concept designs. This planning process included the following:

- Technical analysis of existing data, plans, and policies
- Traffic data collection and field audits
- Engagement with a Stakeholder Working Group and other stakeholders at key project milestones
- Ongoing engagement with the broader public and the community
- Coordination with the cities of Thornton, Westminster, and Federal Heights, DRCOG, and the Regional Transportation District (RTD) staff

2.1 Technical Analysis

The following section presents an overview of the analysis process for each corridor. To understand the performance and benefits of each design option, and ultimately recommend a concept design, the design team gathered contextual and quantitative data. The team reviewed this information and used it to design options that best met the needs of each corridor and its users. Finally, this same intel informed the development of assessment metrics for each options to be scored. Chapters 3 through 5 present the analysis results for each corridor.

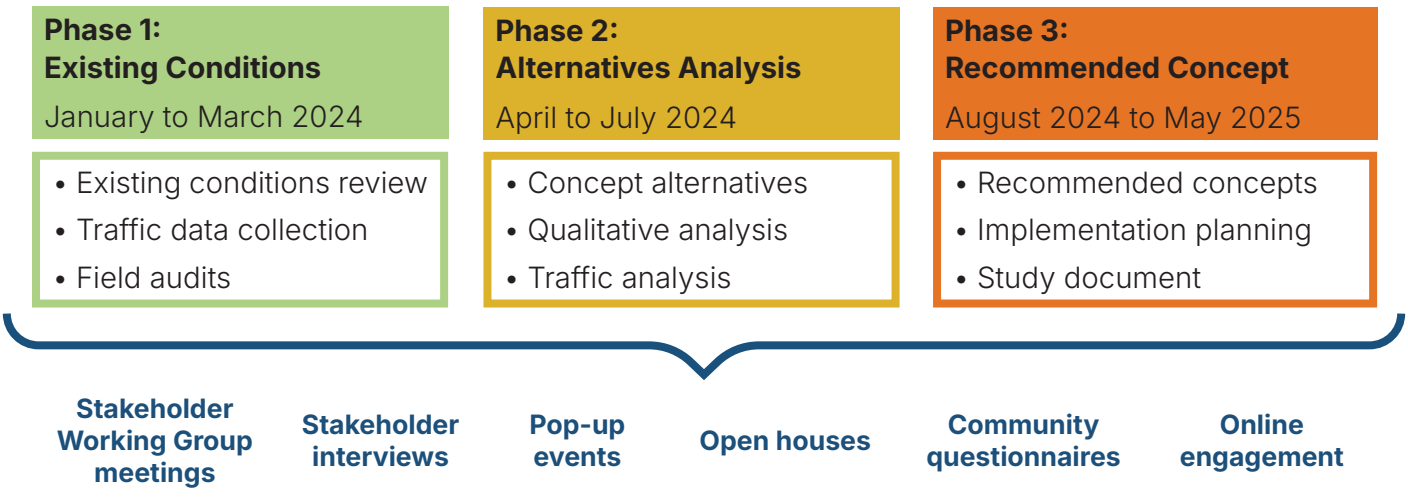
Data Collection and Review

As a first step in the planning process, the project team gathered relevant background data on 128th Avenue, Huron Street, and Pecos Street to establish an understanding of current conditions and inform potential recommendations and corridor concepts. The review included existing data from the U.S. Census and transit ridership data provided by RTD. The Study also collected new data, including traffic turning movement counts, average daily traffic volumes, and motor vehicle speeds. Observations conducted at key intersections contributed to the understanding of existing traffic conditions.

Concept Design Option Development

Next, the project team developed concept design options for each corridor, using both data and input obtained through the Study's public engagement efforts (described in the next section). The Study produced three concept design options for each corridor, which were evaluated by the project team and shared with community members to determine which would best meet their needs and the needs of the city.

FIGURE 3 Project timeline



Concept Design Option Assessment

Qualitative Analysis

The assessment of bicycle and transit infrastructure for the corridors followed a detailed methodology, examining factors such as facility type, separation from other travel modes, connectivity to destinations, and compliance with recommended width standards. *The AASHTO Guide for the Development of Bicycle Facilities, 5th Edition*, served as a key reference for evaluating the design of bike facilities in each corridor. Facility widths were assessed to ensure they met the guide's preferred criteria for safety and comfort. This included considerations for minimum and preferred widths tailored to the specific context of each corridor. Concept design options that adhered to or exceeded preferred widths scored higher due to their ability to better accommodate a range of users, including those on wider or adaptive bicycles.

Bike facilities were scored based on their ability to provide safe, efficient, and user-friendly travel. Two-way facilities generally scored higher in contexts where crossing the corridor may be difficult or undesirable, as they reduced the need for users to make multiple crossings. One-way bike lanes were evaluated for their directional alignment with traffic flow, while raised bike lanes and shared-use paths were assessed for their added physical separation from vehicles and pedestrians.

Transit infrastructure scoring focused on compatibility with bike facilities and user accessibility. Floating bus stops, which create designated waiting areas separate from bike and vehicle travel lanes, were rated highly as they minimize conflicts and improve transit efficiency. Designs where buses must cross bike lanes or stop in mixed traffic scored lower due to potential conflicts and delays.

Overall, the methodology balanced the safety, comfort, and functionality of bike and transit infrastructure, considering both user behavior and design standards to evaluate the effectiveness of each option.

Traffic Analysis

Intersection capacity analysis for the three corridors was conducted using Synchro traffic modeling software and the Highway Capacity Manual (HCM) methodology to evaluate motor vehicle delay and queue lengths. This methodology provided insights into how various design options would affect traffic flow, level of service, and volume-to-capacity (v/c) ratios, allowing for a comparative analysis of potential impacts. Level of service describes motor vehicle delay on a road or at a specific intersection; lower levels of service indicate greater motor vehicle delay, whereas higher levels of service indicate lower motor vehicle delay.

Key factors influencing the analysis included the need for exclusive turn phases, leading bike intervals, and the removal of travel lanes. For example, corridors with two-way bike facilities often required additional exclusive signal phases, which impacted overall traffic flow. In contrast, one-way bike facilities typically utilized leading bike intervals, minimizing disruption to vehicle traffic.

Concept design options that included road diets (i.e., converting 5-lane cross-sections to 3-lane cross-sections) were evaluated for their ability to balance multimodal infrastructure needs with maintaining adequate vehicle capacity. These options generally resulted in higher volume-to-capacity ratios, as the reallocation of space increased the strain on remaining lanes.

All options were assessed against consistent metrics to ensure a thorough and standardized evaluation of traffic impacts. Full results tables and detailed traffic analyses are provided in the appendices for reference.

2.2 Public Engagement

Engagement Methods and Phases

Public engagement was a cornerstone of the Study's development. At the start of the Study, the project team prepared a detailed public engagement plan that outlined a series of online and in-person activities, designed around three phases:

- **Phase 1**: This phase communicated the purpose and need for the Protected Bike Facility Study and solicited input on existing challenges and opportunities.
- **Phase 2**: This phase presented three concept design options for each corridor and solicited feedback that would eventually inform the development of recommended concept designs for each corridor.
- **Phase 3**: This phase presented the recommended concept designs based on public feedback collected during Phases 1 and 2 along with the findings from the technical analysis.

During all three phases, the project team engaged the general public and a Stakeholder Working Group (SWG), which comprised representatives from the City of Thornton, City of Federal Heights, City of Westminster, Denver Regional Council of Governments (DRCOG), Regional Transportation District (RTD), and Colorado Department of Transportation (CDOT). The SWG met three times during the project to discuss the Study's vision and goals, existing conditions, the concept design options, and the recommended concept designs. For stakeholders with more specific interests or less time to dedicate to recurring meetings, the project team conducted 11 stakeholder interviews and one focus group interview.

Because this project focuses on three different corridors, it was important for the project team to craft a robust engagement strategy for each, to reach the many Thornton community members who live, work, play, and travel on 128th Avenue, Huron Street, and Pecos Street. **Appendix A** lists all engagement strategies deployed during the Study. The Study's engagement philosophy followed a comprehensive and inclusive three-pronged approach that was characterized by active grassroots engagement, traditional engagement, and digital engagement.

Grassroots Engagement

The Study organized a series of pop-up events to meet people where they are. Pop-up events bring project resources, materials, and activities directly to community members as they go about their day. Throughout the Study, the project team focused on popping up at popular community events in Thornton, such as Thorntonfest, and at key destinations, such as Allegro Coffee and the Adams 12 Five Star Schools administration building.

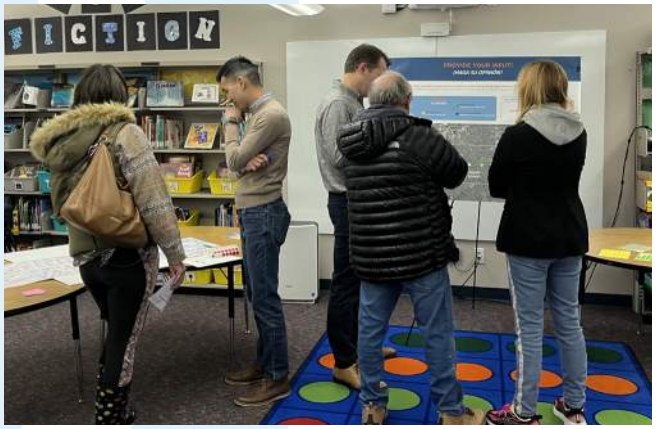
Traditional Engagement

The Study used public open houses and questionnaires as part of the traditional engagement strategy aimed at reaching the general public. Phase 1 activities included an open house and one mapping questionnaire. Phase 2 activities included a virtual public meeting and one text-based questionnaire. These engagement opportunities allowed the public to learn about the project and provide input in their own time or engage with the proposed concept design options in a more structured setting.

Digital Engagement

The project team used a wide range of digital engagement methods to publicize the Study, as well as to promote the questionnaires and public events. The City of Thornton's website hosted a webpage for the Study that included a project overview, project timeline, engagement opportunities, contact information, email sign-up list, project updates, questionnaire links, and other relevant information that city staff regularly updated throughout the Study process. The project team also distributed project information and publicized engagement opportunities through the City of Thornton newsletter, T-mail, and social media—including Facebook, Instagram, Twitter, and LinkedIn.

The results of outreach events and questionnaires are detailed in chapters 03, 04, and 05.



The Study engaged with community members through public meetings and pop-up events.

03

128TH Avenue

From I-25 to York St, 128th Avenue is a five-lane roadway that serves east-west travel and a mix of residential, industrial, and institutional land uses. The north side of the corridor features primarily single-family residences, while the south side is characterized by warehouses, a fire station with an emergency signal, and the Adams 12 Five Star Schools administration building. The corridor also connects to key destinations, including Century Middle School, a church, and the Eastlake & 124th rail station.

Sidewalks along the corridor vary in quality and width. The south side generally includes a wide, landscaped and detached sidewalk that doubles as a shared-use path, intended to accommodate both pedestrians and bicyclists. In contrast, the north side generally has narrower attached sidewalks which limit pedestrian comfort, and there are no dedicated bike facilities, Mature trees along parts of the corridor provide shade, enhancing comfort for pedestrians and bicyclists.

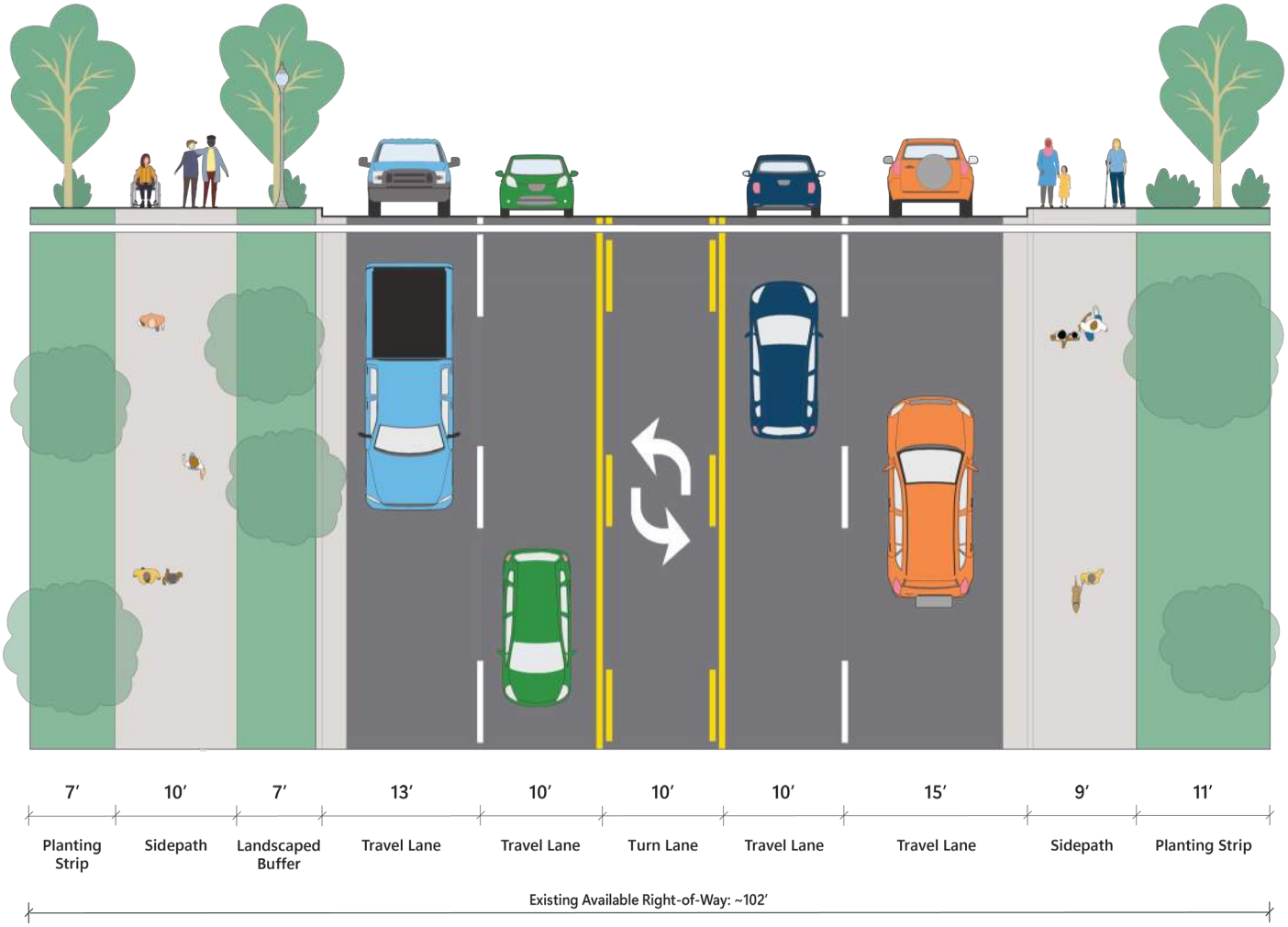
A sign on 128th Avenue directs motorists to give bicyclists at least 3 feet of clearance.

3.1 Existing Conditions

The wide lane widths on 128th Avenue present an opportunity to reallocate space for multimodal infrastructure. Reducing outside lane widths to 10 feet, non-inclusive of the gutter, could allow for protected bike facilities and improve safety and comfort for all travelers. Related changes, such as buffering between sidewalks and the roadway, can support local destinations by encouraging walking and biking to schools and parks. When incoporating upgrades to active transportation infrastructure, it is crucial to maintain or improve accessibility by complying with the Americans with Disabilities Act (ADA) standards to ensure all users have access to these improvements.

While the corridor could serve as a critical link in the active transportation network, thanks to connections to several trails and the 124th & Eastlake commuter rail station, it faces several challenges. High traffic volumes and a posted speed limit of 40 mph make walking and bicycling along the roadway uncomfortable. Additionally, industrial uses on the corridor's south side and planned developments could change traffic patterns and multimodal needs.

FIGURE 4 128th Avenue existing typical cross-section (looking west)

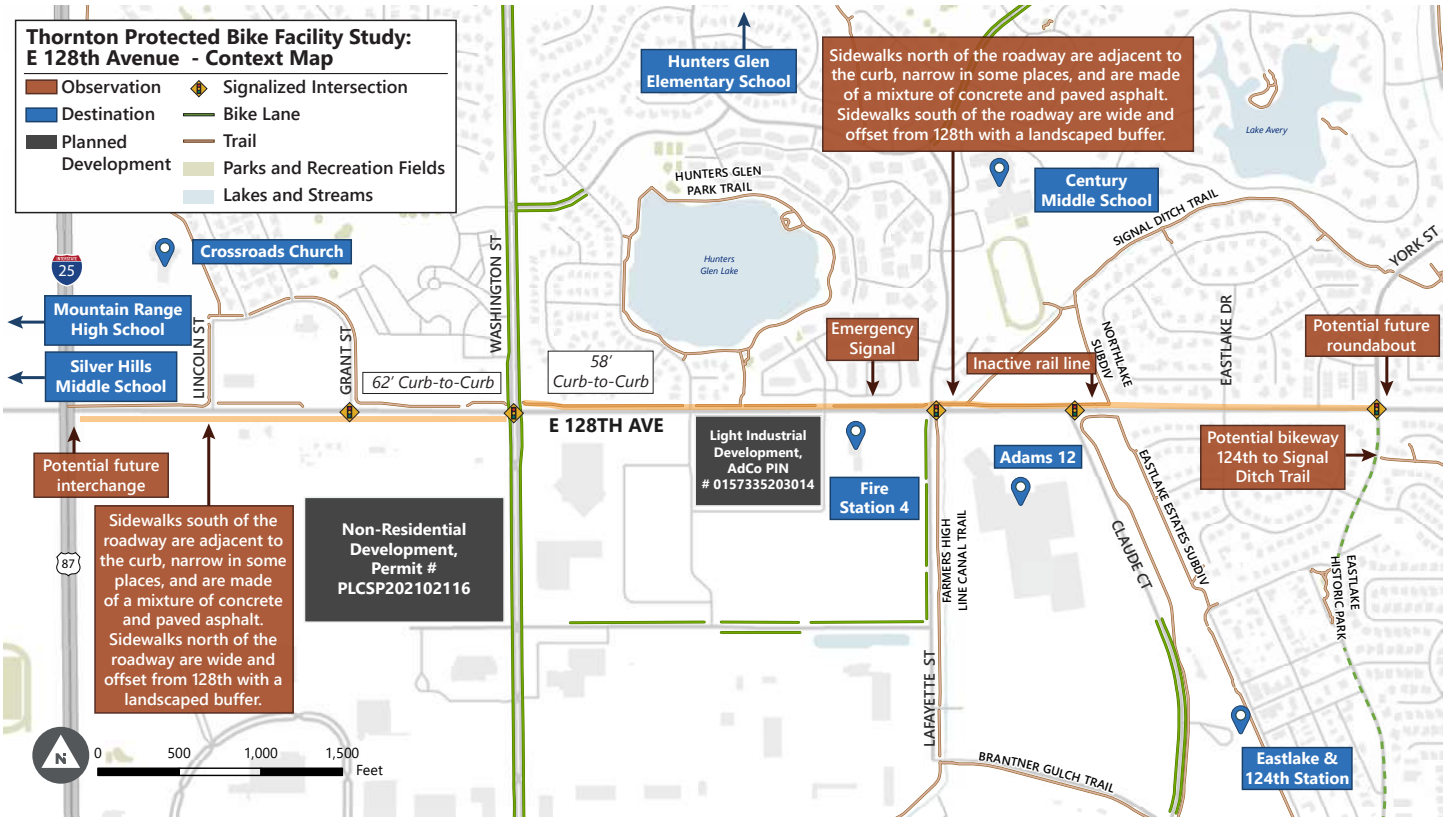


Area Context

The studied segment of 128th Avenue spans 1.5 miles. While it crosses I-25 at the western end, it does not provide direct access to the interstate. West of I-25, the City of Broomfield plans to prioritize multimodal travel where 128th Ave transitions to Midway Blvd. Implementation of active modes infrastructure within the corridor study area would be aligned with this neighboring initiative.

Over 20,000 vehicles per day travel the corridor, consisting of a mix of commuter and local traffic. The busy 124th & Eastlake commuter rail station adjacent to the corridor serves the N Line and facilitates regional connectivity, with approximately 750 daily boardings and alightings on weekdays. These trips include many students and workers who take their bikes and scooters to the station bike racks and on board the train to use downtown. Several trails also intersect the corridor, offering opportunities for active transportation and recreation. The corridor is flat and, therefore, it may be accessible to new, unskilled, or limited mobility active modes users. Fire Station 4 at Lafayette St and 128th Ave services emergency calls, alongside ambulances and other emergency traffic, east and west on the corridor.

FIGURE 5 128th Avenue context map. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.



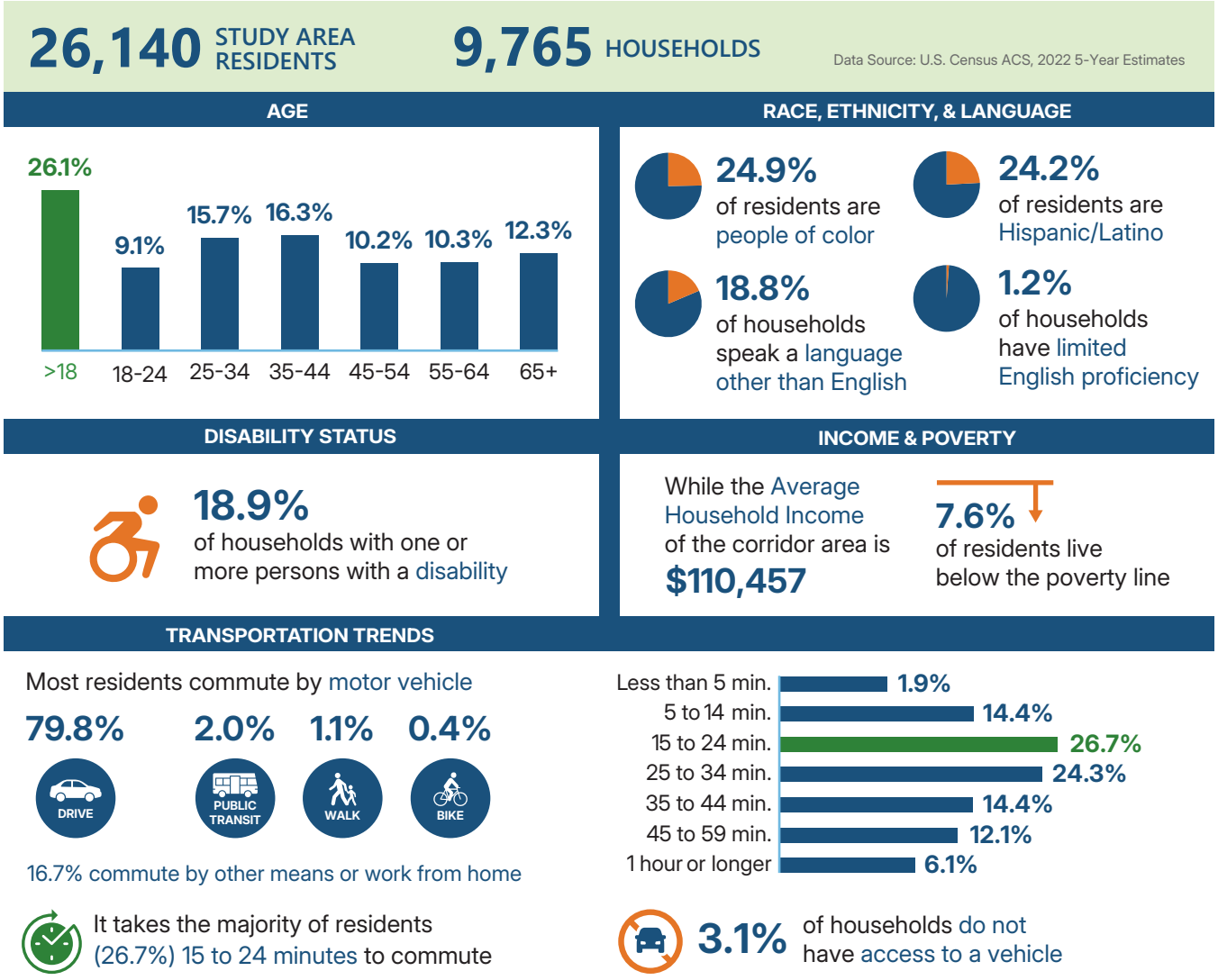
The 128th Avenue corridor supports a diverse, multi-generational community with varied economic and transportation needs. About a quarter of residents identify as Hispanic or Latino or as people of color, and nearly a fifth of households speak a language other than English. The presence of many children underscores the need for safe and accessible infrastructure that connects families to schools, parks, and other community spaces.

Almost 20 percent of households include individuals with disabilities, which emphasizes the importance of accessible transportation design. Features like smooth sidewalks, curb ramps, and safe crossings are essential for enhancing mobility and ensuring that all residents can navigate the corridor comfortably.

Most residents rely on cars for commuting, with trips generally being short in duration. The area includes households with higher incomes, although approximately 8 percent of residents live below the poverty line. Regardless of access to vehicles or financial flexibility, all residents should have reliable transportation options that can reduce reliance on personal vehicles. The corridor's connection to trails and the nearby 124th & Eastlake commuter rail station provides opportunities to enhance alternative travel options, such as safe walking and biking facilities, which support these residents and advance equity.

Overall, the corridor serves a vibrant, evolving community with diverse backgrounds and transportation preferences. Thoughtful planning and design improvements can address the varied needs of residents, fostering a safe, inclusive, and equitable transportation network.

FIGURE 6 128th Avenue demographics



Traffic Conditions

The corridor is a minor arterial with a posted speed limit of 40 mph. The relatively few driveways cement its function as a "drive through" corridor, serving high volumes of east-west commuter traffic.

128th Avenue's current configuration (Figure 4) includes five vehicular travel lanes which adequately accommodates the current average daily traffic (ADT) of over 20,000 vehicles (Figure 7). Road diets were not considered in the concept design options given anticipated population growth and new development.

Active Modes

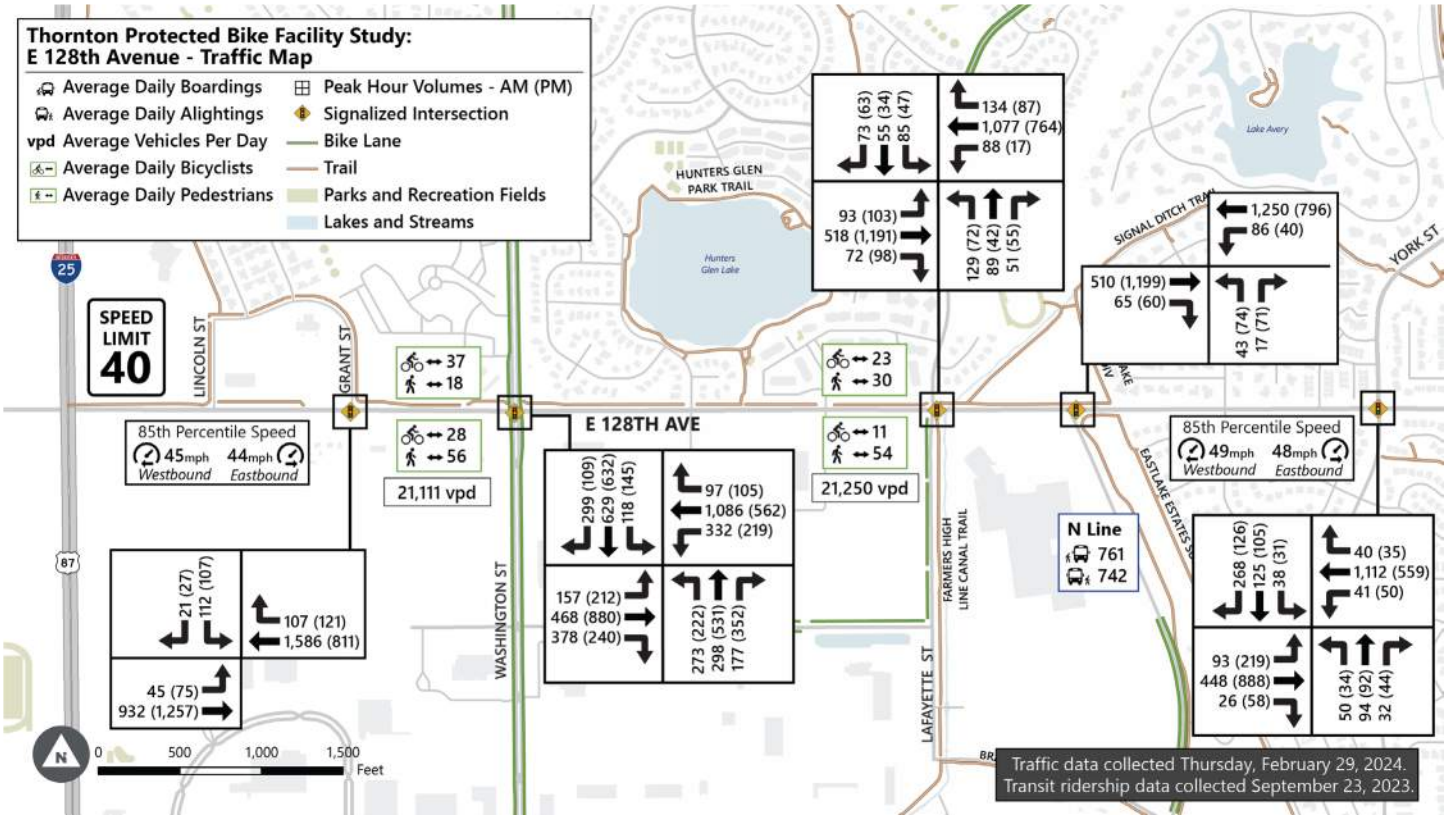
From student pedestrians to transit commuters, 128th Avenue serves more than just motorists. Pedestrian and bicyclist volumes and behavior, as well as sidewalk widths and other measured infrastructure, demonstrate the demand and opportunities for facilities that accommodate active transportation modes on 128th Avenue.

The corridor lacks dedicated bike facilities and bicyclists are instead encouraged to use the full vehicle travel lane. However, a wide and landscaped sidewalk on the south side of the corridor doubles as a shared-use path, intended to accommodate both pedestrians and bicyclists. While the north side sidewalk is generally narrower and directly adjacent to the roadway – which reduces users' perceived safety and comfort -- the project team observed bicyclists riding there, too, rather than using the roadway. Multiple trail connections and access to the nearby 124th & Eastlake commuter rail station reinforce the corridor's multimodal potential.

For much of the study area, the sidewalk is shaded by mature trees, providing comfort for pedestrians. Crossings are limited along the corridor and are often unmarked. The emergency signal near the fire station is primarily designed to prioritize emergency vehicle access rather than pedestrian or bicyclist crossings.

Transit ridership is high at the 124th & Eastlake rail station, with a weekday average of 750 boardings and alightings. However, no bus routes currently serve the corridor, creating connectivity gaps for

FIGURE 7 128th Avenue traffic conditions. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.



transit users. The high commuter rail ridership underscores the potential benefit of integrating multimodal improvements along the corridor to better connect pedestrians and bicyclists to this transit hub.

Public Input

Results of Phase 1 engagement activities, in which the Study asked the public about the challenges they face when traveling along 128th Avenue today, highlight that Thornton community members prioritize strong connectivity between various trails, parks, and transit options and they value safe and convenient access to destinations such as the 124th & Eastlake rail station, residential areas, and recreational trails. Based on how community members described their experiences using 128th Avenue, notable intersections such as those at Washington Street, York Street, Emerson Street, and Lafayette Street, commonly present challenges to safety and mobility. Community members want to see the shared path along the corridor widened and the crossing at Lafayette improved to provide safer, more accessible transportation and recreational options.

3.2 Concept Design Options

Development

In developing concept design options for 128th Ave, the Study aims to present a range of cost alternatives, from a short-term, low-cost solution with minimal construction and changes that could be accomplished through signing and striping, to a long-term, higher-cost option involving roadway reconstruction and potential right-of-way acquisition. Each option was designed to address the corridor's unique layout, destinations, and access points while reflecting the needs and preferences expressed by stakeholders and the public. This information was considered alongside professional judgement to determine suitable options. For example, an option with two-way travel on both sides of the corridor is included to maximize mobility and access to destinations in contrast to one-way bike lanes on both sides. The options were evaluated against multiple criteria and presented for community feedback.

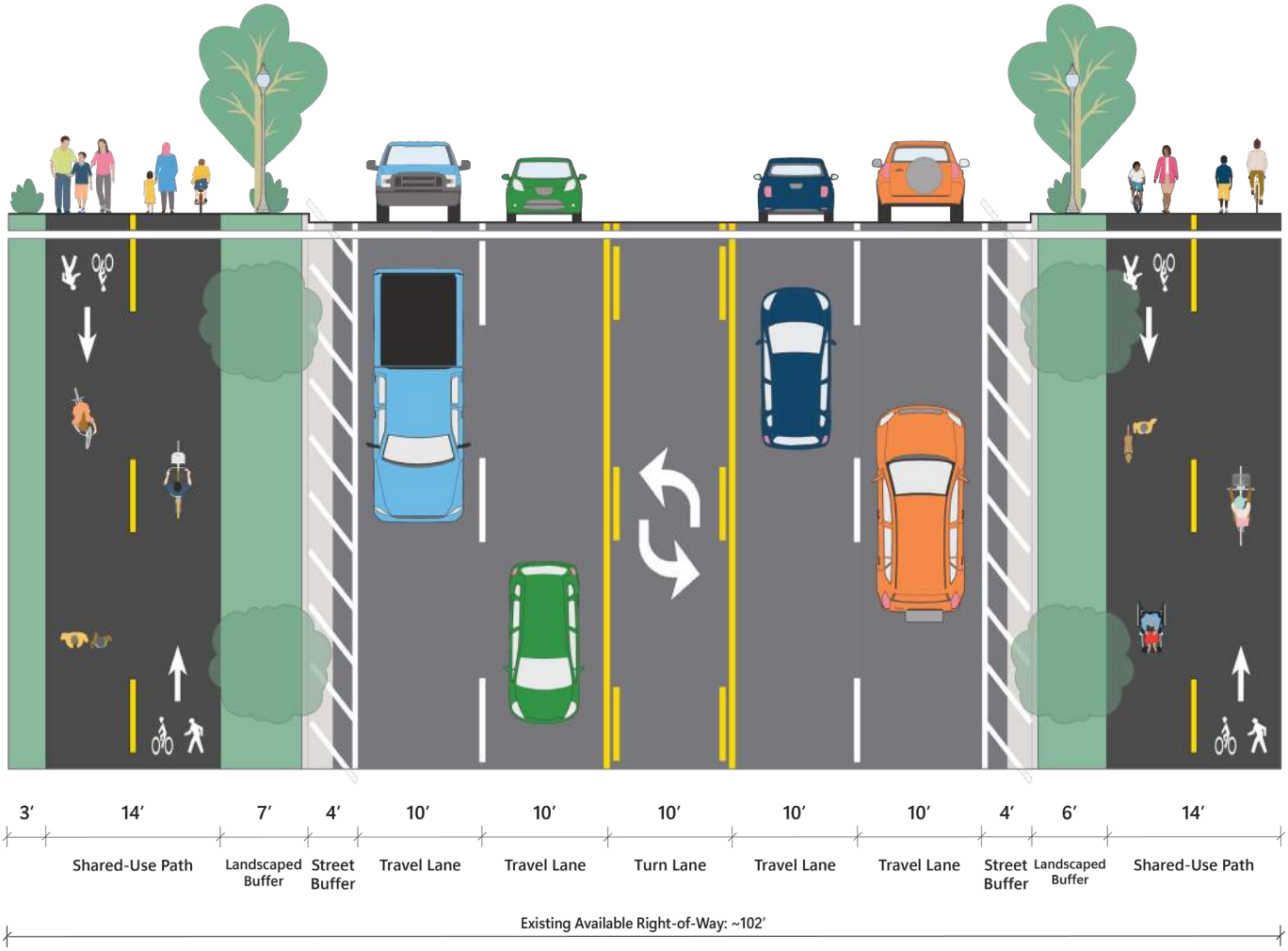
An emergency vehicle travels on 128th Avenue.

Concept Design Options

Option A

128th Avenue concept design Option A restripes the roadway to narrow the existing vehicle lanes to 10 feet increase the buffer between people driving and people walking or bicycling, while maintaining a center turn lane. Option A includes a shared-use path that is present on both sides of the street.

FIGURE 8 128th Avenue Option A typical cross-section (looking west)



Preliminary Concept

Not for Construction

This is a preliminary concept. Field verification, site condition assessments, engineering analysis, and design are necessary prior to implementing any of the recommendations contained herein.

NOTE: INTERSECTION CONFIGURATIONS AND REMOVAL OF TURN LANES CONTINGENT UPON TRAFFIC ANALYSIS

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 100' 200' 300'
SCALE IN FEET

TOOLE DESIGN

OPTION A
128TH AVE
THORNTON PROTECTED BIKE FACILITY
7/30/2024

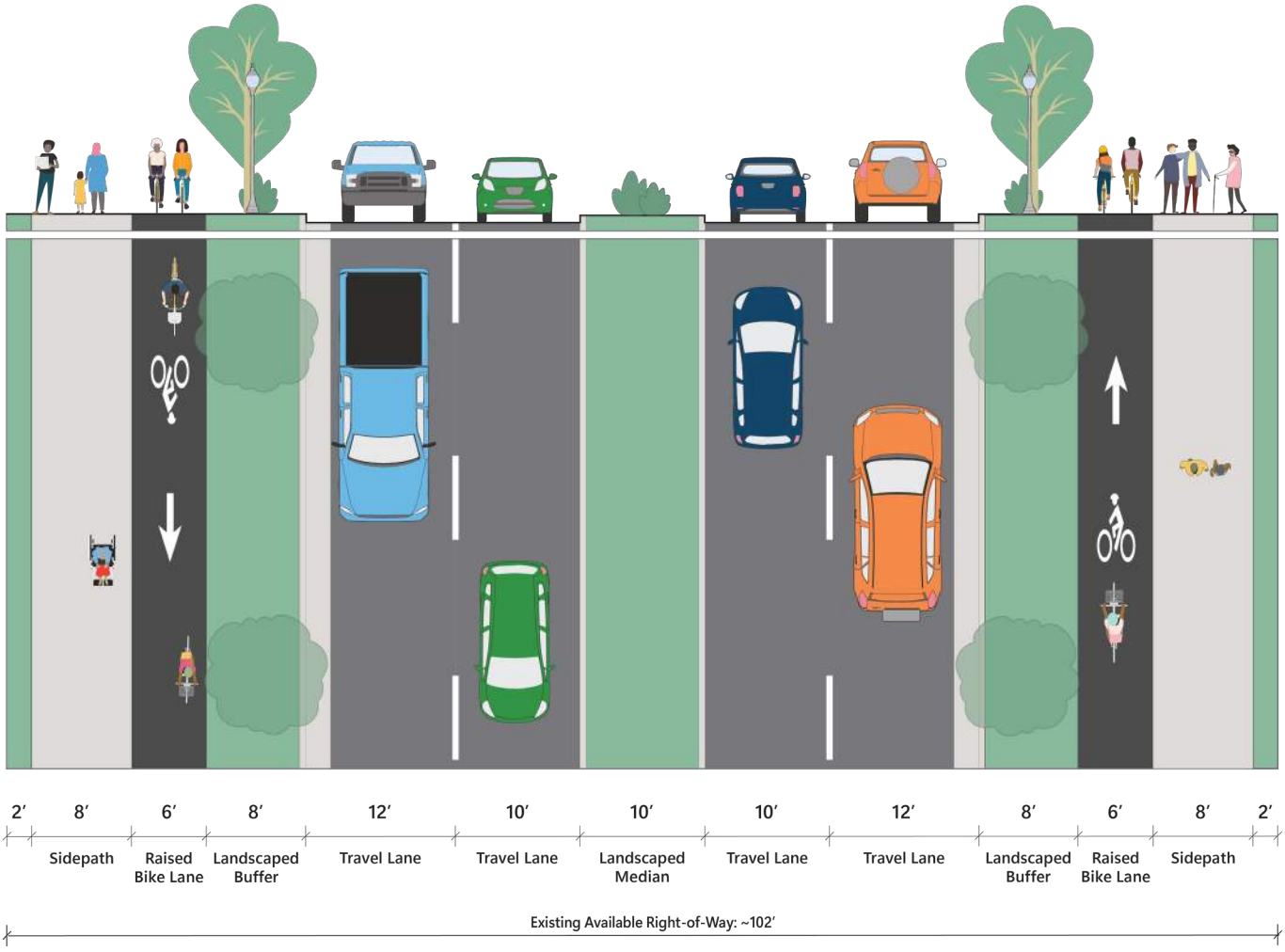
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

THORNTON PROTECTED BIKE FACILITY STUDY | 24

Option B

128th Avenue concept design Option B installs a landscaped median where motorist queuing space is not needed. This option requires reconstruction of the curbs to provide landscaped buffers, sidewalk-level bike lanes, and sidepaths on both sides of the corridor.

FIGURE 9 128th Avenue Option B typical cross-section (looking west)



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NORTH

0 100' 200' 300'
SCALE IN FEET

TOOLE DESIGN

OPTION B
128TH AVE
THORNTON PROTECTED BIKE FACILITY
7/30/2024

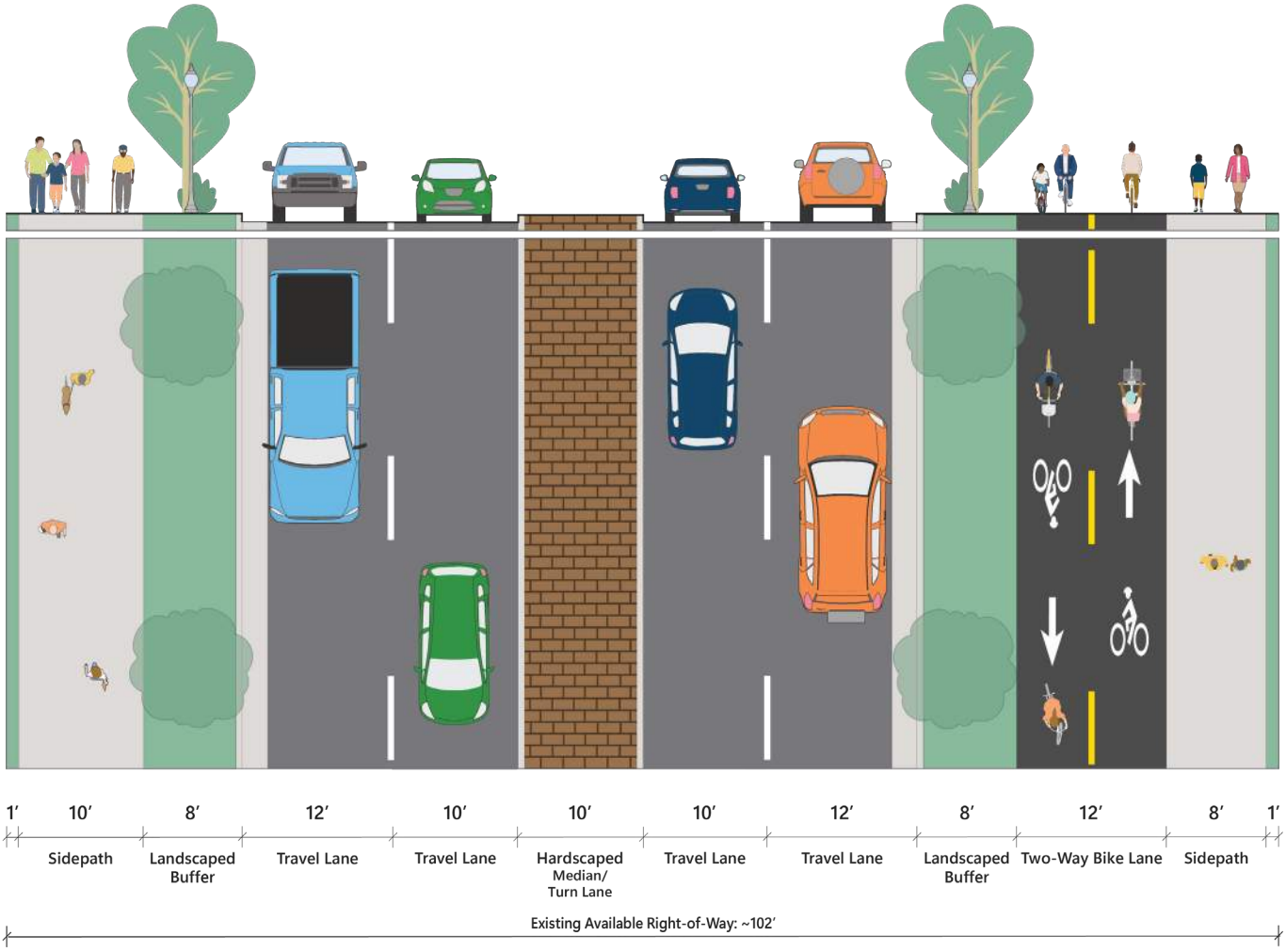
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

THORNTON PROTECTED BIKE FACILITY STUDY | 26

Option C

128th Avenue concept design Option C installs a landscaped median where motorist queuing space is not needed. This option requires reconstruction of the curb to provide landscape buffers on both sides, sidepaths on both sides, and a two-way side-walk level bikeway on the north side.

FIGURE 10 128th Avenue Option C typical cross-section (looking west)



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NOTE: INTERSECTION CONFIGURATIONS AND REMOVAL OF TURN LANES CONTINGENT UPON TRAFFIC ANALYSIS

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2024-07-30

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NORTH

0 100' 200' 300'

SCALE IN FEET

TOOLE DESIGN

OPTION C

128TH AVE

THORNTON PROTECTED BIKE FACILITY

7/30/2024

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Analysis

Detailed analysis results are provided in the **appendix H**.

Bike Facility Type

Both Options A and B provide facilities on either side of the corridor, but the shared use path in Option A scored higher as it provides two-way travel on both the north and south sides. In a setting where changing bike facility directions means crossing a 5-lane street, possibly twice, users are unlikely to cross and may therefore misuse one-way bike facilities. Following a similar logic, the two-way bikeway on the north side in Option C scores better than the raised bike lanes in Option B but not as well as Option A's set of shared-use paths.

The widths of the one-way and two-way bike lanes in their respective contexts as well as the shared-use path, are all within the recommended ranges per the AASHTO Guide for the Development of Bicycle Facilities, 5th Edition, but the additional separation from pedestrians provided by the raised bike lanes results in a higher score for Options B and C.

Safety

Option A, which maintains the existing curb-to-curb pavement width, scores slightly lower than the other two options which relocate the curbs to reduce the pavement width, thereby reducing crossing distances and encouraging lower motorist speeds.

Traffic Operations

The two-way bike facilities require more exclusive turn phases, while the one-way raised bike lanes primarily utilize leading bicycle intervals. In particular, Option A – with two-way shared-use paths on both sides of the corridor – requires 18 exclusive phases. This reallocation of time results greater motor vehicle delay. Full results for the traffic analysis are available in **Appendix F**.

Cost

The narrowing of the curb line and landscaping the buffers and medians in Options B and C increase the potential construction cost substantially. The relocation of the curb lines in these options require updates to signal poles and lighting along the corridor, which are a substantial percentage of the overall costs. Additionally, any design that impacts the culvert near Lafayette Street will considerably increase construction costs.

Full planning-level cost opinions are available in **Appendix G**.

Public Opinion

Community members who engaged in the Study's development favored separation between bike and pedestrian facilities, separation between those facilities and vehicle lanes, bike and pedestrian facilities on both sides of the street, an unchanged center turn lane, and wider shared-use paths and buffers. Community members were less likely to prefer designs that mixed bike and pedestrian traffic, reduced the number of available vehicle lanes or turn lanes, provided bike facilities on only one side of the street, or included more expensive design elements.

All options were generally well received, but overall, community members preferred Option B due to the wide, symmetric facilities on both sides of the street. Community members slightly preferred Option A over Option C due to the presence of facilities on both sides of the road and the lower potential construction cost.

3.3 Recommended Concept Design

Although not the preferred option by the public, traffic operations and bicycle mobility and connectivity made Option C the recommended concept design. The two-way sidewalk-level protected bikeway on the north side of the street is complemented by the wide sidewalk on the south side that still allows for bicycle travel, mitigating the need to ride the "wrong way" with the one-way facilities of Option B. Option C also is directly adjacent to the residential neighborhoods and schools on the north side of the corridor.

Balancing Needs at the 128th Avenue and Washington Street Intersection

The intersection of 128th Avenue at Washington Street presents unique challenges for multimodal safety and traffic operations. The Study's traffic analysis found that competing demands for space at the intersection and time within the traffic signal's cycle length are likely to result in undesirable conditions for all modes in the recommended concept design. While the intersection configuration in the recommended concept design achieves the Study's goal of providing a safe and comfortable bicycle facility through the intersection, a significant increase in motor vehicle traffic volumes in the future may require the City to investigate higher-investment solutions.

The intersection of 128th Avenue and Washington Street presents unique challenges for multimodal safety and traffic operations.

Future phases of traffic analysis and design should explore the feasibility of these potential solutions:

- **Grade separation**: In the same way that the City of Thornton and other Front Range communities provide grade separation for trail crossings (typically routing the trail under the intersecting roadway), the City should consider routing the two-way bikeway in the recommended concept design under Washington Street. While local water table and drainage impacts may pose a challenge and future design phases must determine impacts to utilities and right-of-way, this solution could provide a high-comfort facility for bicyclists traveling east-west while reducing potential conflicts with motorists at street level. Additional opportunities for landscaping and maximum tree retention could increase comfort and should be explored in future design phases.
- **Roadway widening**: This Study envisions 128th Avenue and Washington Street maintaining their existing lane geometry, i.e., every approach comprising two left-turn lanes, two through lanes, and one right-turn lane. Widening the intersection approaches via the addition of more through lanes could increase the vehicular throughput of the intersection. However, it would also result in longer crossing distances for pedestrians and bicyclists.
- **Innovative bicyclist/pedestrian detection/ actuation**: Traffic signal detection and actuation technology continues to evolve. Future design phases should consider the benefits that more innovative detection and actuation may offer. For example, the passive detection of bicyclists and pedestrians may allow the traffic signal to only activate phases when bicyclists and pedestrians are detected. Also, the Manual on Uniform Traffic Control Devices allows for configuring pedestrian push buttons to accept extended button presses (longer than 1 second). Extended button presses can call optional features, which include additional crossing time.

NOTES:
1. INTERMEDIATE LEVEL BIKE LANE OR SIDEWALK LEVEL BIKE LANE WITH TACTILE DIRECTIONAL INDICATOR SEPARATION BETWEEN BIKES AND PEDS WILL BE REQUIRED IN FUTURE DESIGN. (BY OTHERS)
2. ADDITIONAL STREET SIGNAGE (SUCH AS SPEED LIMIT SIGNS, STREET NAME SIGNS, ETC). NOT SHOWN FOR CLARITY.
3. UTILITY IMPACTS NOT SHOWN.
4. DETECTABLE WARNING SURFACES FOR PEDESTRIAN CROSSINGS NOT SHOWN.
5. LOCATION OF EXISTING ROW NOT SHOWN. PROPOSED IMPROVEMENTS ANTICIPATED TO BE WITHIN EXISTING ROW.
6. BICYCLE PHASES PRESENT AT ALL SIGNALIZED INTERSECTIONS WHERE TWO-WAY CYCLE TRACK CROSSINGS ARE PRESENT.
7. EXISTING SIDEWALK ASSUMED TO BE REMOVED WITHIN PROJECT LIMITS WHERE IT CONFLICTS WITH PROPOSED DESIGN.
8. EXPLORE THE USE OF CURB EXTENSIONS, RAISED CROSSINGS, AND/OR SET-BACK CROSSINGS AT ALL SIDESTREETS ALONG 128TH TO SHORTEN CROSSING DISTANCES, ENCOURAGE DRIVER YIELDING, AND IMPROVE VISIBILITY. SEE EXAMPLE CROSSING AT THE LAFAYETTE ST INTERSECTION. DRAINAGE INFRASTRUCTURE IMPROVEMENTS MAY BE REQUIRED.
9. TURN BAY PRESENCE AND LENGTH AT ALL INTERSECTIONS TO BE REFINED IN FINAL DESIGN BY OTHERS.

LEGEND

LANDSCAPING	CONCRETE SIDEWALK
RED BRICK SIDEWALK BUFFER	ROADWAY ASPHALT
COLORED PATTERNED CONCRETE	TWO-WAY CYCLE TRACK

NORTH

0 100' 200' 300'
SCALE IN FEET

TOOLE DESIGN

PREFERRED INITIAL CONCEPTUAL DESIGN
128TH AVE
THORNTON PROTECTED BIKE FACILITY
4/15/2025

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

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04

Huron Street

Huron Street is a 5-lane roadway that serves north-south travelers between residential neighborhoods. The study corridor connects to destinations that largely serve younger users, such as schools and parks. Reflecting the corridor's pedestrian activity, the corridor includes two mid-block pedestrian crossings: a signalized crossing near Polaris Place and a pedestrian hybrid beacon near the Pinnacle schools.

Some mature trees on the east side provide shade, but landscaping along the corridor is otherwise limited. The sidewalk is narrow in places and closely follows the roadway, which may reduce pedestrian comfort. The area near the creek at the base of the hill may flood during heavy rains, which temporarily impacts access.

Several factors make it difficult to travel this corridor safely and comfortably without a car. One-way bike lanes exist on both sides of the street, but they are narrow, share space with the gutter pan, and lack physical protection from motor vehicles.These factors create barriers for less experienced riders. In addition, transit service along the corridor is infrequent.

Bike user rides in the painted bike lane on Huron St.

4.1 Existing Conditions

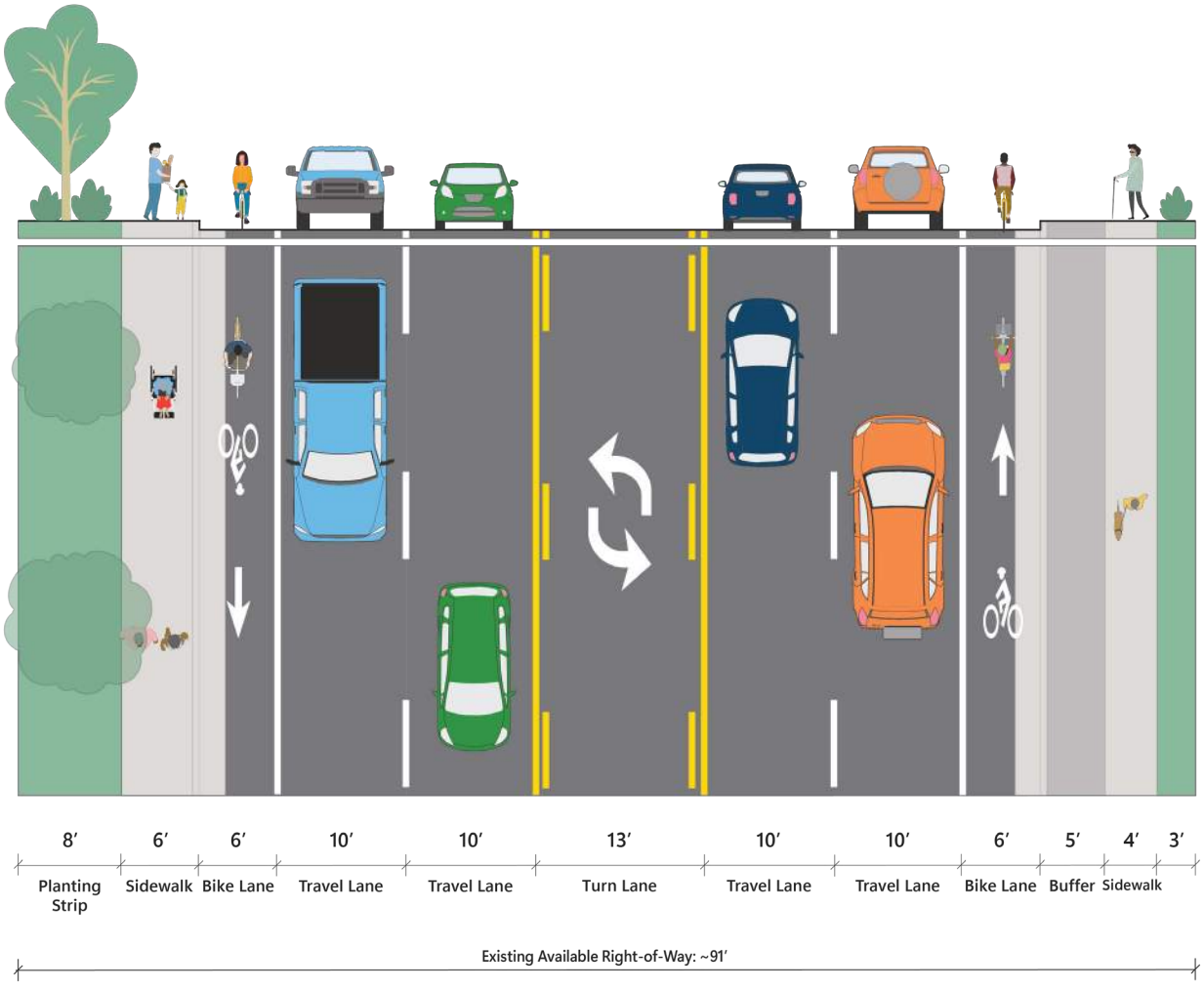
Huron Street's excess lane capacity presents an opportunity to reallocate space for multimodal infrastructure. Reducing the roadway to three lanes from five could allow for wider sidewalks, protected bike lanes, and landscaped buffers, to improve safety and comfort for the area's family-oriented community and to support local destinations such as schools and parks by making walking and biking safe, feasible options.

The corridor's planned bike network connections at Milky Way and 88th Avenue make it well-suited for active transportation. Improvements such as shaded sidewalks, shorter crossings, and vertical separation for bike lanes could address current deficiencies and promote greater use by less-experienced bicyclists and pedestrians.

However, the corridor faces constraints, including narrow, unshaded attached sidewalks, infrequent transit service, and safety challenges at existing pedestrian crossings. Flooding near the creek during heavy rains poses additional accessibility issues. Addressing these challenges may require upgrades necessary to comply with the Americans with Disabilities Act (ADA), costly drainage upgrades, or construction.

The corridor also serves as a critical bus and vehicle route for students and faculty at the Pinnacle schools. Therefore, any redesign must balance multimodal improvements with maintaining traffic flow. High-cost options that require right-of-way acquisition or significant construction could disrupt nearby residential and commercial properties, limiting feasibility.

FIGURE 11 Huron Street existing typical cross-section (looking north)



Area Context

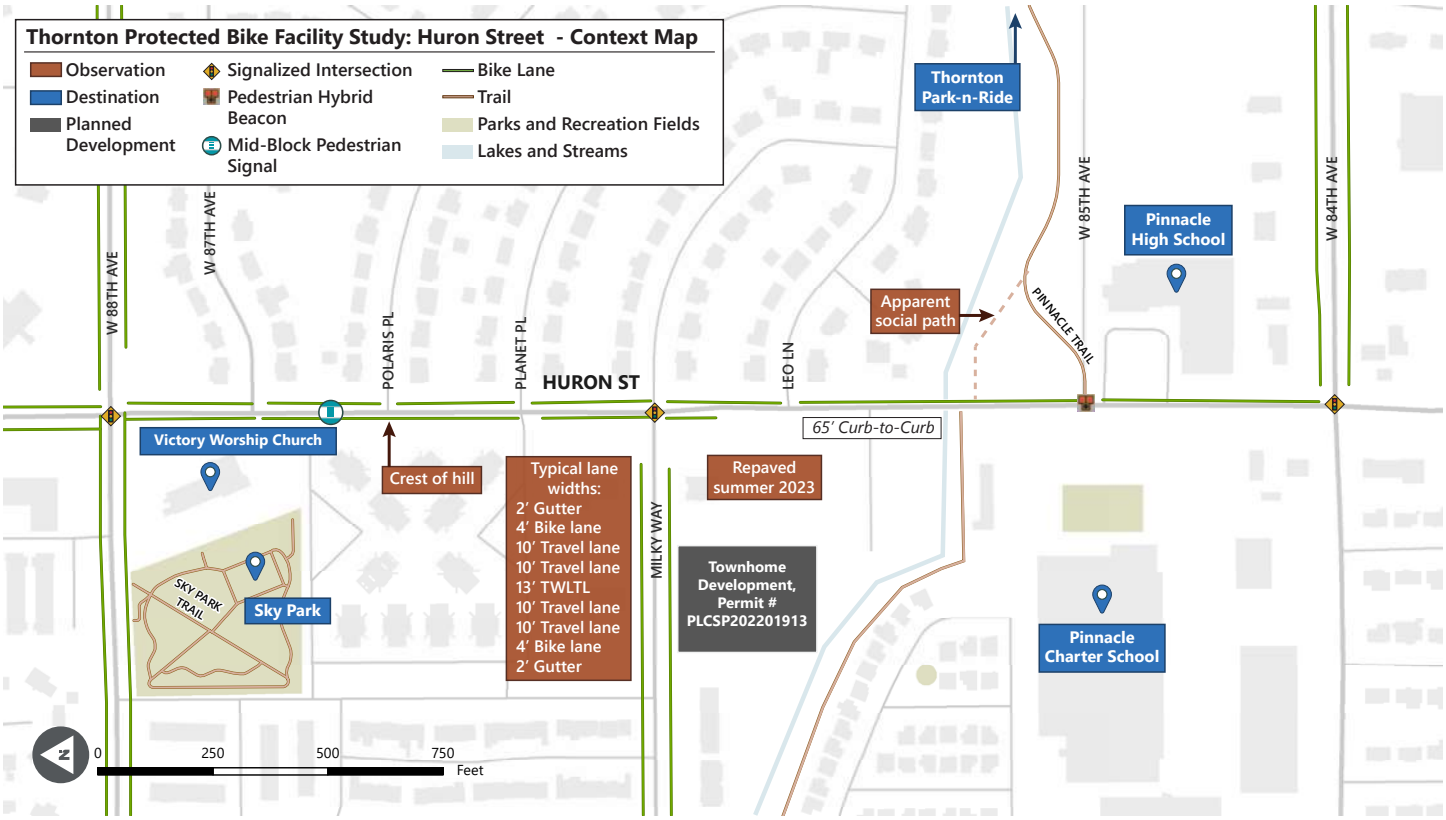
The studied segment of Huron Street lies at the southern end of a 10.5-mile north-south roadway. Land uses adjacent to the study corridor are primarily residential, though there are some commercial uses on the south end. The east side includes single family homes while the west side features medium-density condominiums and apartments, with a townhome development underway near the Milky Way intersection. Located at the southern end of the study corridor are the Pinnacle Elementary, Middle, and High Schools, as well as local recreation fields accessible from a nearby trail that crosses Huron Street. On the northern end of the corridor are Sky Park and North Star Elementary School.

Also at the north end, the city is currently studying 88th Avenue to install infrastructure to improve safety and mobility.

Although not formally designated as an I-25 alternate route in CDOT's Denver Metro Region Traffic Incident Management Plan, stakeholders report that this section of Huron Street is sometimes used as an alternate route. South of this segment, Huron Street transitions into Greenwood Boulevard, which is a nonlinear residential roadway. The corridor experiences unique traffic patterns driven by school arrival and dismissal times and its connection to 84th Avenue, a major arterial, which carries significant east-west traffic.

The Huron Street corridor is home to a diverse and family-oriented community. With a high proportion of Hispanic or Latino residents and many multilingual households, cultural diversity plays a significant role in shaping the character of the area. The presence of young families is evident, given the large percentage of children under 18, emphasizing the importance of safe and accessible infrastructure for schools, parks, and recreational activities.

FIGURE 12 Huron Street context map. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.

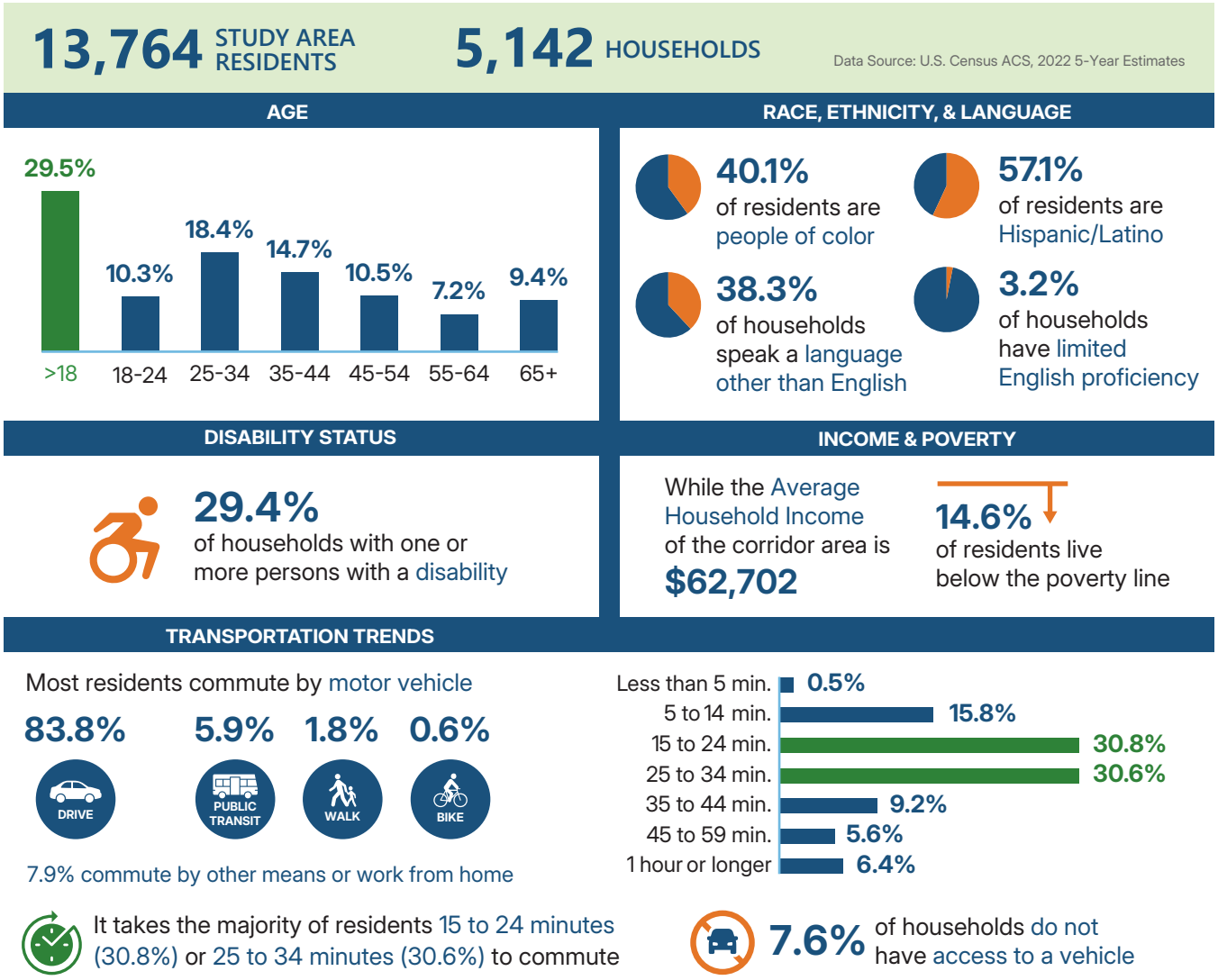


Nearly a third of households include at least one person with a disability, emphasizing the importance of designing transportation improvements that prioritize accessibility. Reliable infrastructure, such as curb ramps, smooth sidewalks, and safe crossing points, can greatly enhance mobility for these residents.

Economic data suggests a mix of income levels, with nearly 15 percent of residents living below the poverty line and over seven percent of households having no access to a vehicle. This highlights the importance of reliable and inclusive transportation options, such as public transit and safe walking and biking facilities. The community's commuting patterns, with most residents relying on personal vehicles but some using transit or other modes, underscore the need for a balanced transportation network that supports varying mobility needs.

Overall, the corridor serves a vibrant, multi-generational population with diverse transportation preferences, economic circumstances, and cultural backgrounds, all of which should be carefully considered in planning improvements.

FIGURE 13 Huron Street demographics



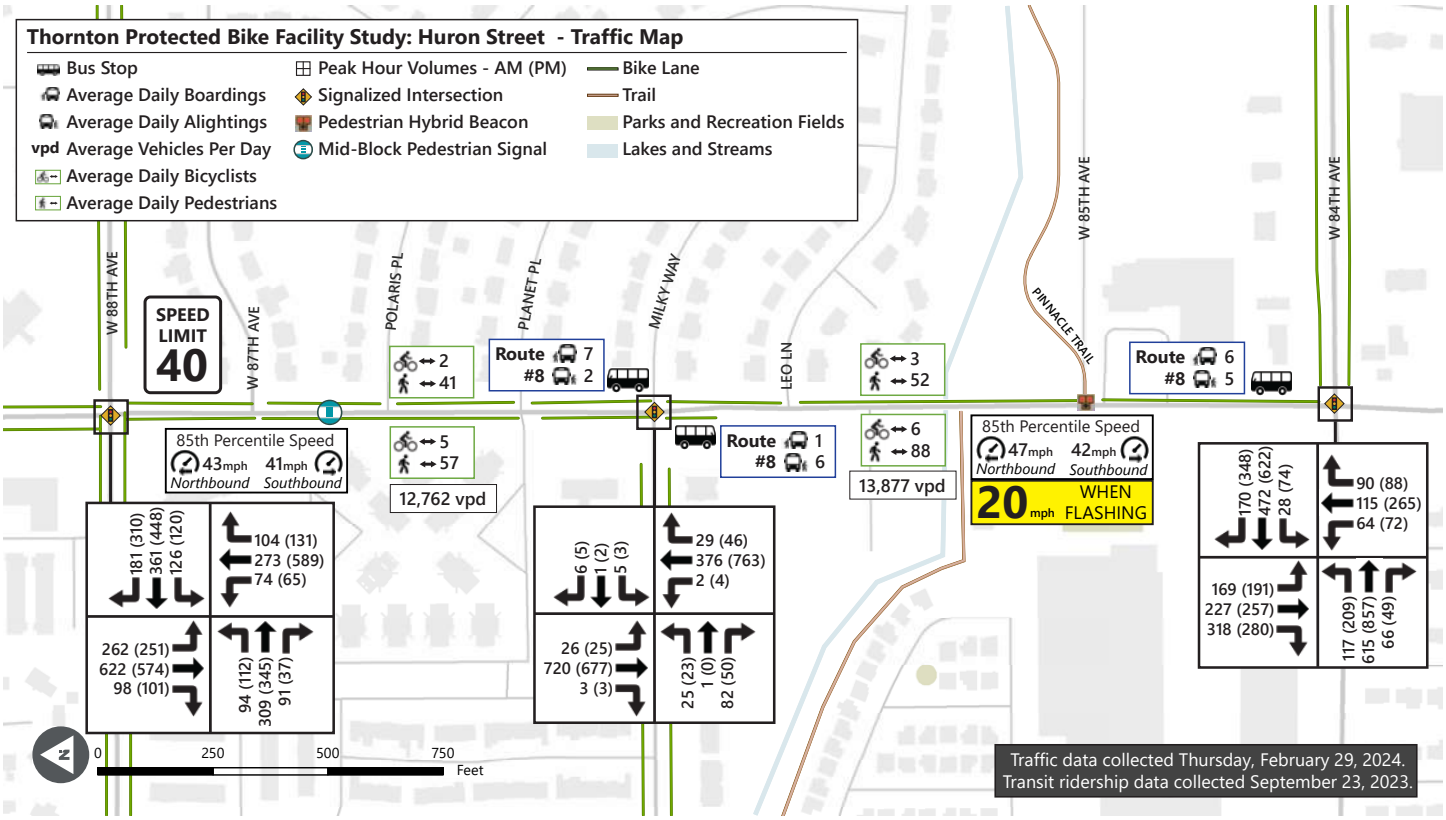
Traffic Conditions

The corridor is a minor arterial with a posted speed limit of 40 mph and a 20-mph school zone. There are relatively few driveways on the segment, which underscores the corridor's utility as a "drive through" street rather than a "drive to" place.

Huron Street's current configuration (Figure 11) includes five vehicular travel lanes, yet its average daily traffic (ADT) of approximately 13,300 vehicles (Figure 14) suggest that three lanes may be sufficient to accommodate demand. This excess capacity creates an opportunity to consider a road diet, reducing the number of travel lanes and reallocating space to support multimodal infrastructure. However, intense peaks in motor vehicle traffic, such as those during Pinnacle drop-off and pick-up times, may decrease the attractiveness of a potential road diet.

Potential design alternatives could incorporate wider sidewalks, protected bike lanes, or landscaped buffers, creating a safer and more accessible corridor for all users. Repurposing the roadway in this way would expand its functionality beyond vehicle travel, improving options for walking, biking, and other active transportation modes, while also enhancing safety for all users through reduced vehicle speeds. Concept design Options B and C explore this idea of road dieting.

FIGURE 14 Huron Street traffic conditions. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.



Active Modes

From student pedestrians to transit commuters, Huron Street serves more than just car travelers. Pedestrian and bicyclist volumes and behavior, as well as sidewalk widths and measured infrastructure, indicate the demand and opportunities for active modes on Huron Street.

While the corridor does have pavement markings for one-way bike lanes, they are narrow and lack a buffer space to separate bicyclists from motor vehicles. Milky Way and 88th Avenue are slated to form part of the planned bike network and connect to the study segment.

For the majority of the study area, the sidewalk is attached, or directly adjacent to the roadway, and unshaded. In areas with vertical or steep elements, such as fencing or grade changes near the school, sidewalks can feel narrow and uncomfortable. While two pedestrian traffic control devices are present on the corridor, they're not necessarily effective. The placement of the pedestrian hybrid beacon on the north side of the school driveway intersection serves users following the Niver Creek Tributary Trail, but students and staff crossing the corridor between east and west-side campus buildings may desire a crossing further south.

Transit ridership is low with a weekday average of 14 boardings and 13 alightings for the full studied segment. Bus frequency is hourly, making it an inflexible and unforgiving commute option. Two of the three bus stops provide shelter and seating, which may enable riders to wait for infrequent service in less-than-ideal weather conditions.

Public Input

Results of Phase 1 engagement activities, in which the Study asked the public about the challenges they face when traveling along Huron Street today, emphasize that community members care about connections to the Niver Creek Tributary Trail, Pinnacle Charter School, and existing bike lanes on 88th Avenue and Milky Way, highlighting the importance of active transportation routes and opportunities on Huron Street. Although access to the 88th Avenue bike lanes is a priority amongst respondents, the 88th Avenue intersection was consistently called out as a significant barrier. Thornton community members generally feel that there are opportunities on Huron Street to construct buffered sidewalks and medians, plant trees, and add landscaping. Overall, the results suggest a strong community desire for more accessible streets with elements that help calm traffic.

Travelers travel along and cross Huron Street near Pinnacle Charter School during a school-day morning.

4.2 Concept Design Options

Development

The project team developed concept design options that reflect the city's aim to present a range of cost alternatives. These range from a low-cost, minimal construction option that leans on repaving and adjusting signing and striping, to a high-cost option that includes roadway reconstruction and potential right-of-way acquisition. Each concept design option responds to the corridor's unique layout, destinations, and users and incorporates the needs and preferences expressed by stakeholders and the public.

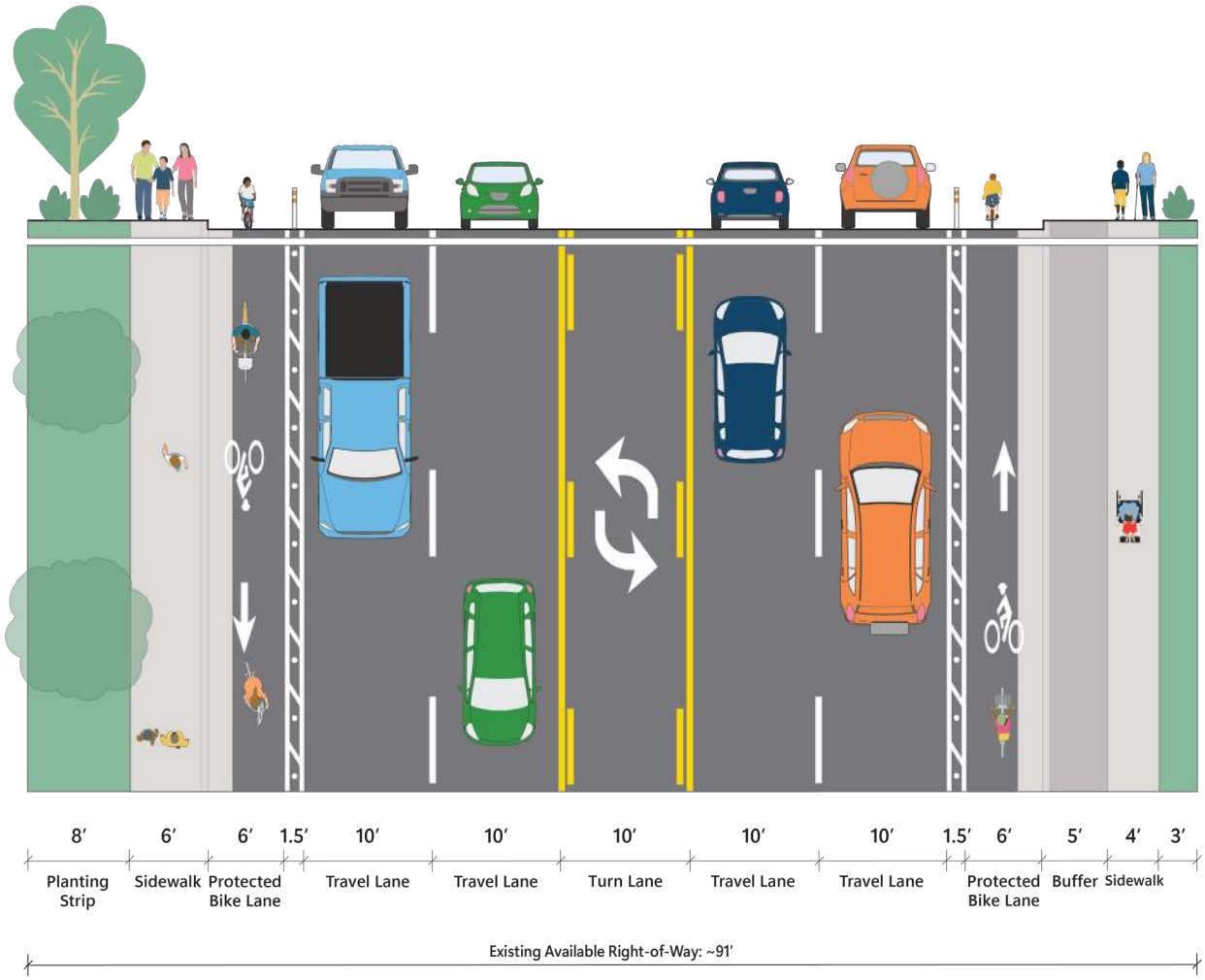
These options were then evaluated against safety, traffic performance, and other criteria and presented for community feedback. All proposed options retain one-way bike lanes, as the existing facility was deemed conceptually appropriate but insufficiently safe and comfortable. Therefore, designs explored various enhancements, such as vertical protection, buffer space, and elevation changes, to create a more accessible and inviting environment for bicyclists of all skill levels.

Options

Option A

Huron Street concept design Option A restripes the roadway to convert the existing striped bike lanes to protected bike lanes with a narrow buffer space and flex posts. The two-way left-turn lane (TWLTL) is maintained through the corridor. This option does not include reconstruction of the curbs, so the sidewalk infrastructure would remain in its existing form.

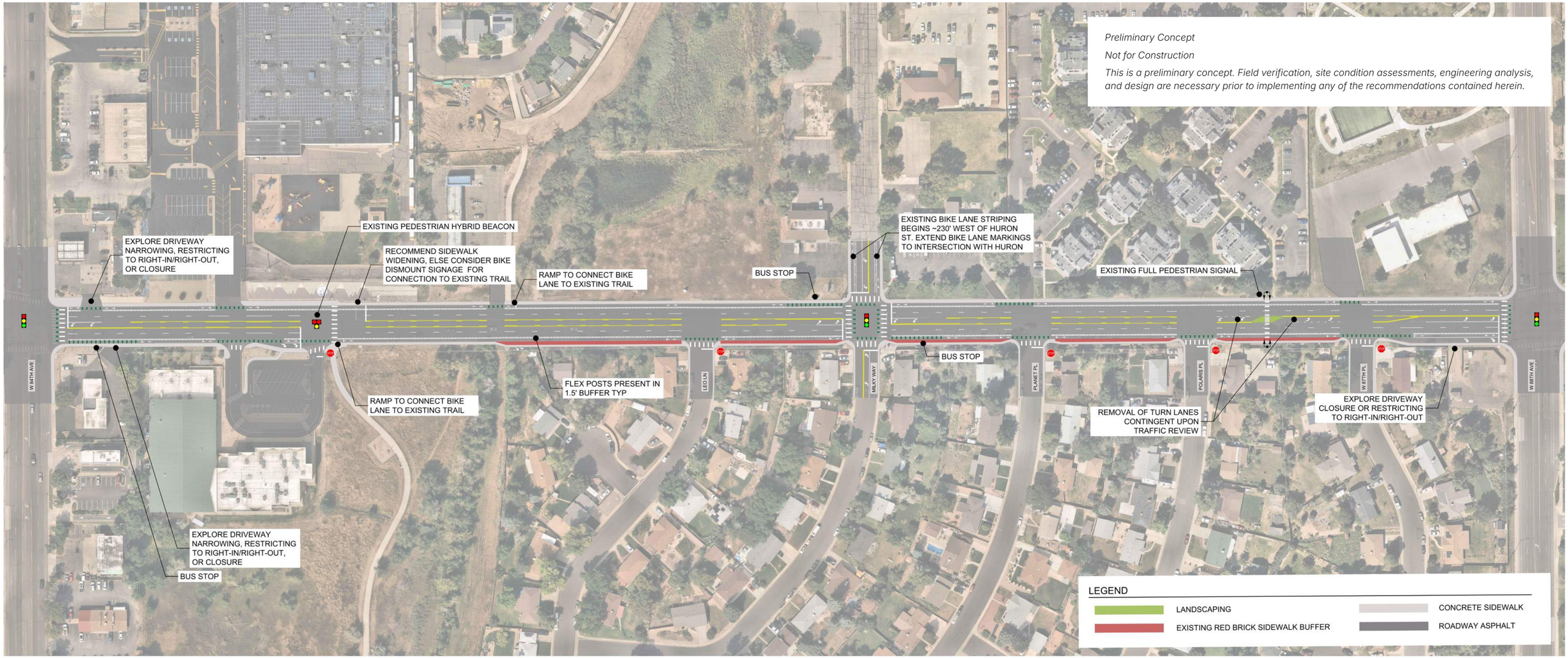
FIGURE 15 Huron Street Option A typical cross-section (looking north)



Preliminary Concept

Not for Construction

This is a preliminary concept. Field verification, site condition assessments, engineering analysis, and design are necessary prior to implementing any of the recommendations contained herein.



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7/30/2024

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 60' 120' 180'
SCALE IN FEET

TOOLE DESIGN

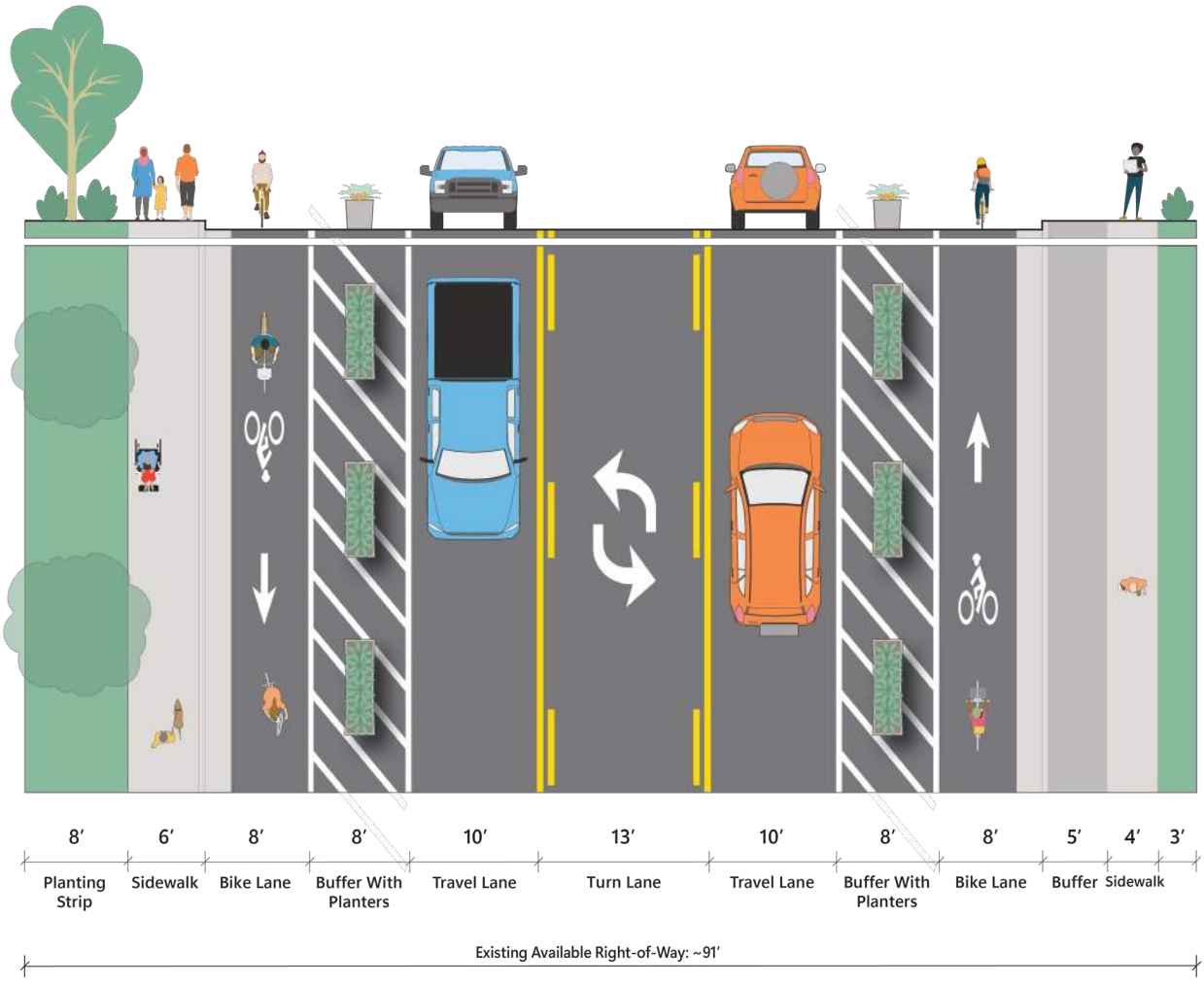
OPTION A
HURON ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

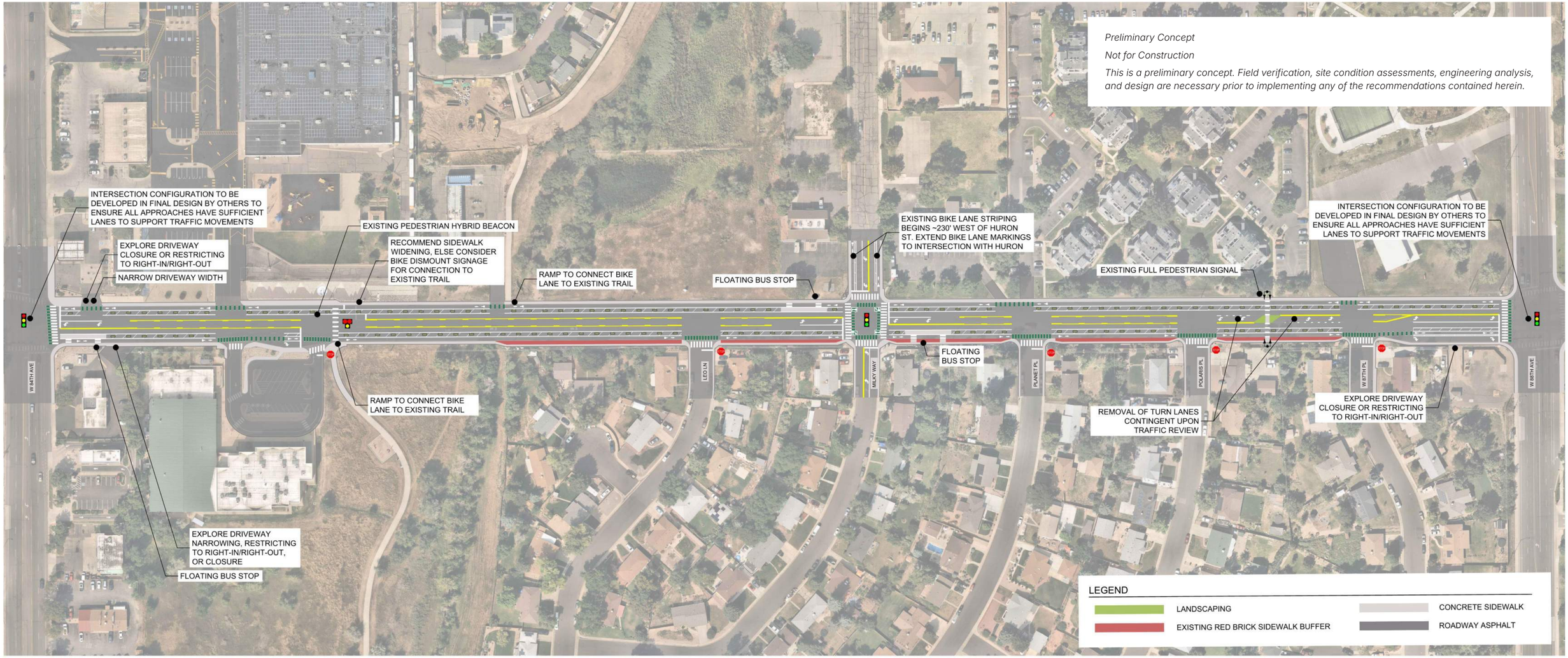
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Option B

Huron Street concept design Option B includes a road diet to reduce vehicle travel lanes from 5 to 3 but maintains the two-way left-turn lane (TWLTL) through the corridor. The repurposed lane space is used for a wide bike lane buffer with vertical protection provided by concrete planters or other robust separator. This option does not include reconstruction of the curbs, so the sidewalk infrastructure would remain in its existing form.

FIGURE 16 Huron Street Option B typical cross-section (looking north)





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THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 60' 120' 180'
SCALE IN FEET

TOOLE DESIGN

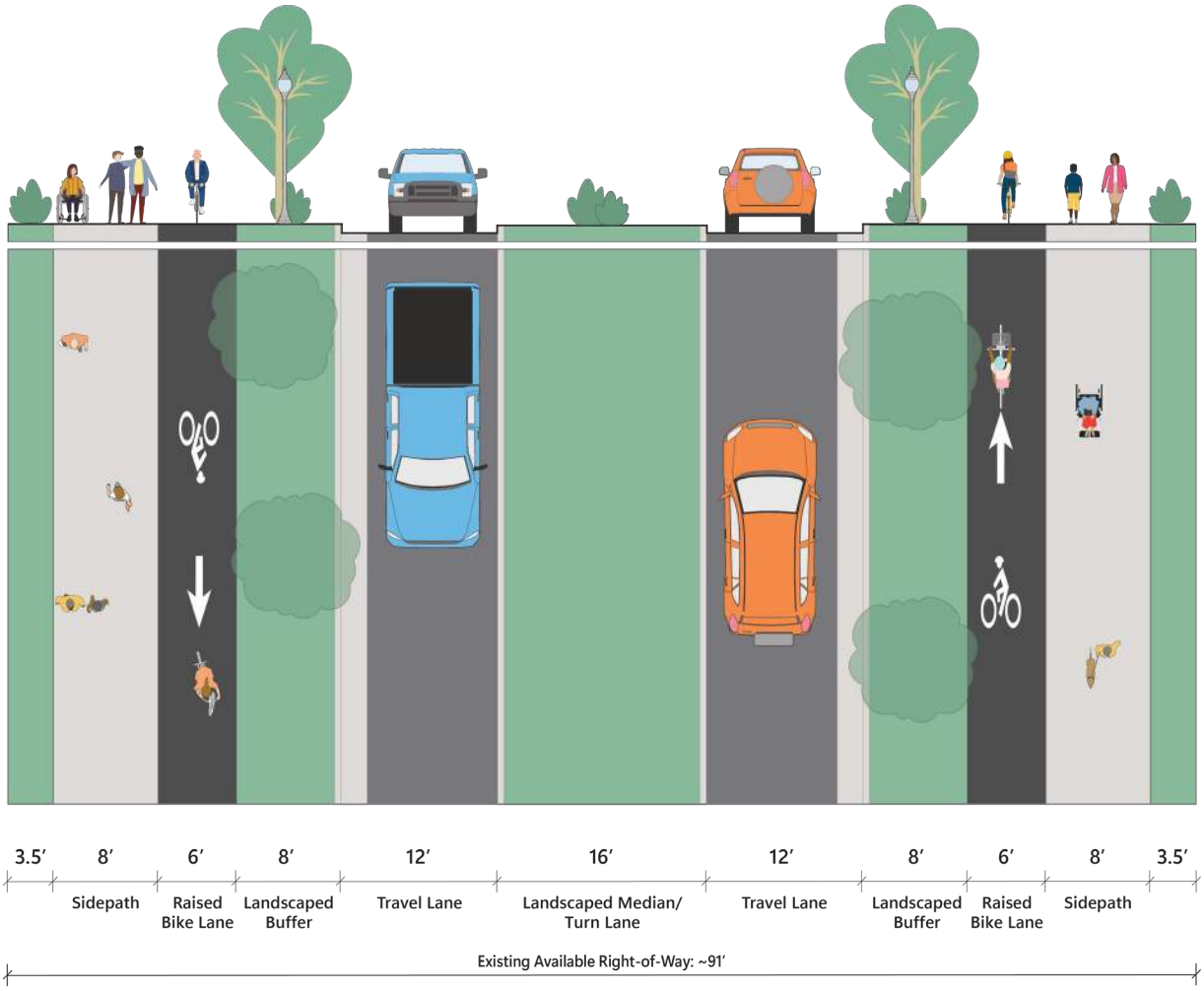
OPTION B
HURON ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

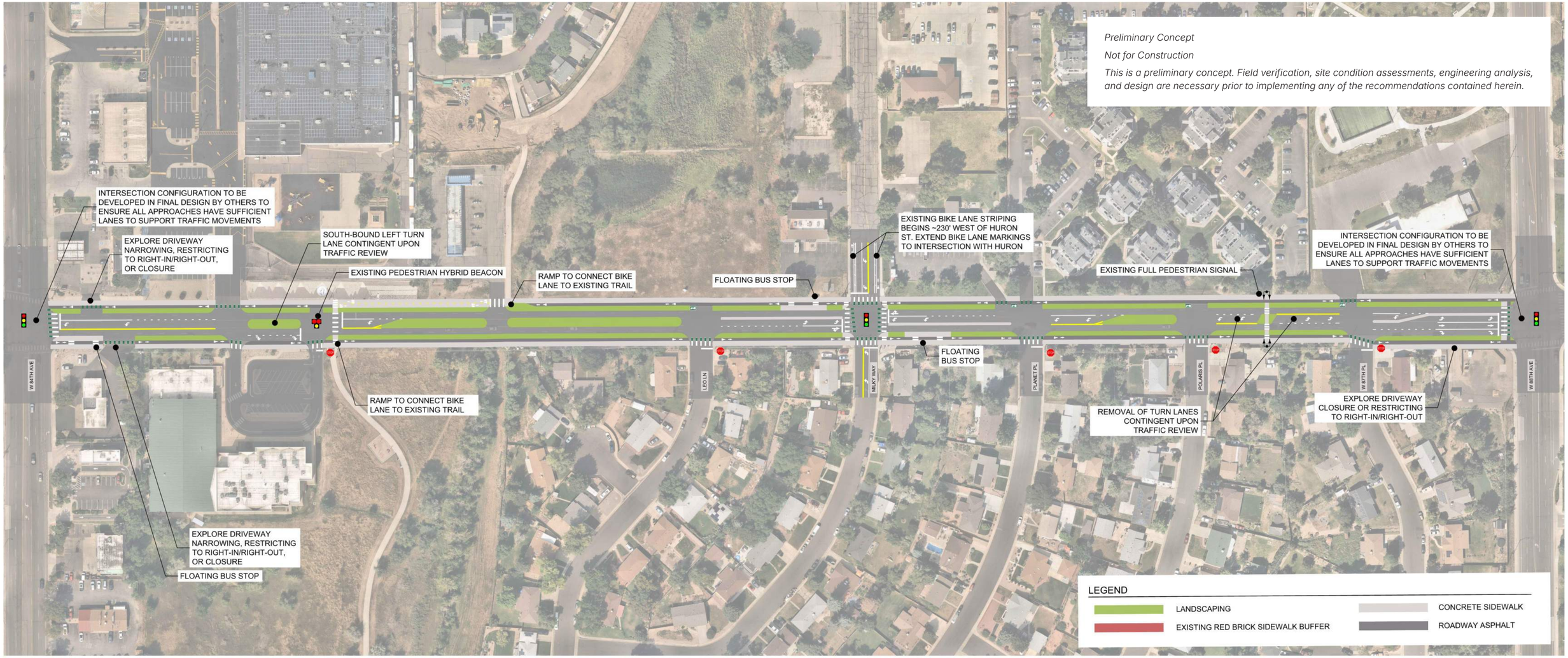
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Option C

Huron Street concept design Option C includes a road diet, reducing vehicle travel lanes from 5 to 3, and it replaces the two-way left-turn lane (TWLTL) with a landscaped median in locations where turn lane queueing space and bicyclist and pedestrian crossings are not needed. This option requires reconstruction of the roadway to provide raised bike lanes and wider sidewalks.

FIGURE 17 Huron Street Option C typical cross-section (looking north)





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THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 60' 120' 180'
SCALE IN FEET

TOOLE DESIGN

OPTION C
HURON ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Analysis

Detailed analysis results are provided in the **appendix H**.

Bike Facility Type

Because all options include one-way directional bike lanes between the vehicle lanes and the sidewalk, these facilities maintain identical access to connections and destinations on both sides of the street. The widths of the bike lanes in their respective contexts are within the recommended range per the AASHTO Guide for the Development of Bicycle Facilities, 5th Edition, but the additional separation from vehicles of the raised bike lane results in a higher score for Option C.

The varied physical protection and spatial demand of the road diet options (Options B and C) result in floating bus stop infrastructure, compared to Option A, where buses would cross the bike lane to reach stops. The floating bus stop infrastructure provides a designated waiting area for transit riders and allows transit operators to stop in-lane without conflicting with bike users.

Safety

Option A, which does not include a road diet, creates a longer crossing distance for pedestrians and a greater number of vehicle lane conflicts. Options that provide robust center medians, such as Option C, score higher, as they protect pedestrian safety.

Traffic Operations

All options include leading bike intervals for the north-south directional bike lanes. Right turns on red are prohibited in Option B because of the two-stage left turn queue box needed for bikes. Full descriptions of traffic operations are available in **Appendix D**.

Each of the options received similar scores for level of service. However, the road diet Options – B and C – have higher volume-to-capacity ratio than Option A, which remains overbuilt, and therefore score lower. Full results tables for traffic analysis are available in **Appendix F**.

Cost

The relocation of the curb line, installation of landscaped medians, and the updates to traffic signals and lighting along the corridor in Option C make it the most expensive option. The use of planters in the bike lane buffer in Option B increases costs compared to the flexible delineator posts in Option A.

Planning-level cost opinions are available in **Appendix G**.

Public Opinion

For the alternative concepts presented for Huron Street a majority of community members favored grade separation between bike and pedestrian facilities, separation between those facilities and vehicle lanes, at least two vehicle travel lanes in each direction, and opportunities for landscaping in buffer spaces. Community members were less likely to prefer designs that did not provide significant protection to bicyclists from motor vehicle traffic, reduced the number of available vehicle lanes or turn lanes, or included more expensive design elements.

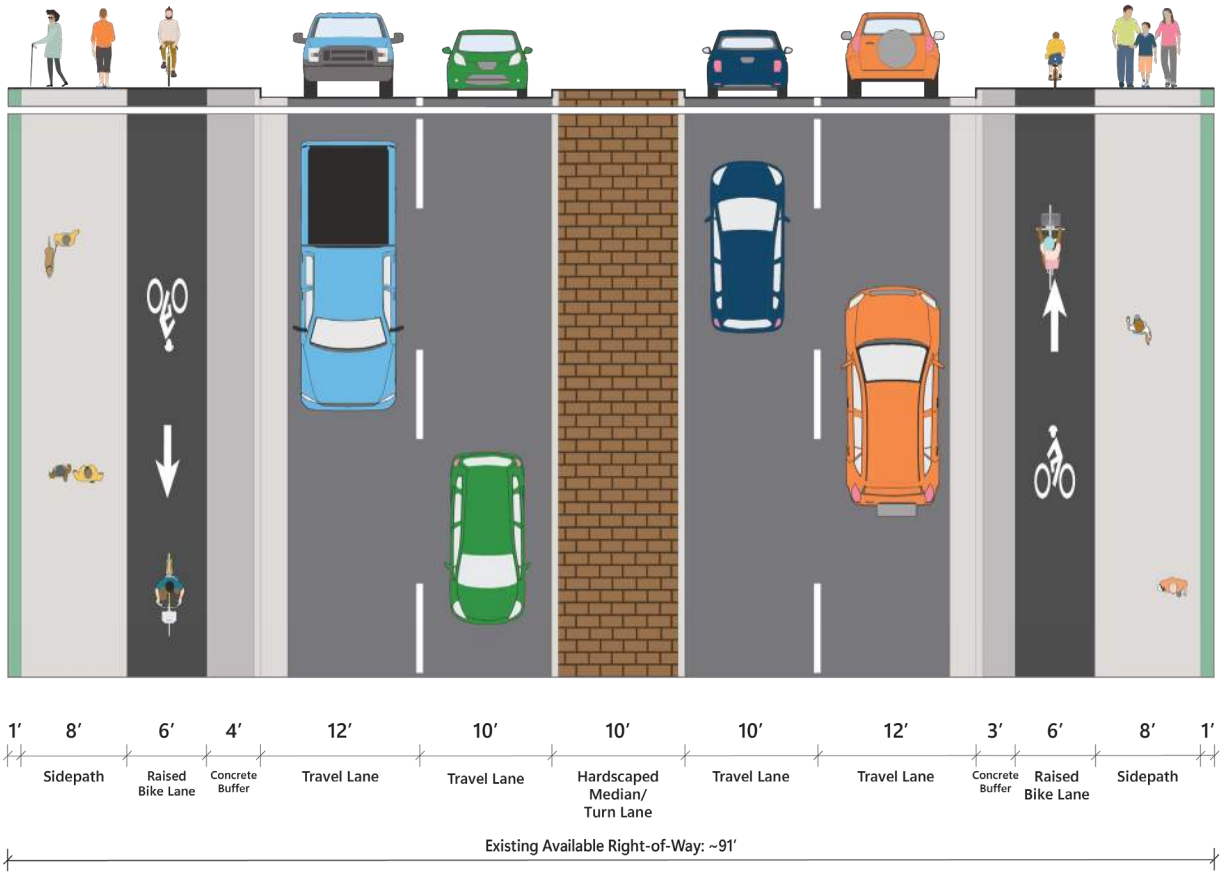
Options A, B, and C were presented to the public and, overall, the community preferred Option A because it maintained all five vehicle lanes and presented lower costs. However, respondents noted it did not provide enough protection for bike users. Options B and C garnered favorable reactions due to bike lane protection and landscaping opportunities.

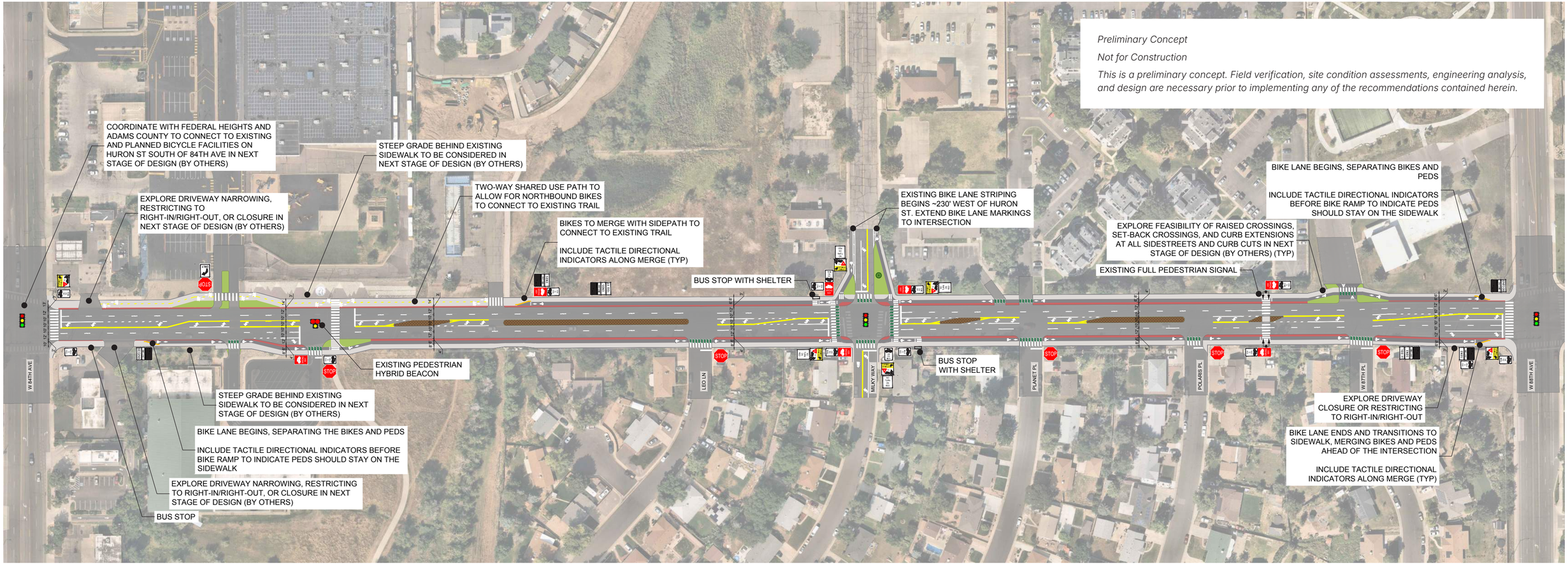
4.3 Recommended Concept Design

Based on feedback from the community, city staff, and stakeholders, the Study produced a new option, shown in Figure 18, which combines aspects of the original options and the existing roadway to better meet the varying needs of this corridor. This recommended concept design maintains five vehicle travel lanes, but reconstructs the street to provide raised bike lanes and wider sidewalks.

The recommended concept design combines the desire to maintain existing vehicular capacity with the recognized need for safer, more comfortable bike lanes. Space for both of these objectives requires reconstruction of the street which increases the potential construction cost of the project. However, peak traffic hours around school arrival and dismissal times would be less impacted. Additionally, buses may stop in-lane without halting all directional vehicle traffic. Although the buffer space between the roadway and the raised bike lanes is too narrow for landscaping, the center median can include landscaping with trees. Future design phases should explore options to maximize tree retention and landscaping along the corridor to increase shade and comfort.

FIGURE 18 Huron Street recommended typical cross-section (looking north)





NOTES:

1. INTERMEDIATE LEVEL BIKE LANE OR SIDEWALK LEVEL BIKE LANE WITH TACTILE DIRECTIONAL INDICATOR SEPARATION BETWEEN BIKES AND PEDS WILL BE REQUIRED IN FUTURE DESIGN. (BY OTHERS)
2. ADDITIONAL STREET SIGNAGE (SUCH AS SPEED LIMIT SIGNS, STREET NAME SIGNS, ETC). NOT SHOWN FOR CLARITY.
3. UTILITY IMPACTS NOT SHOWN.
4. DETECTABLE WARNING SURFACES FOR PEDESTRIAN CROSSINGS NOT SHOWN.
5. LOCATION OF EXISTING ROW NOT SHOWN. PROPOSED IMPROVEMENTS ANTICIPATED TO BE WITHIN EXISTING ROW.
6. LEADING PEDESTRIAN AND BICYCLE INTERVALS PRESENT AT ALL SIGNALIZED INTERSECTIONS.
7. EXISTING SIDEWALK ASSUMED TO BE REMOVED WITHIN PROJECT LIMITS WHERE IT CONFLICTS WITH PROPOSED DESIGN.
8. EXPLORE THE USE OF CURB EXTENSIONS, RAISED CROSSINGS, AND/OR SET-BACK CROSSINGS AT ALL SIDESTREETS AND CURB CUTS ALONG HURON TO SHORTEN CROSSING DISTANCES, ENCOURAGE DRIVER YIELDING, AND IMPROVE VISIBILITY. SEE EXAMPLE AT ROCKY MOUNTAIN CANCER CENTER DRIVEWAY, SOUTH OF 88TH/HURON INTERSECTION, AND POLARIS PLACE. DRAINAGE INFRASTRUCTURE IMPROVEMENTS MAY BE REQUIRED.
9. COORDINATE DESIGN AT LATER PHASE TO AVOID BIKE CROSSINGS ALONG EXISTING CONCRETE GUTTERS AT SIDE STREET INTERSECTIONS.
10. TURN BAY PRESENCE AND LENGTH AT ALL INTERSECTIONS TO BE REFINED IN FINAL DESIGN BY OTHERS.
11. ALL BUS STOPS TO HAVE CONCRETE BUS PADS.

LEGEND

LANDSCAPING	CONCRETE SIDEWALK
RED BRICK SIDEWALK BUFFER	ROADWAY ASPHALT
COLORED PATTERNED CONCRETE	RAISED BIKE LANE

NORTH

0 60' 120' 180'
SCALE IN FEET

TOOLE DESIGN

PREFERRED INITIAL CONCEPTUAL DESIGN
HURON ST
THORNTON PROTECTED BIKE FACILITY
4/15/2025

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

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05

Pecos Street

Pecos Street is a 5-lane roadway with auxiliary right-turn lanes that serves commuter traffic between residential neighborhoods to the north and US 36 to the south. The corridor connects to destinations with highly seasonal traffic, such as Water World, which experiences heavy use during summer months. At the southern end, Bell Roth Park and Camenisch Park feature recreation fields that attract local visitors.

The corridor's sidewalks are narrow in places and attached, or directly adjacent to the roadway, reducing pedestrian comfort. Landscaping is limited along the corridor, though some mature trees offer shade near residential areas. The lack of dedicated bike facilities presents safety challenges for bicyclists, especially less experienced riders and riders that need more room when climbing a hill. Transit service along the corridor is infrequent and, therefore, offers a weak alternative to car travel.

A bicyclist and a motorized wheelchair user cross Pecos Street at 88th Avenue.

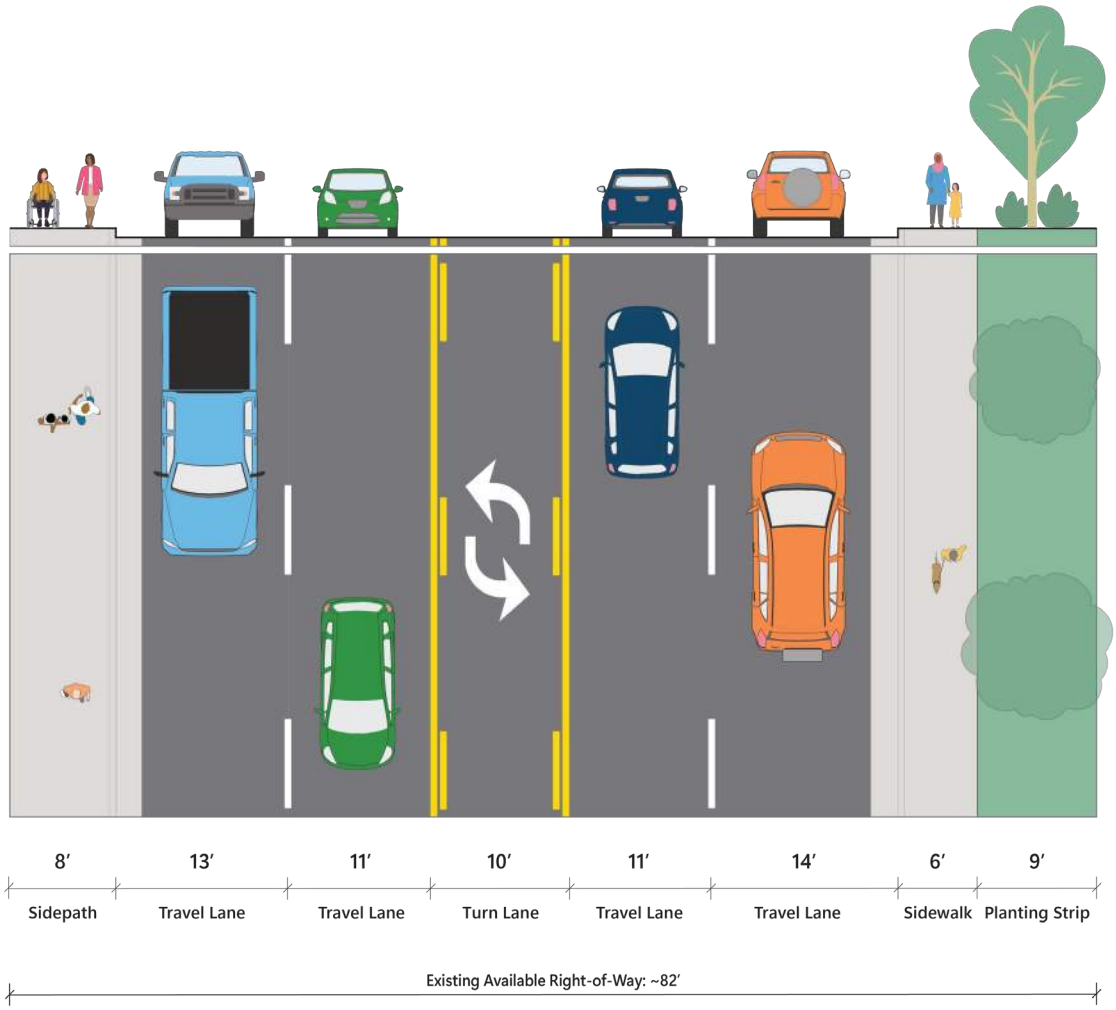
5.1 Existing Conditions

Current infrastructure deficiencies, such as narrow, unshaded attached sidewalks and an absence of dedicated bike lanes, present safety challenges for pedestrians and bicyclists, especially those that are less experienced or for people with disabilities. However, these could be ameliorated with vertical separation for bike facilities, shaded sidewalks, and shortened pedestrian crossings. High pedestrian and bicycle demand observed near parks, schools, and recreation fields highlights the need for such changes.

Pecos Street has more vehicle lanes than necessary to accommodate daily traffic, which presents an opportunity to reallocate space to provide safe, comfortable facilities for other modes. A reduction from five lanes to three makes space for protected bike lanes, wider sidewalks, and landscaped buffers to boost safety by firmly separating pedestrians and bicyclists from vehicle traffic. These changes will make walking and biking real possibilities in a community that relies on the corridor for local travel, school commutes, and recreation. The corridor's planned bike connections at Milky Way and 88th Avenue further support Pecos Street's potential to be a key active transportation route.

However, any active transportation improvements must balance the street's other demands, including the needs of transit users and the seasonal traffic increase associated with Water World. In addition, upgrades critical to enhancing accessibility, such as curb ramps compliant with the Americans with Disabilities Act (ADA) and wider sidewalks, may increase costs or require right-of-way acquisition.

FIGURE 19 Pecos Street existing typical cross-section (looking north)



Area Context

Pecos Street is a major arterial with high commuter volumes, and it is therefore a critical route for regional traffic. While the corridor experiences relatively steady use for most of the year, Water World draws significant vehicle traffic in summer months.

At the northern end of the study area, Pecos Street connects to 92nd Avenue/Thornton Parkway, a major east-west arterial. STEM Launch School is just north of the study area, but students use this section of Pecos Street to access the school. At the southern end of the study area are recreational and park uses.

The Pecos Street corridor is home to a diverse and family-oriented community. With a high proportion of Hispanic or Latino residents and many multilingual households, cultural diversity plays a significant role in shaping the character of the area. The presence of young families is evident, given the large percentage of children under 18, emphasizing the importance of safe and accessible infrastructure for schools, parks, and recreational activities.

Nearly a third of households include at least one person with a disability, emphasizing the importance of designing transportation improvements that prioritize accessibility. Reliable infrastructure, such as curb ramps, smooth sidewalks, and safe crossing points, can greatly enhance mobility for these residents.

Economic data suggests a mix of income levels, with nearly 20 percent of residents living below the poverty line and seven percent of households without access to a vehicle. This highlights the importance of reliable and inclusive transportation options, such as public transit and safe walking and biking facilities. The community's commuting patterns, with most residents relying on personal vehicles but some using transit or other modes, underscore the need for a balanced transportation network that supports varying mobility needs.

Overall, the corridor serves a vibrant, multi-generational population with diverse transportation preferences, economic circumstances, and cultural backgrounds, all of which should be carefully considered in planning improvements.

FIGURE 20 Pecos Street context map. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.

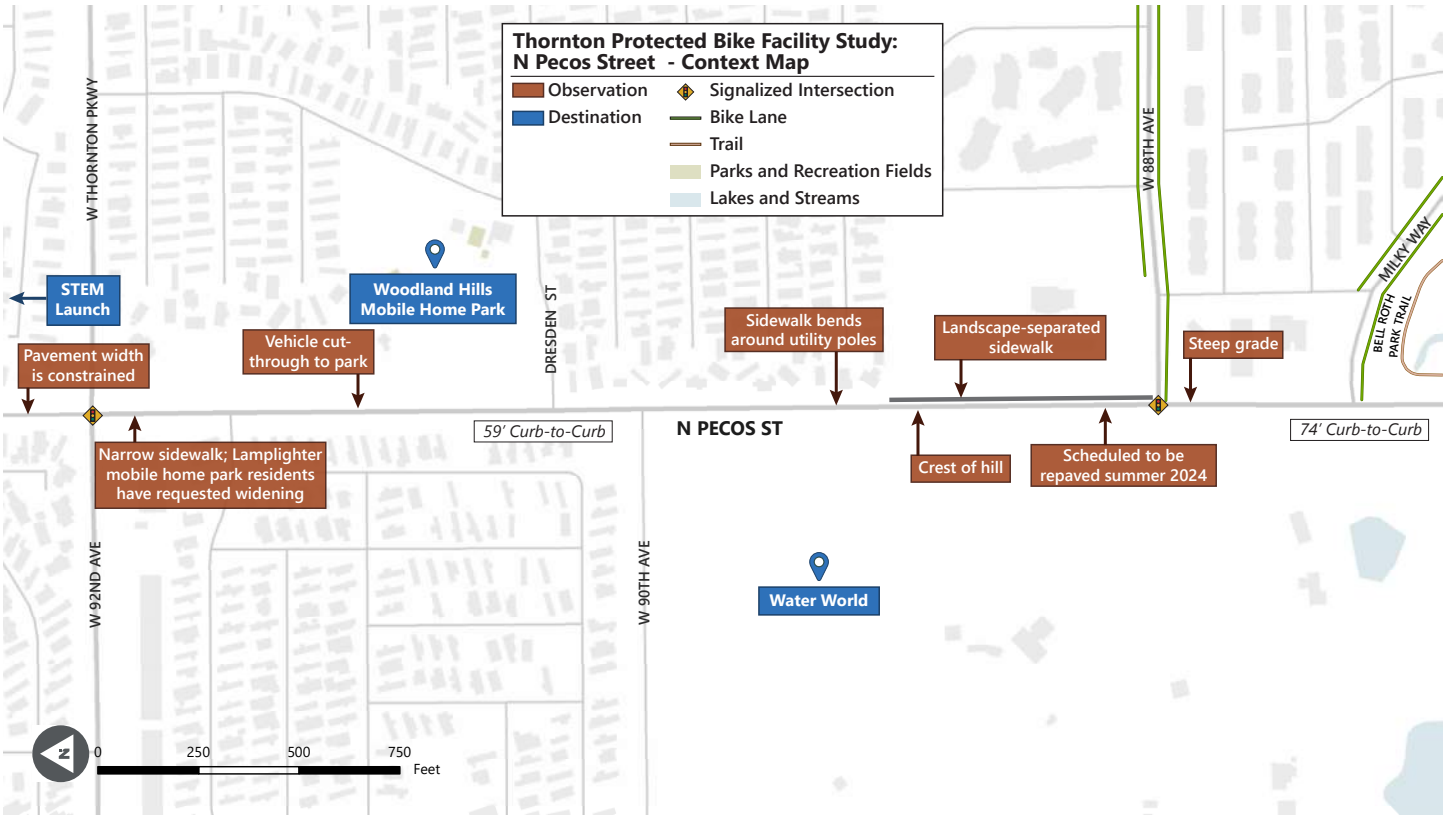
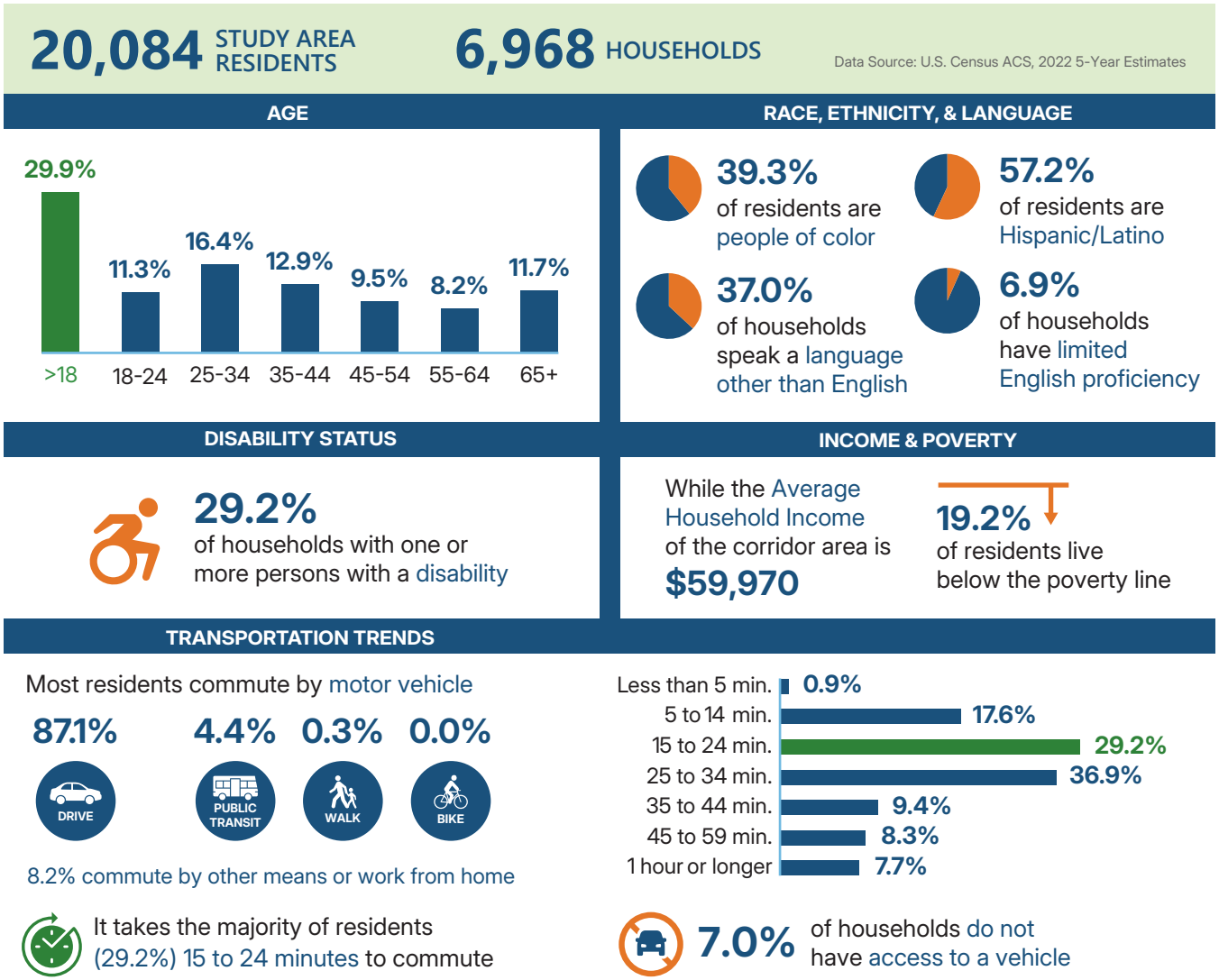


FIGURE 21 Pecos Street demographics



Traffic Conditions

The corridor is a major arterial with a posted speed limit of 35 mph and relatively few interruptions from driveways, which creates a "drive-through" mentality of maintained speeds and few stops. A major seasonal destination adjacent to the corridor, Water World, is open Memorial Day through Labor Day. Traffic volume data was collected in the spring and summer to compare volumes and understand Water World's impact on traffic conditions along the study corridor.

Pecos Street's current configuration (Figure 19) includes five vehicular travel lanes which are dramatically underutilized during off-peak hours. This excess capacity provides an opportunity reduce the number of lanes dedicated to motor vehicles and instead accommodate multimodal infrastructure,. However, intense peaks in motor vehicle traffic, such as those during Water World's opening and closing times, may decrease the attractiveness of a potential road diet.

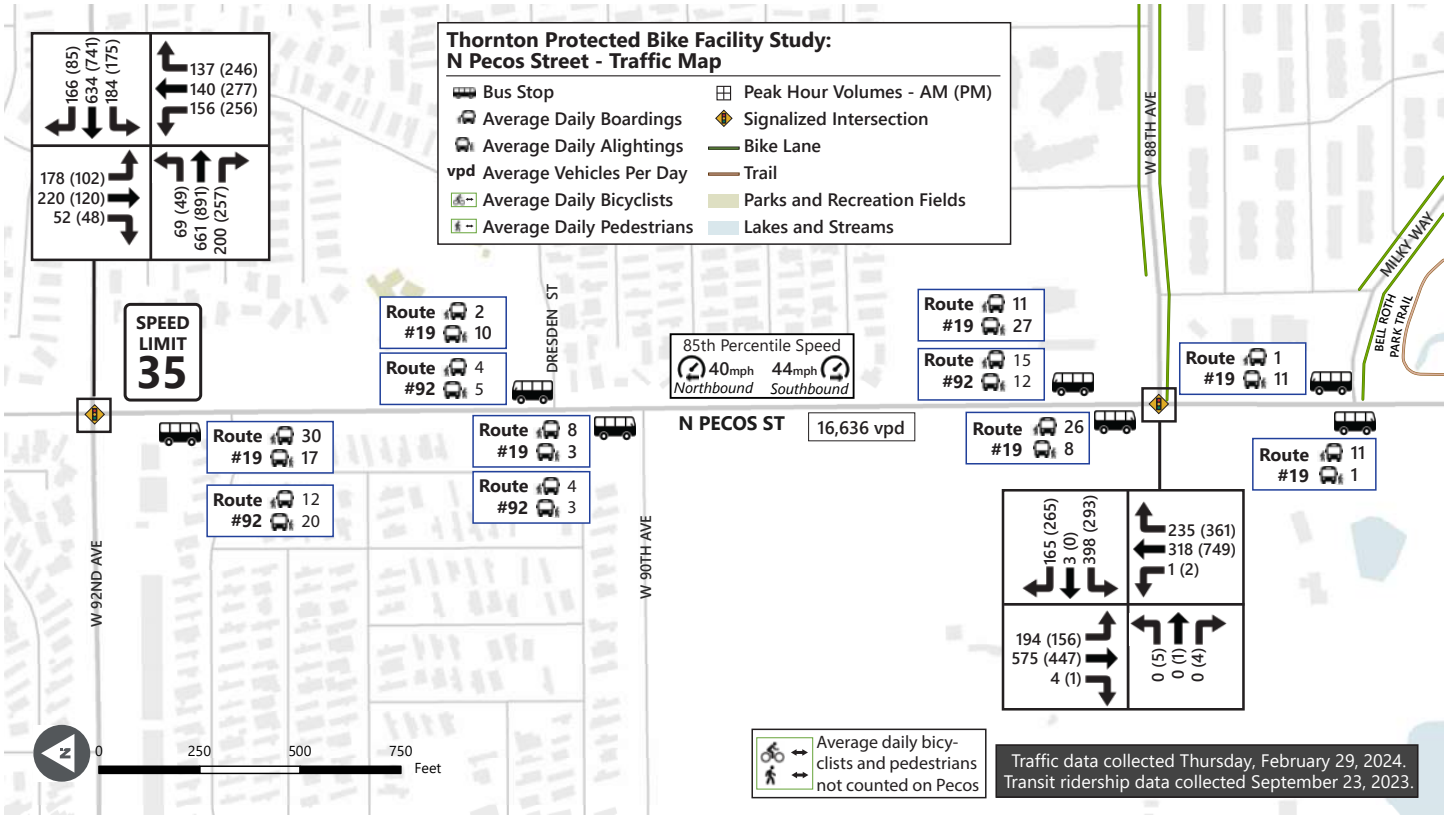
To create a safer, more accessible corridor for all users, potential design elements include widened sidewalks, protected bike lanes, and landscaped buffers. Repurposing the roadway in this way – and reducing vehicle speeds -- expands its functionality and improves active transportation modes and overall safety. Concept design Options A and B explore this idea of road dieting.

Active Modes

In addition to motor vehicle travel, student pedestrians, transit users, and many other people rely on Pecos Street. Observed pedestrian and bicyclist volumes and behavior, as well as sidewalk widths and measured infrastructure, demonstrated the demand for and opportunities to provide active transportation accommodations.

Although the corridor lacks bike facilities, bicyclists were observed riding on sidewalks and crossing the corridor. In addition, Milky Way and 88th Avenue connect to the studied segment.

FIGURE 22 Pecos Street traffic conditions. Additional alternative text descriptions for this image, as well as supporting visual information presented in table format, are included in **Appendix B**.



For most of the study area, the sidewalk is attached, or directly adjacent to the roadway, and unshaded.

The corridor is served by two bus routes and sees notable ridership demand: on average, there are 124 daily boardings and 117 daily alightings for the full studied segment. Buses arrive every 30 to 60 minutes, depending on the route and the day of the week. This more frequent service better allows commuters to depend on transit. Six of the seven bus stops provide shelter and seating, which may also enable riders to wait for the bus even in less-than-ideal weather conditions.

Public Input

Results of Phase 1 engagement activities, in which the Study asked the public about the challenges they face when traveling along Pecos Street today, reveal that community members value the existing bike lanes on 88th Avenue and Milky Way, and any connection to Water World. However, several intersections, including the ones with 88th Avenue, 92nd Avenue/Thornton Parkway, Milky Way, and 90th Avenue, are identified as challenging areas due to safety or accessibility concerns. To address these challenges, there is support for the construction of detached sidewalks and the integration of traffic calming measures, such as lane narrowing.

This bus stop on Pecos Street north of Dresden Street serves RTD routes 19 and 92.

5.2 Concept Design Options

Development

The following concept design options for Pecos Street cover a range of changes and associated costs, from minimal construction cost to more comprehensive and expensive improvements. Each concept design option responds to the unique characteristics of Pecos Street, its destinations and users, as well as incorporates information gathered from community members about their needs and hopes for the study area.

Various safety and modal use criteria were used to evaluate each of the concept design options before being presented to stakeholders for feedback.

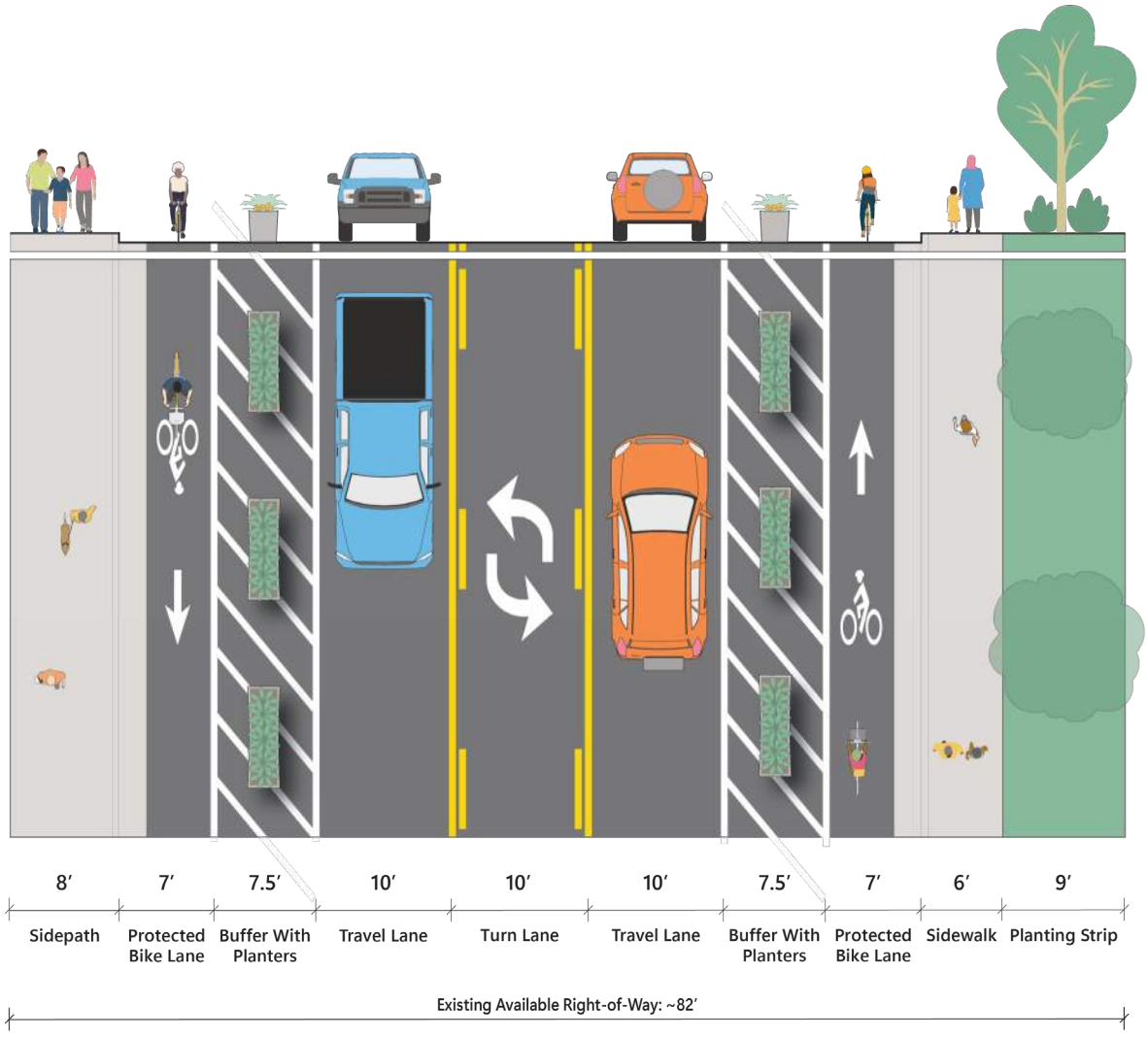
The proposed concept design options include both bike lanes and shared-use paths, which require different traffic operation considerations and space allocation. The designs also explore various enhancements, such as vertical protection, buffer space, and elevation changes, to create a more accessible and inviting environment for bicyclists of all skill levels.

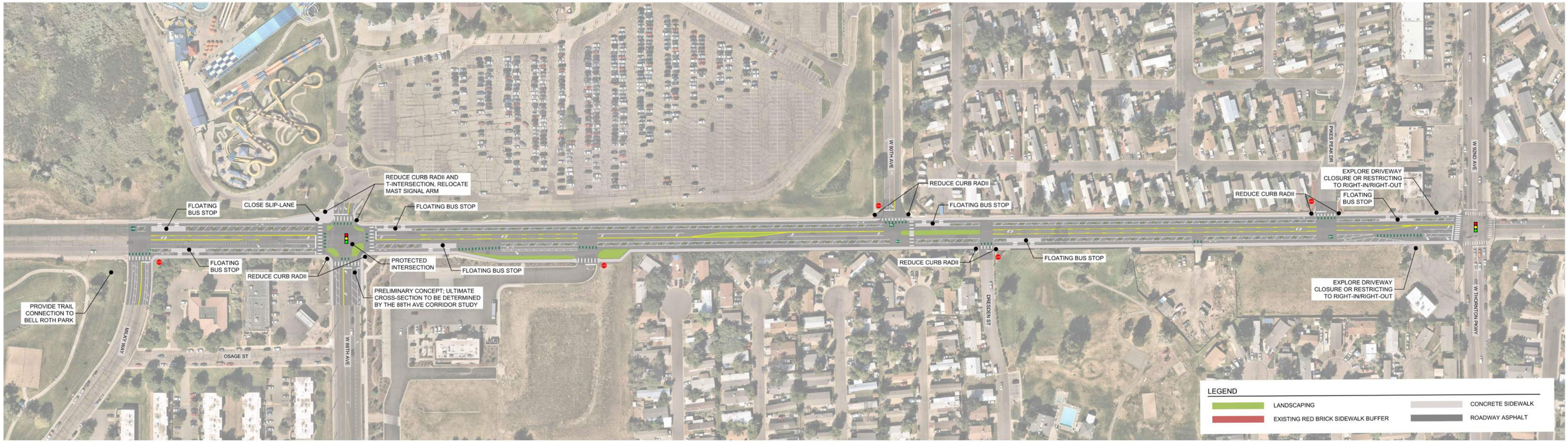
Options

Option A

Pecos Street concept design Option A includes a road diet, reducing vehicle travel lanes from 5 to 3. The repurposed lane space is used for a wide buffer between a one-way bike lane and motor vehicles, with vertical protection provided by planters or other robust vertical element. This option does not include reconstruction of the curbs, so the sidewalk infrastructure would remain in its existing form.

FIGURE 23 Pecos Street Option A typical cross-section (looking north)





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7/30/2024

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 80' 160' 240'
SCALE IN FEET

TOOLE DESIGN

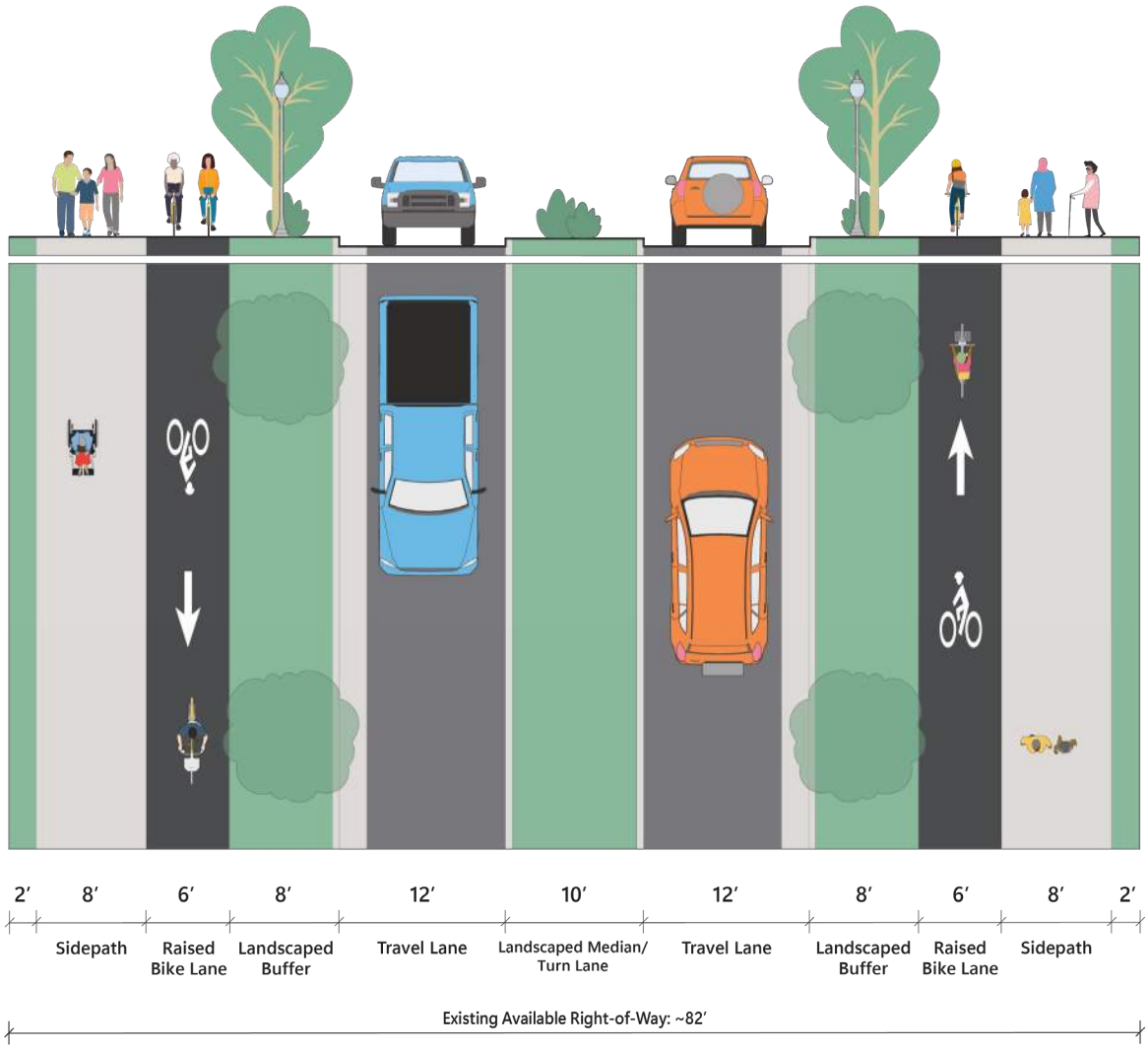
OPTION A
PECOS ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

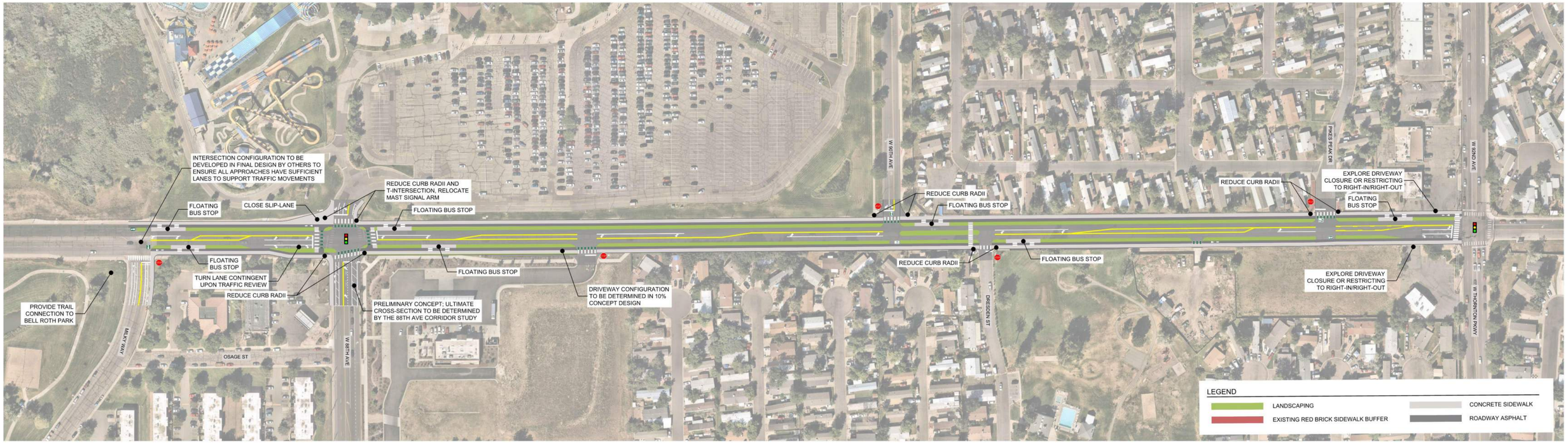
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Option B

Pecos Street concept design Option B includes a road diet, reducing vehicle travel lanes from 5 to 3, and installs a landscaped median where queueing space for motorists is not needed. This option requires reconstruction of the street to provide landscaped buffers, raised bike lanes, and sidepaths on both sides of the street.

FIGURE 24 Pecos Street Option B typical cross-section (looking north)





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NORTH

0 80' 160' 240'
SCALE IN FEET

TOOLE DESIGN

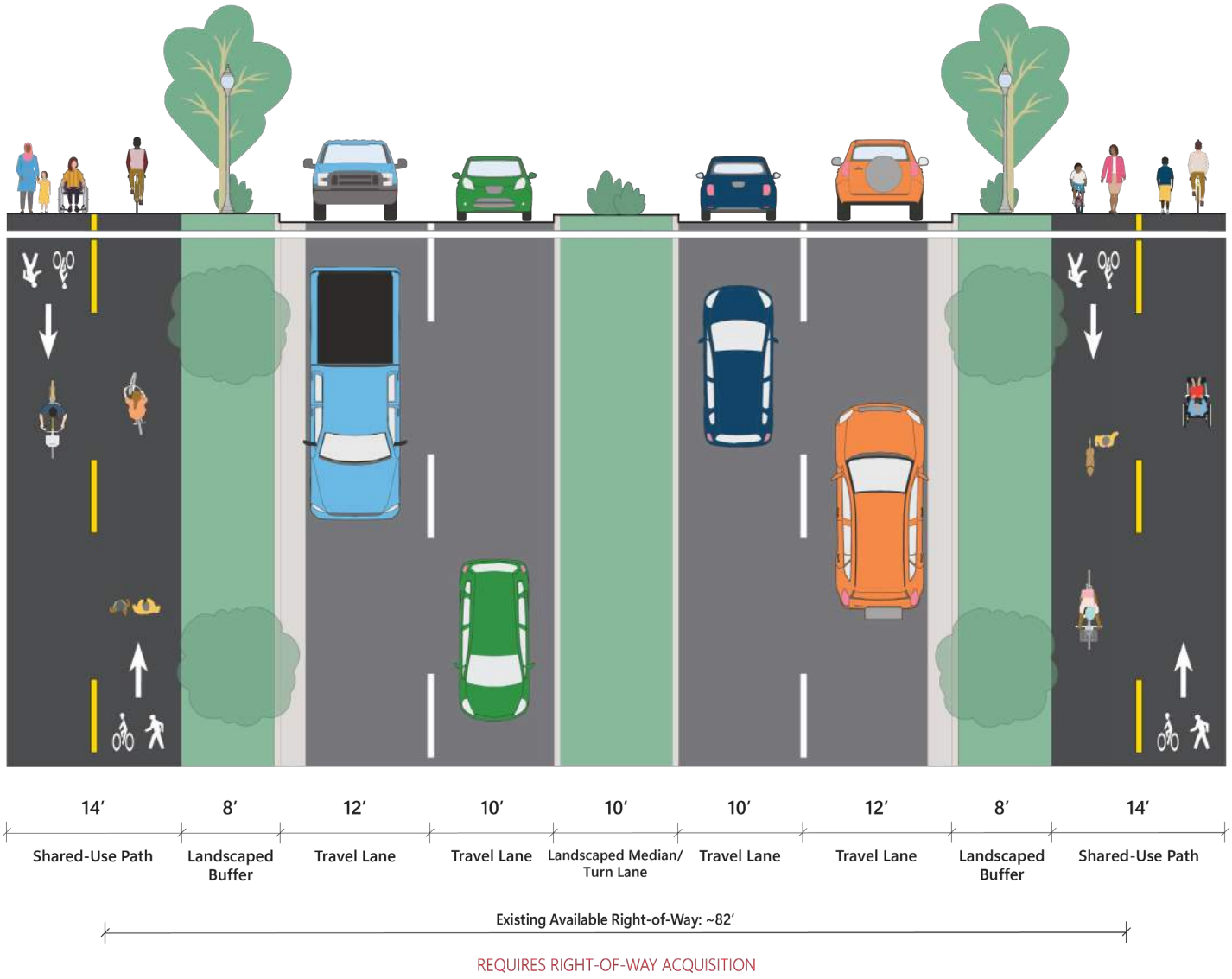
OPTION B
PECOS ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

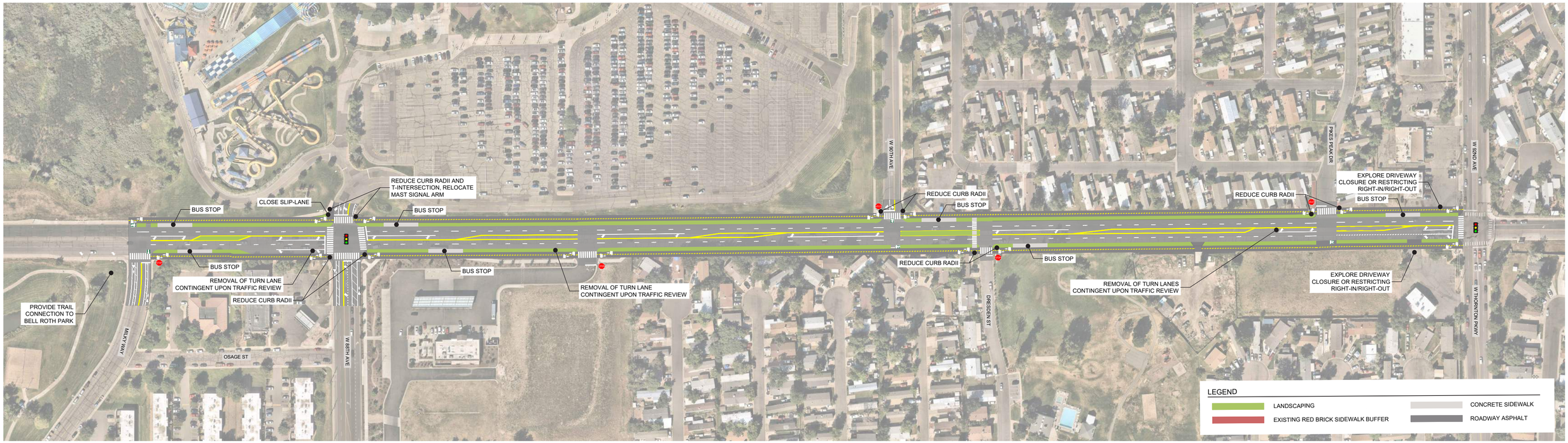
PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Option C

Pecos Street concept design Option C retains two vehicle lanes in each direction as well as a center left-turn lane. This option would reconstruct the street to provide landscaped buffers and shared-use paths on both sides of the street. Right-of-way acquisition would be required.

FIGURE 25 Pecos Street Option C typical cross-section (looking north)





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THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

NORTH

0 80' 160' 240'
SCALE IN FEET

TOOLE DESIGN

OPTION C
PECOS ST
THORNTON PROTECTED BIKE FACILITY
7/30/2024

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

Analysis

Detailed analysis results are provided in the **appendix H**.

Bike Facility Type

The concept design options with one-way bike lanes (A and B) provide identical connections and access to destinations on both sides of the street. The widths of the bike lanes in their respective contexts are within the recommended ranges per the AASHTO Guide for the Development of Bicycle Facilities, 5th Edition. However, the additional separation from vehicles of the raised bike lane results in a higher score for Option B. The shared-use path option in Option C is also within the recommended range and scores highly due to the provided separation from motor vehicles. However, it doesn't score as highly as a bike-only facility. All options allow buses to stop in lane, and they allow for exclusive transit waiting areas, though the floating bus stops score slightly higher.

Safety

Option C , which does not include a road diet, requires a longer crossing distance for pedestrians and a greater number of vehicle lane conflicts. Options B and C, which provide robust center medians that may protect pedestrians, receive higher safety scores.

Traffic Operations

All options include leading bike intervals for the north-south bike facilities at Thornton Parkway and all-direction protected left turns at 88th Avenue. Full descriptions of traffic operations are available in **Appendix D**. Additionally, the summer traffic patterns near Water World led to the study and warrant of a traffic signal at the 90th intersection. The full study is available in **Appendix E**.

All options score similarly for level of service. However, the road diet options, A and B, have a higher volume-to-capacity ratio than the overbuilt Option C and, therefore, score lower for this metric. Full traffic analysis results are available in **Appendix F**.

Cost

The relocation of the curb line, installation of landscaped medians, and updates to traffic signals and lighting along the corridor in Options B and C make them the more expensive options. Option A is the most affordable by restriping the roadway and using concrete planters to protect walkers and bikers, rather than reconstruction.

Planning-level cost opinions are available in **Appendix G**.

Public Opinion

For the concept design options for Pecos Street, a majority of community members who engaged in the development of the Study favored physical separation between all modes, at least two vehicle travel lanes in each direction, and opportunities for landscaping in buffer spaces. Community members were less likely to prefer designs that included a "temporary" buffer space (i.e., using only paint and planters for separation), reduced the number of available vehicle lanes or turn lanes, or included more expensive design elements or right-of-way acquisition. Respondents were divided on whether to remove the center turn lane and replace it with a median.

Community members preferred Option C due to the retention of five vehicle lanes and the installation of shared-use paths to benefit bike users and pedestrians. Between the two road diet options, the public preferred the more permanent bike facility in Option B over the "temporary" buffer space in Option A.

5.3 Recommended Concept Design

Based on feedback from the community, city staff, and stakeholders, the Study produced a new option, shown in Figure 26, which combines aspects of the original options and the existing roadway to better meet the varying needs of this corridor. The recommended concept design combines the desire to maintain roadway capacity to accommodate Water World traffic with the recognized need for permanent bike facilities and safer, more comfortable sidewalks. Space for both requires reconstructing the roadway, which increases the cost of the project. Four of seven bus stops will have an in-lane stopping area that, due to the number of lanes, will not delay directional vehicle traffic. Landscaping and trees are included in the design which will provide shade along the corridor and increase its aesthetics. In place of landscaping, the striped median maintains access for emergency vehicles.

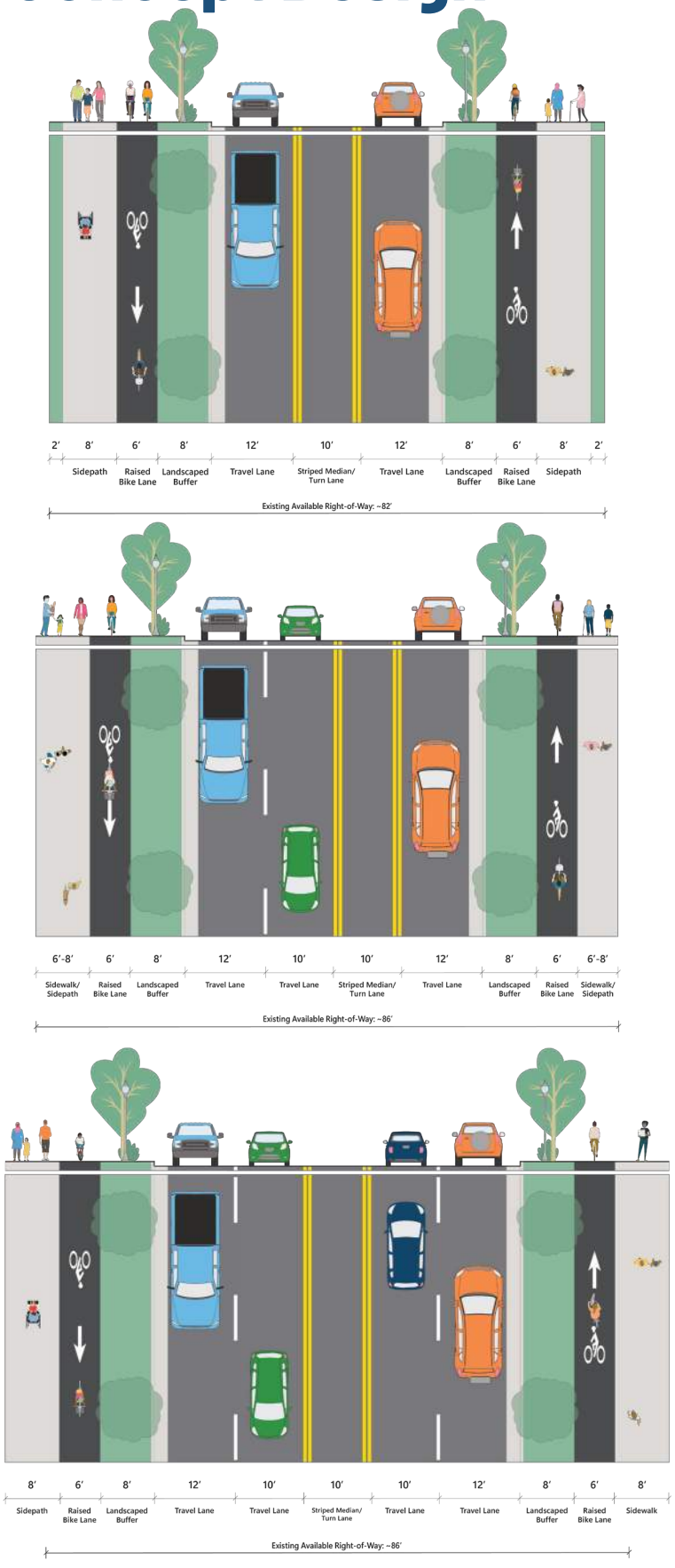
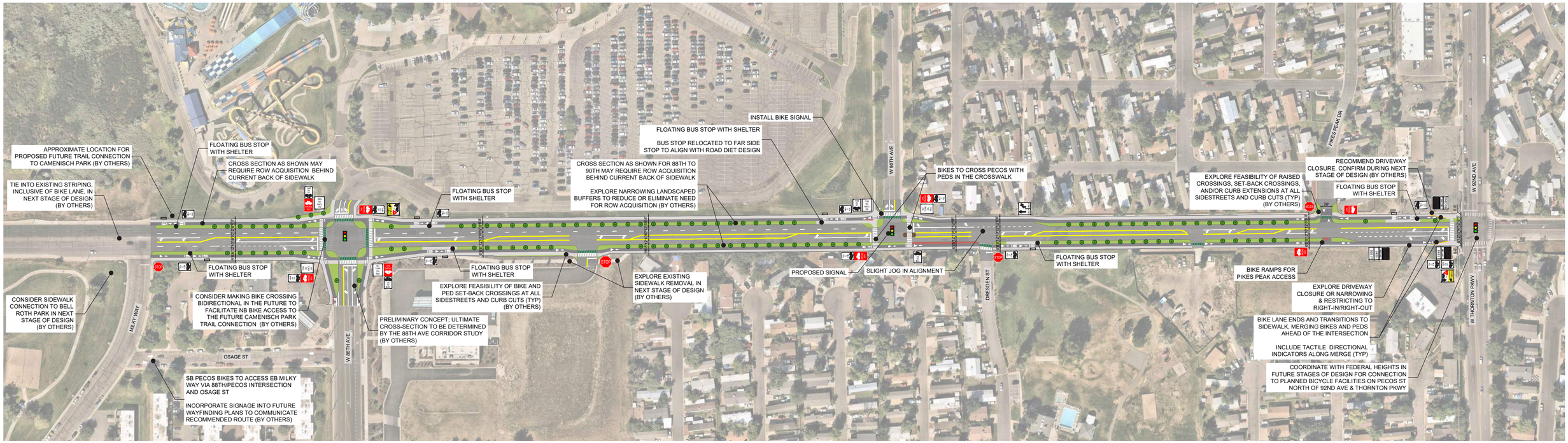


FIGURE 26 Pecos Street recommended typical cross-sections (looking north) between 90th Street and 92nd Avenue/ Thornton Parkway, between 88th Street and 90th Street, and between Milky Way and 88th Street (from top to bottom)



NOTES:

1. INTERMEDIATE LEVEL BIKE LANE OR SIDEWALK LEVEL BIKE LANE WITH TACTILE DIRECTIONAL INDICATOR SEPARATION BETWEEN BIKES AND PEDS WILL BE REQUIRED IN FUTURE DESIGN. (BY OTHERS)
2. ADDITIONAL STREET SIGNAGE (SUCH AS SPEED LIMIT SIGNS, STREET NAME SIGNS, ETC.) NOT SHOWN FOR CLARITY.
3. UTILITY IMPACTS NOT SHOWN.
4. DETECTABLE WARNING SURFACES FOR PEDESTRIAN CROSSINGS NOT SHOWN.
5. LOCATION OF EXISTING ROW NOT SHOWN. ACQUISITION MAY BE REQUIRED IN SOME LOCATIONS.
6. LEADING PEDESTRIAN AND BICYCLE INTERVALS PRESENT AT ALL SIGNALIZED INTERSECTIONS.
7. EXISTING SIDEWALK ASSUMED TO BE REMOVED WITHIN PROJECT LIMITS WHERE IT CONFLICTS WITH PROPOSED DESIGN.
8. EXPLORE THE USE OF CURB EXTENSIONS, RAISED CROSSINGS, AND/OR SET-BACK CROSSINGS ALONG PECOS TO SHORTEN CROSSING DISTANCES, ENCOURAGE DRIVER YIELDING, AND IMPROVE VISIBILITY. SEE EXAMPLE AT PIKE'S PEAK DR. DRAINAGE INFRASTRUCTURE IMPROVEMENTS MAY BE REQUIRED.
9. TURN BAY PRESENCE AND LENGTH AT ALL INTERSECTIONS TO BE REFINED IN FINAL DESIGN BY OTHERS.
10. REDUCE CURB RADII AT ALL INTERSECTIONS AND DRIVEWAYS AS SHOWN. (TYP)
11. ALL BUS STOP S TO HAVE CONCRETE BUS PADS.

LEGEND

- LANDSCAPING
- RED BRICK SIDEWALK BUFFER
- COLORED PATTERNED CONCRETE
- CONCRETE SIDEWALK
- ROADWAY ASPHALT
- RAISED BIKE LANE

NORTH

0 80' 160' 240'
SCALE IN FEET

THIS IS A PRELIMINARY CONCEPT. FIELD VERIFICATION, SITE CONDITION ASSESSMENTS, ENGINEERING ANALYSIS AND DESIGN ARE NECESSARY PRIOR TO IMPLEMENTING ANY OF THE RECOMMENDATIONS CONTAINED HEREIN.

TOOLE DESIGN

PREFERRED INITIAL CONCEPTUAL DESIGN

PECOS ST

THORNTON PROTECTED BIKE FACILITY

4/15/2025

PRELIMINARY CONCEPT - NOT FOR CONSTRUCTION

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06

Implementation

6.1 Implementation Plan

Implementing the multimodal visions for 128th Avenue, Huron Street, and Pecos Street will require maintaining community and political support for safe streets in addition to securing funding for final design, construction, and maintenance. A phased approach will facilitate progress while addressing the most critical safety and mobility improvements immediately and in the long term. Collaboration between stakeholders and careful prioritization of projects will allow the City of Thornton to transform these corridors into safer, more accessible, and more connected spaces for all users. By maintaining focus on these shared goals, the City can effectively realize the visions outlined in this Study.

6.2 Recommended Phasing and Timeline

Thornton's Transportation and Mobility Master Plan (TMMP) proposed protected bike facility projects for three key corridors (128th Avenue, Pecos Street, and Huron Street) for implementation between 2021 and 2030. This phased approach focuses on improving safety and mobility in the near term while gradually achieving the long-term visions established during the planning process. By prioritizing critical safety improvements early, the strategy ensures steady progress while addressing the most urgent needs first.

Short-Term (0-5 years)

In the next year, efforts should focus on operational improvements, striping, and temporary flex posts to reduce conflicts at intersections and along the corridors. The following treatments can be applied to all three corridors.

- Test medians, curb extensions, and right-in/right-out (RIRO) islands with paint and flex posts
- Install signs and markings for bike and pedestrian crossings
- Implement operational improvements at signalized intersections such as:
  - No Turn on Red signage
  - Leading Pedestrian Intervals
  - Protected phasing for left-or right-turns
  - On 128th Avenue: Bikes to Use Pedestrian Signal signage (until bike-specific signals are installed) – 128th Avenue only

Mid-Term Improvements (5-10 years)

In the next five years, efforts should focus on more substantial infrastructure enhancements to create a stronger physical separation between vulnerable users and vehicular traffic, like paint-and-post and permanent side-street approaches.

- Restripe the roadway to narrow vehicular lanes and add painted buffers or crash-rated barriers
- Install temporary raised crossings at side streets

Long-Term Improvements (10+ years)

Finally, long-term improvements include full curb reconstruction, accessibility improvements, and larger-scale changes often facilitated through capital improvement plan (CIP) funding, grants, or development partnerships, further embedding these bike and pedestrian facilities into the streetscape.

- Full build out of bike and pedestrian facilities, including curb reconstruction, concrete medians and pedestrian refuge islands, setback raised crossings, detectable warning surfaces, and landscaping
- Final striping, signage, and signal adjustments

The following pages provide more specific guidance for phasing implementation for the three study corridors.

128th Avenue

Full Build

The planning process for 128th Avenue established a vision focused on creating safe and efficient facilities for bicyclists and pedestrians. The preliminary design includes a raised two-way cycle track next to a sidewalk and separated from vehicle traffic by a buffer for improved safety and comfort. The existing center turn lane is converted to a landscaped median where turning movements are not permitted. To reduce conflicts at intersections and driveways, the design incorporates features such as striped bike and pedestrian crossings, detectable warnings, side street medians, and bike signals.

The plan also recommends curb extensions, set back crossings, and wayfinding signage to enhance visibility and accessibility.

Potential Partners

- Future development
- Thornton Parks and Planning

Cost Estimate: $36,677,000

Medium Term & Short Term

As the City secures funding for a full build out of 128th Avenue, the following treatments can be made in the short- and mid-term to protect people walking and biking.

- Test medians, pedestrian refuge islands, and/or curb extensions along the corridor and at side-street approaches with paint and flex posts
- Install signs and markings for bike and pedestrian crossings, potentially coordinated with scheduled repaving
- Restripe the roadway to narrow vehicular lanes and add painted buffers or crash-rated barriers to the north side
- Implement operational improvements at signalized intersections such as:
  - No Turn on Red signage
  - Leading south-side pedestrian Intervals
  - Protected north-side bike and pedestrian phase
  - Bikes to Use Pedestrian Signal signage (until bike-specific signals are implemented)
- Evaluate installing temporary raised crossings at side streets

[An illustrative rendering of] 128th Avenue west of Fire Station 4, looking west.

[An illustrative rendering of] The cycle track opposite of Fire Station 4, looking west.

Huron Street

Full Build

The planning process for Huron Street established a vision that prioritizes safe and efficient facilities for bicyclists and pedestrians while maintaining vehicle access in the area. The preliminary design includes raised bike lanes, shared-use paths, enhanced crossings, and floating bus stops. To further improve multimodal safety and connectivity, the plan proposes reconfiguring some driveways and installing detectable warnings in shared bike and pedestrian zones. The bike lane on Huron will connect to Pinnacle Trail by transitioning to a two-way multi-use path on the west side. This design emphasizes safety, accessibility, and seamless multimodal connections. The plan also recommends curb extensions, set back crossings, and wayfinding signage to enhance visibility and accessibility.

Potential Partners

- Federal Heights
- Future development
- Thornton Parks and Planning
- Pinnacle Charter School

Cost Estimate: $12,759,000

Medium Term & Short Term

As the City secures funding for a full build out of Huron Street, the following treatments can be made in the short- and mid-term to protect people walking and biking.

- Test medians, curb extensions, and or right-in/right-outs (RIROs) along the corridor and at side street approaches with paint and flex posts
- Install signs and markings for bike and pedestrian crossings, potentially coordinated with scheduled repaving
- Implement operational improvements at signalized intersections such as:
  - No Turn on Red signage
  - Leading Pedestrian Intervals
- Evaluate installing temporary raised crossings at side streets

[An illustrative rendering of] Huron Street at Polaris Place, looking north.

[An illustrative rendering of] Huron Street at W 87th Place, looking south.

Pecos Street

Full Build

The planning process for Pecos Street established a vision that prioritizes safe and efficient facilities for bicyclists and pedestrians while maintaining vehicle access in the area. The preliminary design includes raised bike lanes, enhanced crossings, and floating bus stops. Along the corridor, vehicle lanes will be reduced to create more space for pedestrians and bicyclists. The existing center turn lane will be converted to a landscaped median where turning movements are not allowed. To improve multimodal safety and connectivity, the plan proposes adding detectable warnings in shared bike and pedestrian zones, incorporating bike signals, and exploring the feasibility of narrowing or closing some driveways. A new traffic signal at 90th Avenue will help reduce conflicts with vehicles turning into Water World. The plan also recommends curb extensions, set back crossings, and wayfinding signage to enhance visibility and accessibility. This preliminary concept aims to balance multimodal needs with future design refinements and right-of-way considerations.

Potential Partners

- Federal Heights
- Hyland Hills Park & Recreation District
- Future development
- Thornton Parks and Planning

Cost Estimate: $13,638,000

Medium Term & Short Term

As the City secures funding for a full build out of Pecos Street, the following treatments can be made in the short- and mid-term to protect people walking and biking.

- Test medians, pedestrian refuge islands, curb extensions, and or right-in/right-outs (RIROs) along the corridor and at side street approaches with paint and flex posts
- Install signs and markings for bike and pedestrian crossings, potentially coordinated with scheduled repaving
- Restripe the roadway to narrow vehicular lanes and add painted buffer or crash-rated barriers to both sides
- Implement operational improvements at signalized intersections such as:
  - No Turn on Red signage
  - Leading Pedestrian Intervals
- Evaluate installing temporary raised crossings at side streets

[An illustrative rendering of] The protected intersection at Pecos Street and W 88th Ave, looking northwest.

[An illustrative rendering of] Pecos Street at W 90th Ave, looking southeast.

6.3 Implementation Considerations

To ensure the smoothest implementation of the full build-out, the City should consider the following:

- **Communicating with external partners** like adjacent municipalities, RTD, utility companies, neighborhoods, and businesses
- **Coordinating with other City departments** to ensure that critical services are not impeded (emergency response services, street sweeping, snow plowing, landscape and new facility maintenance, etc.)
- Maintaining **communication with stakeholders and the community** through project updates, meetings to review the design as it progresses, and advance notices of construction and any detours
- Securing **capital funding** through the City budget, state, regional, or national resources
- Focusing initial safety improvements on the **areas with the most need**
- **Refining the design** based on any right-of-way, utility, environmental, or other unforeseen site conflicts
- Developing temporary traffic control plans to ensure smooth traffic flow and safety during construction to minimize disruptions
- Determining **maintenance and operations for the new facilities**, including any new equipment like smaller snowplows and street sweepers

Funding Opportunities

The tables on pages 66 - 68 outlines potential funding sources for the implementation and maintenance of protected bike facilities in Thornton. These funding programs include both City and external opportunities, ranging from Thornton's Capital Improvement Projects Fund to broader state and federal grants. Each funding source is categorized by its applicable uses, such as bike facilities, pedestrian enhancements, and maintenance needs, to ensure a sustainable and comprehensive approach to supporting the City's active transportation goals. This table serves as a resource for aligning financial strategies with project implementation phases.

Operations and Maintenance Plan

Before progressing to final design and construction, the City needs to have a plan for how to maintain the new facilities. This plan should include regular maintenance like street sweeping and snow plowing, which may require new equipment, as well as repairs to the infrastructure. Due to the locations of the Pecos Street and Huron Street facilities, the Cities of Thornton and Federal Heights could share maintenance responsibilities.

In addition to developing an operations and maintenance plan, the City should consider long-term sustainability and lifecycle costs. Depending on available funding, it may be more cost-effective in the long run to implement fully built concrete facilities rather than paint-and-post or temporary barriers, as the latter tend to require frequent replacement and/or repair.

Funding Program	Description	Funding Amount	Match Requirement	Medium-Term Build Out	Full Build Out	Bike Facilities	Pedestrian Crossing Enhancements	Striping and Signage	Signal Modification or improvement	Maintenance and Operations
Thornton Programs										
Capital Improvement Projects (CIP) Fund	The City's Public Works/Infrastructure Department is responsible for the planning, design, rehabilitation, and inspection of Thornton's infrastructure-related capital projects. During the annual budget cycle, an ongoing list of possible projects is updated and reviewed for consideration. Projects compete for annual funding along with other city needs for roads, water/sewer, traffic, parks maintenance and repairs. CIP projects are financed through the General Fund as well as .25% sale and use tax for parks and open space acquisition and development.	Varies	N/A	Yes	Yes	Yes	Yes	Yes	Yes	No
General Fund	The City's General Fund, primarily sourced from sales and use taxes, supports various municipal operations and projects. A portion of this fund is directed towards operations and maintenance.	Varies	N/A	No	No	No	Yes	Yes	Yes	Yes
Street Resurfacing Program	Building a protected bike lane through an annual resurfacing program is a cost-effective strategy that integrates bike-friendly infrastructure into routine roadway maintenance. When streets are scheduled for resurfacing, the City can allocate a portion of the resurfacing budget to include bike lane design and construction. This typically involves striping bike lanes. Leveraging the resurfacing schedule minimizes disruptions and reduces overall costs by combining resurfacing and bike lane construction into a single project. Collaboration with transportation engineers, community stakeholders, and local governments ensures the bike lane design meets safety standards and aligns with broader mobility goals, ultimately fostering a safer, more connected network for cyclists.	Varies	N/A	Yes	No	Yes	No	Yes	No	No
Regionally-Administered Programs										
DRCOG Transportation Improvement Program (TIP) https://drcog.org/transportation-planning/funding-project-delivery/transportation-improvement-program	The Denver Regional Council of Governments (DRCOG) Transportation Improvement Program (TIP) outlines a four-year plan for federally and state-funded transportation projects in the Denver region, aligning with the goals of Metro Vision and the Regional Transportation Plan. Developed through collaboration among local governments, the Colorado Department of Transportation, and the Regional Transportation District, the TIP ensures that selected projects meet air quality standards and regional priorities. The program includes set-aside funds for specific initiatives, such as transportation demand management and air quality improvements, to address targeted regional needs.	$100,000 minimum	20%	Yes	Yes	Yes	Yes	Yes	Yes	No
Congestion Mitigation & Air Quality (CMAQ)	CMAQ is a federally mandated program, the objective of which is to improve air quality in non-attainment and maintenance areas for ozone, carbon monoxide, and particulate matter. Funds may be used for transportation projects designed to contribute to the attainment or maintenance of national ambient air quality standards (NAAQS), with a high level of effectiveness in reducing air pollution.	Varies	20%	Yes	Yes	Yes	Yes	Yes	Yes	No
Adams County Road and Bridge Tax Fund https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm	The Adams County Road and Bridge Tax Fund is a dedicated financial resource allocated for the maintenance and development of the county's transportation infrastructure, including roads and bridges. Revenue for this fund is primarily generated through property taxes, with specific mill levies assigned to support these infrastructure projects. The fund is incorporated into the Thornton General Fund and utilized for various capital improvement projects, such as road resurfacing, bridge repairs, and other essential transportation enhancements, ensuring safe and reliable infrastructure for the community.	Varies	N/A	Yes	Yes	Yes	No	No	No	No

Funding Program	Description	Funding Amount	Match Requirement	Medium-Term Build Out	Full Build Out	Bike Facilities	Pedestrian Crossing Enhancements	Striping and Signage	Signal Modification or improvement	Maintenance and Operations
State-Administered Programs										
CDOT Transportation Alternatives Set-Aside Program (TA) https://www.codot.gov/programs/planning/grants/tap-fiscal-years-2024-26	The TA Set-Aside Program (formerly known as Transportation Alternatives Program, or TAP) is administered by the U.S. Federal Highway Administration (FHWA) and helps states fund a variety of activities related to improving transportation assets, including on- and off-road pedestrian and bicycle facilities, environmental mitigation, and creating or improving recreational trails projects.	Varies	20%	Yes	Yes	Yes	Yes	No	No	No
Safe Routes To School (SRTS) https://www.codot.gov/programs/bikeped/saferoutes	The FHWA Safe Routes to School (SRTS) program promotes safe and accessible walking and biking routes for children traveling to and from school. It provides funding and resources for infrastructure improvements, education, and encouragement programs to enhance student safety and increase active transportation. The program aims to reduce traffic congestion, improve public health, and foster community engagement around school travel.	Infrastructure grants: $100,000 to $1,000,000	20%	Yes	Yes	Yes	Yes	Yes	Yes	No
Highway Safety Improvement Program (HSIP) https://www.codot.gov/safety/traffic-safety/data-analysis/hsip	The Highway Safety Improvement Program (HSIP) is a federal initiative aimed at reducing traffic fatalities and serious injuries on public roads. It provides funding to states for safety improvement projects that are data-driven and focus on reducing crashes. The program emphasizes identifying high-risk locations and implementing cost-effective measures to enhance roadway safety for all users.	Minimum $250,000	10%	Yes	Yes	Yes	Yes	Yes	Yes	No
CDOT Multimodal Transportation and Mitigation Options Fund (MMOF) https://www.codot.gov/programs/planning/grants/mmof-local	The CDOT Multimodal Transportation and Mitigation Options Fund (MMOF) supports projects that enhance mobility, reduce greenhouse gas emissions, and improve multimodal transportation statewide. It prioritizes funding for vulnerable populations, safe routes to schools, and rural communities. Eligible projects include transit services, bike and pedestrian infrastructure, and transportation demand management programs.	Minimum $150,000	20%	No	Yes	Yes	Yes	No	No	No
CDOT Nonattainment Area Air Pollution Mitigation Enterprise (NAAPME) Community Clean Transportation Assistance Grant Funding Program (CCTAP) https://www.codot.gov/programs/naapme/about/naapme-community-clean-transportation-assistance-grant-funding-program	The Community Clean Transportation Assistance Grant Funding Program (CCTAP) will look to support communities and other governmental entities in the nonattainment area with eligible projects that will provide demonstrated improvements to air quality in the nonattainment area. Projects funded through this program should aim to meet the business purpose of NAAPME and look to address at least one of the funding focus areas identified in the NAAPME 10-Year Plan. Additional consideration will be given to projects that support disproportionately impacted communities, as defined in Colorado Revised Statutes.	Minimum $500,000	20%	No	Yes	Yes	Yes	Yes	Yes	No

Funding Program	Description	Funding Amount	Match Requirement	Medium-Term Build Out	Full Build Out	Bike Facilities	Pedestrian Crossing Enhancements	Striping and Signage	Signal Modification or improvement	Maintenance and Operations
Great Outdoors Colorado (GOCO) - Community Impact Grant https://goco.org/programs-projects/grant-programs/community-impact	GOCO's Community Impact Grant invests revitalizing parks, trails, schoolyards, fairgrounds, environmental education facilities, and other outdoor projects. For example, funding might support local capacity for project management, land acquisition for development, community-centered planning and design, and project implementation—and all within a single grant. In the end, through this program, GOCO celebrates the incredible and unique impacts the outdoors has across Colorado's diverse communities.	No maximum, but typically under $1 million	None	Yes	Yes	Yes	Yes	No	No	No
Federal/National Programs										
USDOT Active Transportation Infrastructure Investment Program (ATIIP) https://www.transportation.gov/rural/grant-toolkit/active-transportation-infrastructure-investment-program-atiip	The ATIIP is a new competitive grant program created by the Bipartisan Infrastructure Law to construct projects to provide safe and connected active transportation facilities in active transportation networks or active transportation spines. ATIIP projects will help improve the safety, efficiency, and reliability of active transportation networks and communities; improve connectivity between active transportation modes and public transportation; enhance the resiliency of on- and off-road active transportation infrastructure; help protect the environment; and improve quality of life in disadvantaged communities through the delivery of connected active transportation networks and expanded mobility opportunities.	Active transportation projects or group of projects with a total cost of over $15 million, or total cost of $100,000 for planning and design grants.	20%	No	Yes	Yes	Yes	Yes	Yes	No
USDOT Better Utilizing Investments to Leverage Development (BUILD) https://www.transportation.gov/sites/dot.gov/files/2025-01/BUILD%202025%20NOFO%20Amendment_0.pdf	The BUILD grant program, formerly known as RAISE, is a federal discretionary grant initiative aimed at supporting surface transportation infrastructure projects with significant local or regional impact. BUILD grants support a variety of surface transportation projects, including highways, bridges, transit, rail, port, and multimodal transportation.	Capital grants in urban areas: $5 million to $25 million	20%	No	Yes	Yes	Yes	Yes	Yes	No
USDOT Safe Streets and Roads for All (SS4A) https://www.transportation.gov/grants/ss4a/how-to-apply	The Office of the Secretary's Safe Streets and Roads for All Grant program provides supplemental funding to support local initiatives to prevent death and serious injury on roads and streets, commonly referred to as Vision Zero or ˜Toward Zero Deaths" initiatives.	Implementation grants: $2,500,000 to $25,000,000	20%	Yes	Yes	Yes	Yes	Yes	No	No
Recreational Trails Program (RTP) https://recreationaltrailsinfo.org/	The FHWA Recreational Trails Program (RTP) is a federally funded program that supports the development and maintenance of recreational trails for both motorized and non-motorized uses. Funding is derived from the federal Highway Trust Fund and allocated to states, which distribute grants to local governments, nonprofit organizations, and other entities. The program aims to enhance outdoor recreation opportunities by improving access to trails, promoting environmental stewardship, and fostering partnerships between public and private organizations.	$5,000 to $25,000	20%	Yes	No	Yes	Yes	Yes	Yes	No

6.4 Monitoring and Evaluation Metrics

Establishing monitoring and evaluation metrics before implementation is essential for measuring the effectiveness of specific treatments and guiding future improvements. The pedestrian, bicycle, and motor vehicle data (volumes, speeds, and crash history)analyzed as part of this Study, provide a baseline for pre-implementation conditions. However, additional metrics may gathered in the near term can ensure a more comprehensive evaluation. The following sections outline the recommended timeline and metrics for data collection. To capture a full understanding of usage and effectiveness, collecting data during different seasons can help account for weather-related variations. The metrics in bold are typical datapoints that are the most effective as evidence for how the new facilities are being used.

0-6 Months After Implementation

- **Safety Metrics: Begin tracking crash data and near-miss incidents immediately after implementation but allow at least 3 to 6 months to identify trends.**
- **Usage Metrics: Collect initial bicycle and pedestrian counts to assess early adoption of the new infrastructure.**
- User Experience: Distribute surveys and collect comments from community members to capture feedback about safety and comfort.
- Facility Effectiveness: Conduct initial observations and surveys about new infrastructure (e.g., bike lanes, signals, and raised crossings) to identify any needed adjustments.

6-12 Months After Implementation

- **Behavioral Changes: Evaluate changes in vehicle speeds, yielding compliance, and multimodal usage patterns.**
- Transit Impacts: Assess changes in bus ridership where transit facilities like floating bus stops were part of the improvements.

1-3 Years After Implementation

- **Safety Metrics: Conduct a comprehensive crash analysis to evaluate reductions in crashes and severity.**
- **Usage Growth: Compare long-term trends in bike and pedestrian counts to pre-implementation data.**
- Sustainability of Design: Evaluate the condition of infrastructure, such as raised bike lanes or pedestrian crossings, to assess durability.
- Community Impact: Survey public sentiment to determine whether the improvements are meeting community needs over time.
- Long-Term Outcomes: Assess whether the project has achieved its broader goals, such as sustained reductions in crashes, increased multimodal usage, or reduced traffic volumes for air quality.

By collecting and evaluating data on a regular basis, the City of Thornton can make necessary modifications, such as improving signal timing, reconfiguring crossings, or expanding facilities, as well as apply successful treatments elsewhere in the city.