E 88TH AVE 8800 N

I-76 NB RAMPS TO HIGHWAY 2

# DESIGN OPTIONS SCREENING REPORT

May 2021


*Prepared for:*
City of Commerce City

Commerce CITY



ENVIRONMENTAL ASSESSMENT


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# Acronyms and Abbreviations

| | |
|---|---|
| BNSF | BNSF Railway |
| CDOT | Colorado Department of Transportation |
| FHWA | Federal Highway Administration |
| I-76 | Interstate 76 |
| LOS | Level of Service |
| NEPA | National Environmental Policy Act |
| PLT | Project Leadership Team |
| UPRR | Union Pacific Railroad |

# Contents



## Figures

# 1.0 INTRODUCTION

This report describes how the Proposed Action was developed for the City of Commerce City E. 88th Avenue (Interstate 76 [I-76] to Highway 2) Project (project) during the Environmental Assessment process. It describes the options that were considered for identified design elements, and the key factors used for evaluation and screening. Figure 1 and Figure 2 show the project location and project study area. Section 6 of this report is a list of the retained design options discussed in detail throughout the report.

**Figure 1. E. 88th Avenue Location Map**

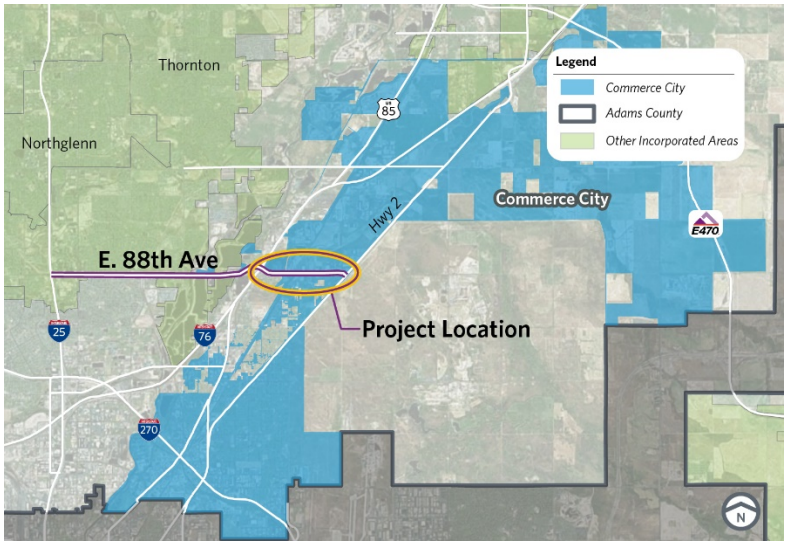
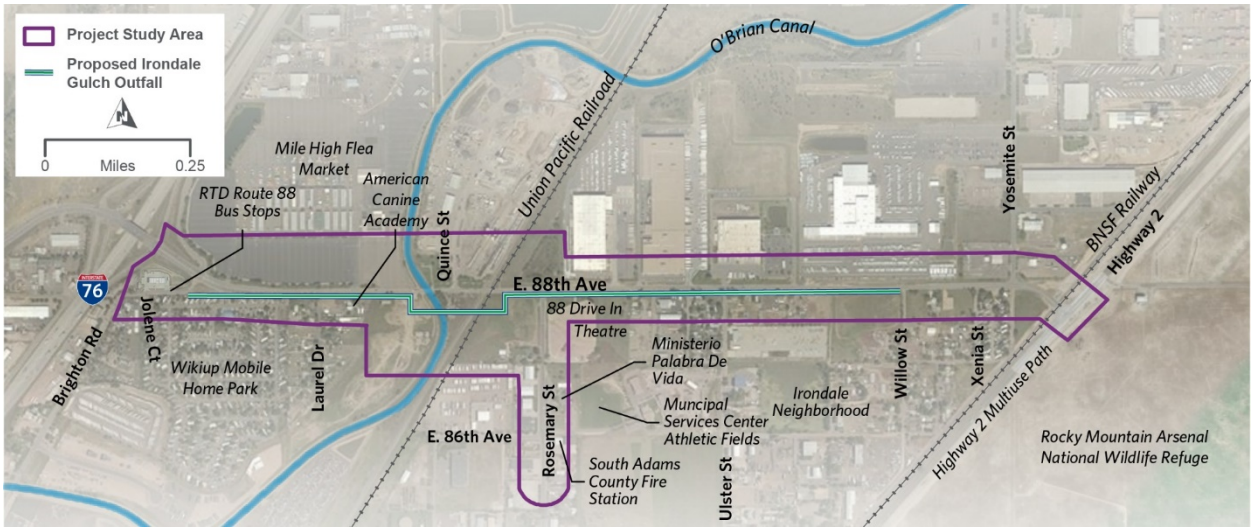



**Figure 2. Project Study Area**




# 2.0 PURPOSE AND NEED

The purpose of the E. 88th Avenue project is to improve traffic operations and accommodate current and future general vehicular traffic, heavy trucks, bicycles, and pedestrians on East 88th Avenue (E. 88th Avenue) between I-76 and Highway 2.

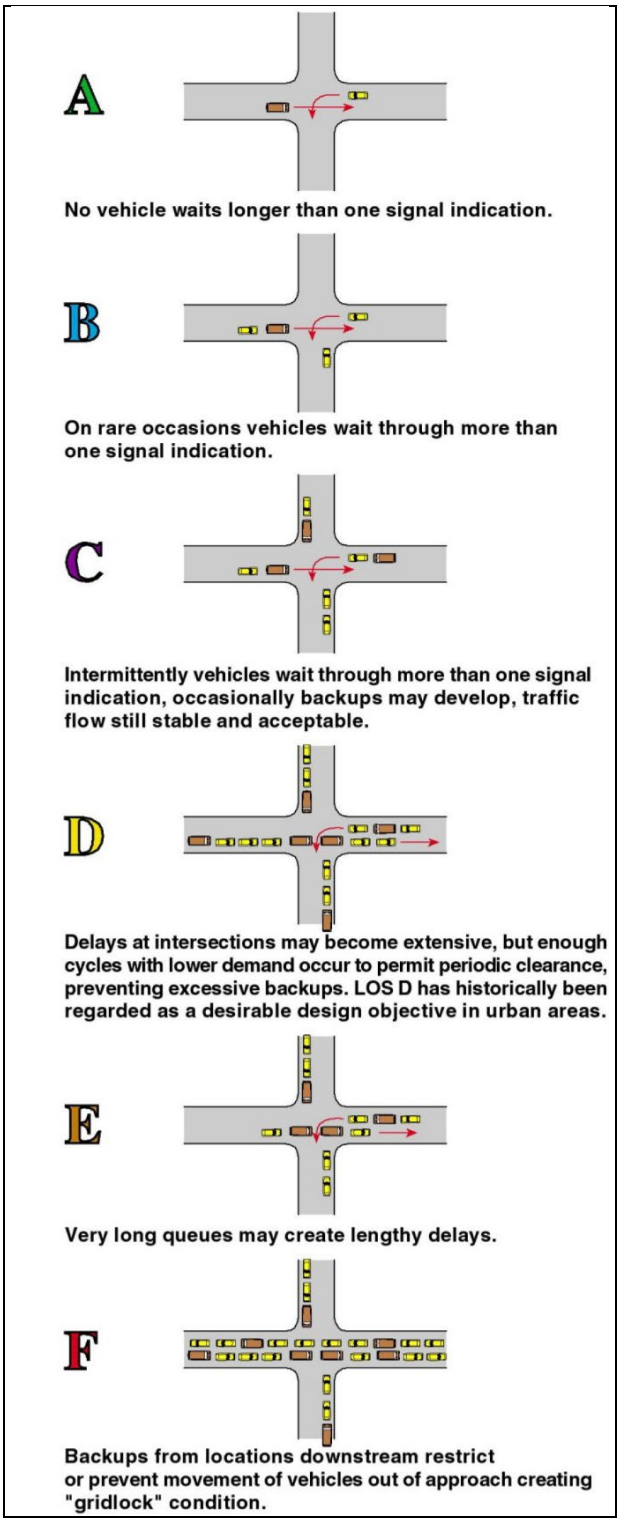
The needs for the project are described by two interrelated statements:

**Need 1: Improve roadway operations.** The need for improvement in roadway operations is primarily due to substandard road design and insufficient future capacity.

- **Substandard Road Design.** E. 88th Avenue is a two-lane minor arterial roadway. Roadway operations on E. 88th Avenue are negatively affected by its substandard road design characteristics that cause congestion, such as narrow lane widths and lack of turn lanes and acceleration/deceleration lanes, which is exacerbated by the high number of heavy truck trips in the corridor. The high number of access points increases congestion on the corridor as vehicles accelerate and decelerate to turn in and out of the driveways, affecting overall corridor efficiency.
- **Insufficient Future Capacity.** E. 88th Avenue has insufficient capacity to accommodate the projected demand for vehicle trips in the corridor. Daily traffic volume in 2018 exceeded 20,000 vehicles per day at the Rosemary Street intersection with a current level-of-service (LOS) rating of C during the PM peak hour of traffic.

  Daily volume at this intersection is projected to exceed 27,500 vehicles per day in 2040 (an increase of 37.5%), operating at LOS E during the PM peak hour of traffic. Figure 3 defines what LOS ratings are for intersections.

**Figure 3. Level of Service Definitions for Intersections**



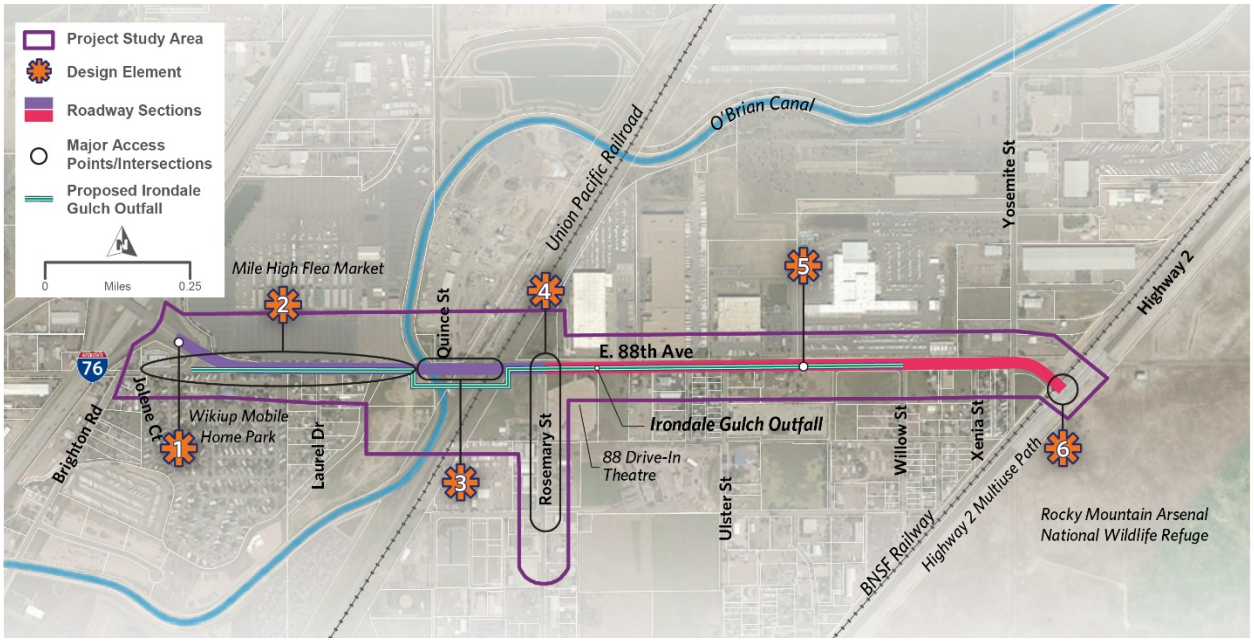

**Need 2: Accommodate all users.** The E. 88th Avenue corridor serves commuter, residential, and commercial trips. The number of heavy truck trips exceeds 15% of overall trips during peak hour, and the growth of heavy-truck traffic is expected to keep pace with the growth of general vehicular traffic. The substandard road design characteristics do not accommodate efficient heavy truck movements and contribute to congestion. In addition, there are no sidewalks or bicycle facilities on E. 88th Avenue and no pedestrian or bicycle connections to the bus stops on Brighton Road. This causes pedestrians

and bicyclists to use the unpaved shoulders, compromising safety, and can discourage non-vehicular travel in the corridor.

# 3.0 METHODOLOGY

Because of the diversity of existing roadway design, existing and projected traffic volumes, and surrounding land use within the corridor, the project study area was broken into six separate design elements (Figure 4). For each of the design elements, a range of design options was developed. Design options were based on the typical sections identified in prior planning documents (described in Section 4.0).The design options were screened against their ability to meet the Purpose and Need, Commerce City's goals for the project, and impacts on social, cultural, and environmental resources. The design options proposed to meet the Purpose and Need for the project are all within the E. 88th Avenue project study area. Options proposed outside of the study area would not meet the location-specific need factors determined within the project study area. Retained design options were packaged into the Proposed Action. This report describes the process and rationale used to screen each option to develop an alternative that best meets the Purpose and Need for evaluation as the Proposed Action in the *E. 88th Avenue (I-76 to Highway 2) Environmental Assessment*.

**Figure 4. Design Elements**




Typical sections were determined for the corridor. Typical sections options considered, the appropriate roadway classification, the width of the typical section and the centerline alignment of the typical section.

In addition, design options were evaluated for their ability to connect to adjacent roadways and properties, provide improvements at the O'Brian Canal and Union Pacific Railroad (UPRR) crossings, achieve acceptable future operations at the E. 88th Avenue and Rosemary Street intersection, and determine bicycle and pedestrian crossings at the Burlington Northern Santa Fe Railway (BNSF) tracks and Highway 2.

A Project Leadership Team (PLT) of Commerce City, Colorado Department of Transportation (CDOT), Federal Highway Administration (FHWA), and the consultant team preliminarily discussed which options best met the screening criteria during a meeting on March 15, 2019. After further considering input from a public meeting on March 27, 2019, and four stakeholder meetings on April 24 and 26, 2019, additional environmental analysis and design detail, and continued input from Commerce City on the needs of the corridor, the PLT agreed on which options should be carried forward into the *E. 88th Avenue (I-76 Highway 2) Environmental Assessment* as the Proposed Action on May 28, 2020. The Proposed Action and revised project Purpose and Need were presented as part of the June 22 to August 7, 2020, online public meeting.

The Proposed Action is a combination of the design options that were determined to best meet the project's Purpose and Need and retained for further environmental review under the National Environmental Policy Act (NEPA).

# 4.0 TYPICAL SECTION CONSIDERATIONS

The typical sections for the E. 88th Avenue corridor were developed based on Commerce City's local long-term transportation planning guidance set forth in the *C3 Vision Transportation Plan* (Commerce City, 2010) and the City's Engineering *Construction Standards and Specifications* (Commerce City, 2017).

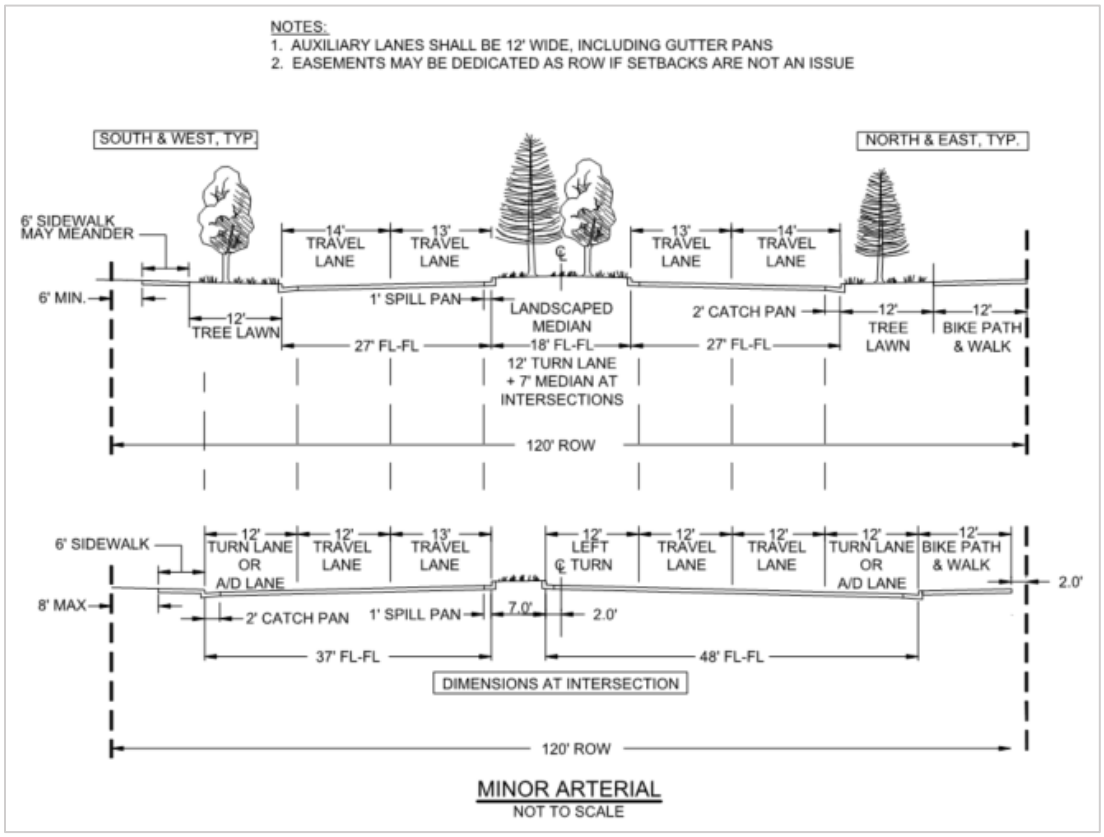
The *C3 Vision Transportation Plan* (Commerce City, 2010) shows that E. 88th Avenue will remain a minor arterial between I-76 and Highway 2 and recommends four lanes by 2035. Minor arterials are described in the plan as follows:

"Minor arterials also have limited access but may provide direct access to properties if no other reasonable form of access exists. Intersections are at-grade and may be signalized. Minor arterials provide relatively unimpeded connections within the community and distribute traffic to higher classification roadways. 72nd, 88th, and 96th Avenues are examples of minor arterials in Commerce City. These facilities are designed to accommodate trucks and other large vehicles."

The City's *Engineering Construction Standards and Specifications* (Commerce City, 2017) provides a template for roadway designers. Figure 5 shows the Roadway and Parking Details Typical Street Section template for a minor arterial. This typical section design was used as a baseline for developing roadway options on E. 88th Avenue.

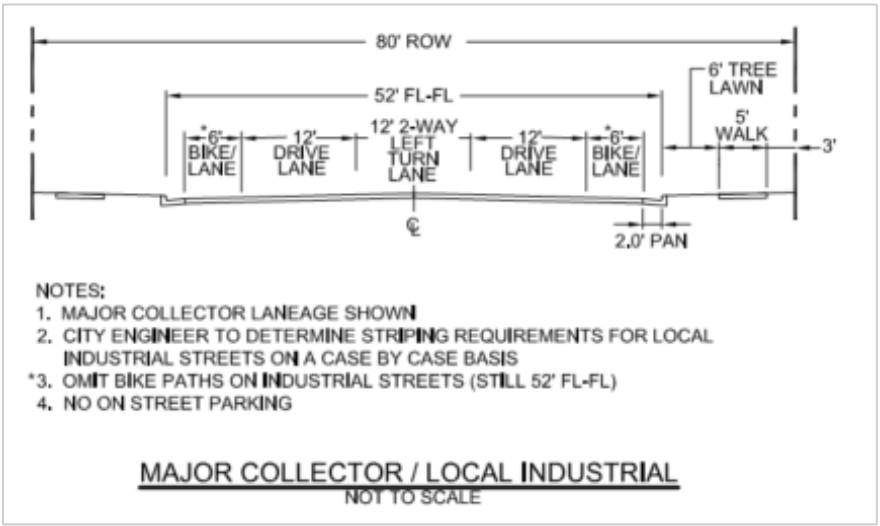
The Denver Regional Council of Governments travel demand model traffic volumes for 2015 and future year 2040 for E. 88th Avenue are over three times higher west of Rosemary Street than they are east of Rosemary Street. East of Rosemary Street existing and projected traffic volumes are less due to the industrial nature of the land uses. The heavily traveled commuter route from Rosemary Street (the northern terminus of Quebec Street) to the 88th Ave / I-76 Interchange contributes to the higher volumes west of Rosemary Street. The Major Collector/Local Industrial typical section template was used to evaluate options on E. 88th Avenue between Rosemary Street and Highway 2, because it doesn't require additional space for a second travel lane in each direction and maintains the existing access points to the industrial properties. Figure 6 shows the template for a Major Collector/Local Industrial roadway typical section.

**Figure 5. Minor Arterial Typical Section Template**




*Source: Commerce City, 2017*

**Figure 6. Major Collector/Local Industrial Roadway Typical Section Template**




*Source: Commerce City, 2017*

# 5.0 DESIGN ELEMENT OPTIONS CONSIDERED

A range of options was developed for each design element in the corridor. Each design option considered is described below. Each option was evaluated on how well it met the project's Purpose and Need, Commerce City's goals for the project, and the option's impacts on social, cultural, and environmental resources. The rationale for which options were retained for the Proposed Action is also documented. The options are labeled as "Retained" if they were carried forward into the Proposed Action. A summary of options retained for the Proposed Action is provided in Section 6.0, Summary of Retained Design Elements.

## 5.1 Design Element 1: E. 88th Avenue Typical Section and Alignment Between Brighton Road and UPRR Crossing

Design Element 1 considered a range of options for the typical section, alignment, and locations for the multiuse path and sidewalk.

### 5.1.1 Typical Section

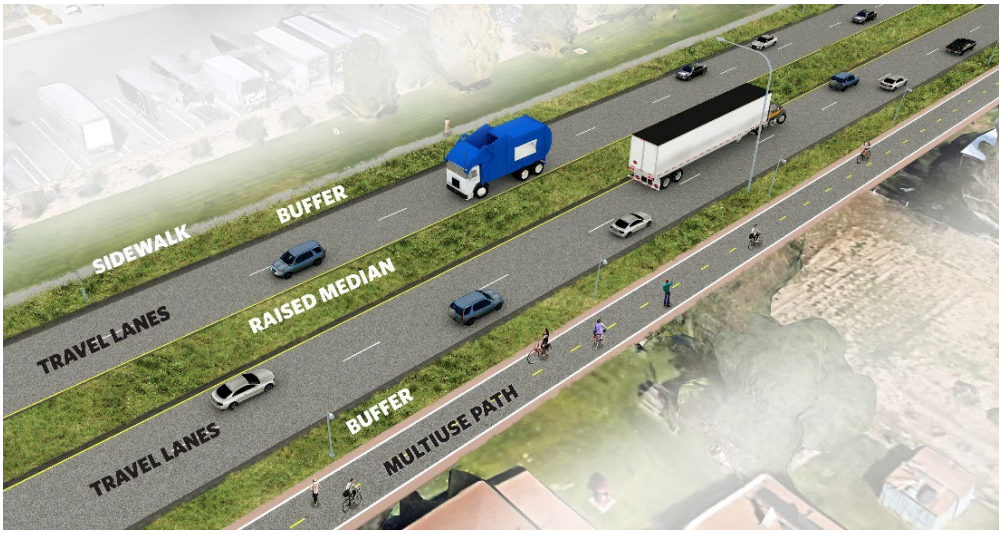
There were three variations of Commerce City's minor arterial typical section (Figure 5) were considered for widening E. 88th Avenue ranging from 82 to 120 feet. These three options are described below.

#### Design Element 1, Typical Section Option 1: Full Minor Arterial Typical Section

This option has two 12- to 14-foot-wide travel lanes in each direction separated by an 8- to 20-foot-wide raised median to form a 4-lane typical section. The typical section includes a 5- to 6-foot-wide sidewalk on one side of E. 88th Avenue and an 8- to 12-foot-wide multiuse path on the other side. Each are separated from the roadway by a 10-to 12-foot-wide buffer. The total width of this typical section is approximately 120 feet. Figure 7 shows a visualization of this option. On pages 9 through 11 of this document are Figure 10, Figure 11, and Figure 12 that show the approximately 120-foot width over an aerial photograph for each evaluated alignment option described in Section 5.1.2.

**Not Retained.** The full typical section width was not needed to achieve the Purpose and Need for the project, and would have the highest right-of-way acquisition impacts to adjacent properties. Right-of-way acquisition would potentially include the Mike High Flea Market, Wikiup Mobile Home Park and several residences south of E. 88th Avenue. The median and buffers would be wider than necessary to provide the service and aesthetic planned for in the corridor.

**Figure 7. Minor Arterial—120-Foot Right-of-Way**




### Design Element 1, Typical Section Option 2: Modified Minor Arterial Typical Section

This option has the same travel lane, median, sidewalk, and multiuse path widths as Typical Section Option 1. However, the vegetated buffer area between the roadway and multiuse path have been reduced to a 6- to- 12- foot section and the buffer between the roadway and the sidewalk has been removed. The vegetated buffer area is occupied by acceleration and deceleration lanes near the Mile High Flea Market entrance and Quince Street to improve traffic operations on E. 88th Avenue and removed at the O'Brian Canal and UPRR crossing to minimize impacts at those historic properties. The total width of this typical section is approximately 95 feet. Figure 8 shows a visualization of this option. On pages 9 through 11 of this document are Figure 10, Figure 11, and Figure 12 that show the approximately 95-foot width over an aerial photograph for each evaluated alignment option described in Section 5.1.2.

**Retained.** This option provides the optimal balance of improved traffic operations and accommodation of pedestrians and bicyclists to meet the Purpose and Need, with fewer right of way impacts than Option 1.

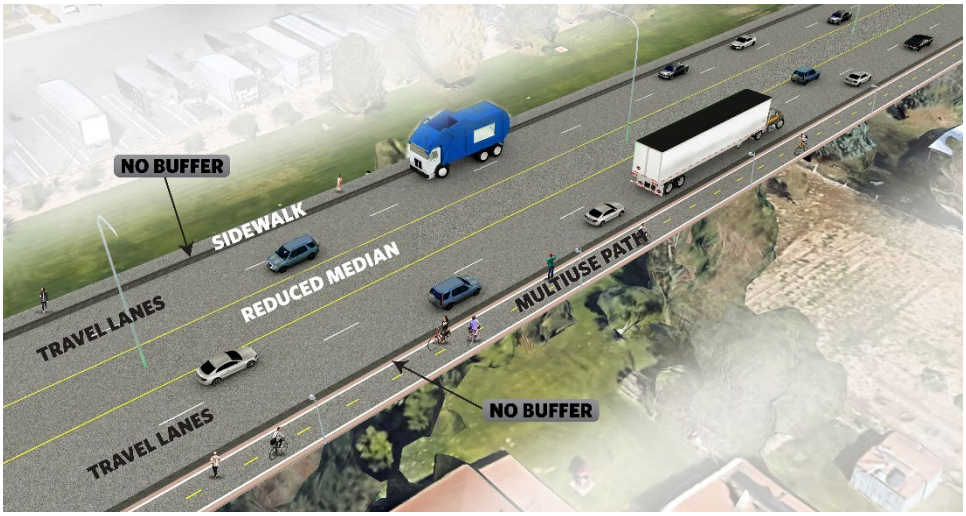
**Figure 8. Minor Arterial—95-Foot Right-of-Way**

### Design Element 1, Typical Section Option 3: Minimum Modified Minor Arterial Typical Section

This option has the same travel lane, sidewalk, and multiuse path widths as Typical Section Options 1 and 2. However, the median is reduced to a 11- to- 13-foot section and would not be raised, and the multiuse path and sidewalks would be located adjacent to the roadway without a buffer between them. There would no additional space for acceleration or deceleration lanes at the Mile High Flea Market or Quince Street. The total width of this typical section is approximately 82 feet. Figure 9 shows a visualization of this option. On pages 9 through 11 of this document are Figure 10, Figure 11, and Figure 12 that show the approximately 82-foot width over an aerial photograph for each evaluated alignment option described in Section 5.1.2.

**Not Retained.** This typical section would minimize right-of-way impacts. It would be less safe for pedestrians and bicyclists than Options 1 and 2 because of the lack of a buffer between the multiuse path and the 4-lane roadway; therefore, it does not address the Purpose and Need as well as Options 1 and 2.

**Figure 9. Minor Arterial—82-Foot Right-of-Way**




## 5.1.2 Alignment

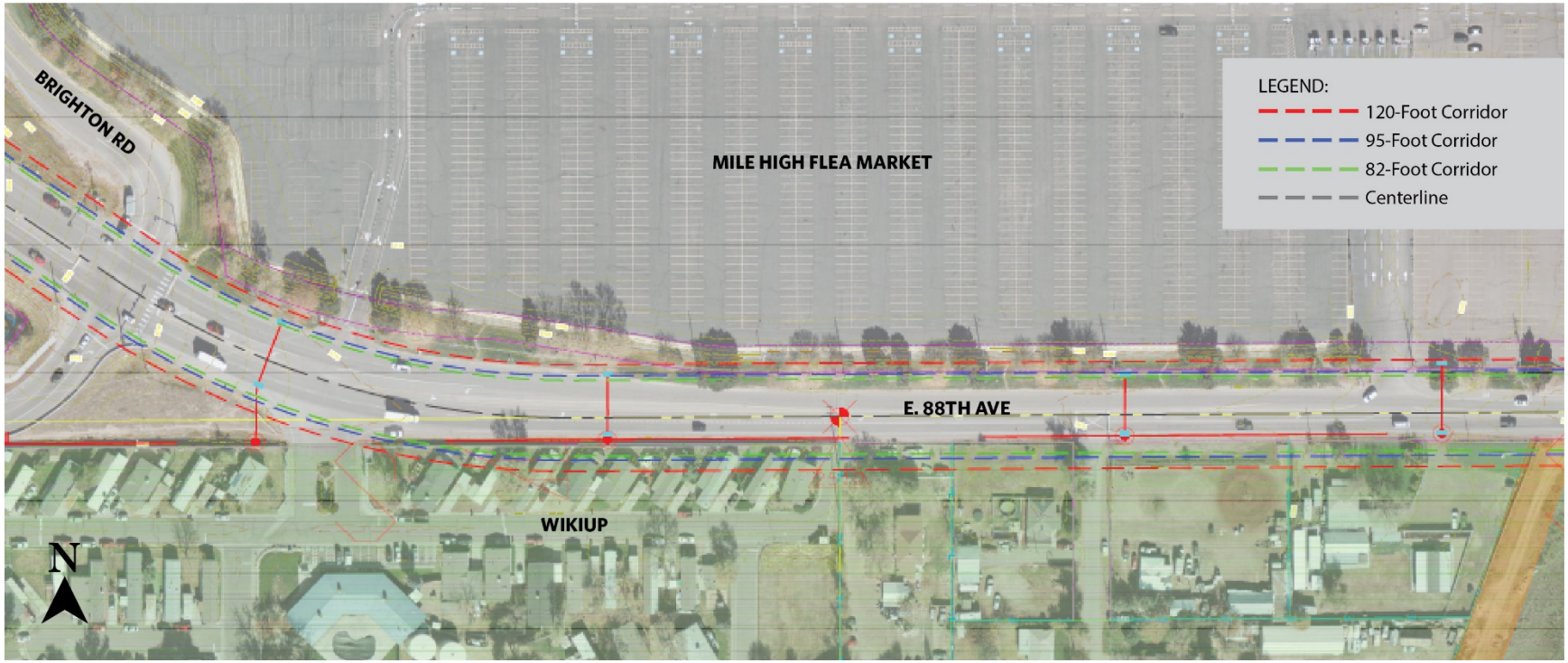
Three alignment options were evaluated between Brighton Road and Rosemary Street to determine if E. 88th Avenue would be widened symmetrically from the centerline, widened to the north, or widened to the south. Most impacts would occur between Brighton Road and the O'Brian Canal, which was the focus of the evaluation. The rationale for the alignment option at the O'Brian Canal and UPRR at-grade crossing is discussed under Design Element 3.

### Alignment Option 1: Widen from the Existing Centerline

This option would maintain the existing E. 88th Avenue centerline and generally widen the roadway symmetrically to both the north and south, as shown in Figure 10.

**Not Retained.** Although the alignment would meet the Purpose and Need, this alignment would require residential relocations from the Wikiup Mobile Home Park. The census block groups surrounding E. 88th Avenue between I-76 and Highway 2 contain environmental justice populations and the Wikiup Mobile Home Park is considered an environmental justice population resource. Design decisions were made to avoid and minimize impacts to environmental justice populations. The Environmental Justice Analysis for the Project is included in the *Community Understanding Report*, located in Appendix A of the Environmental Assessment.

**Figure 10. Alignment Option 1: Widen from the Existing Centerline from Brighton Road to the O'Brian Canal**

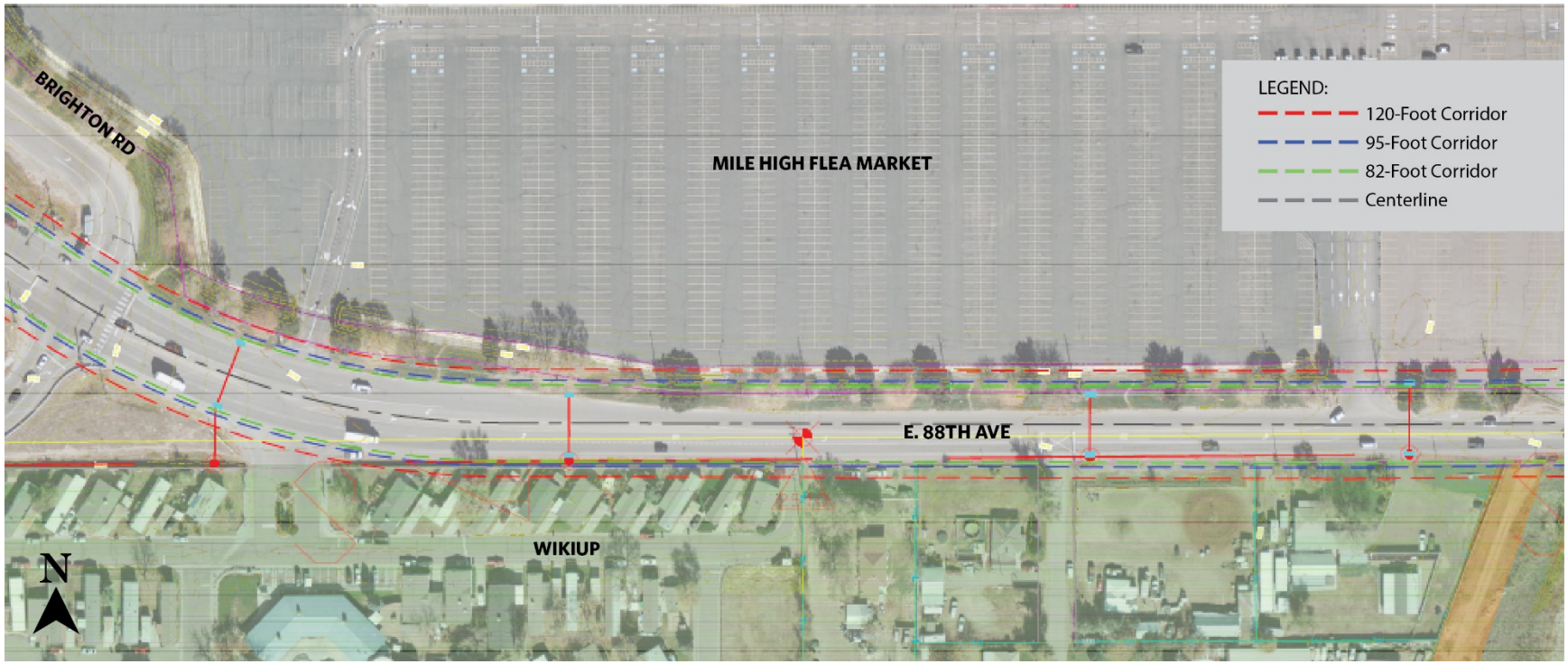


### Alignment Option 2: Widen to the North

This option would widen the roadway to the north by shifting the E. 88th Avenue centerline to the north, as shown below in Figure 11.

**Retained.** This alignment would best meet the Purpose and Need. The widening to the north avoids residential relocations at Wikiup and uses the existing right-of-way preservation easement on the Mile High Flea Market property.

**Figure 11. Alignment Option 2: Widen to the North from Brighton Road to the O'Brian Canal**

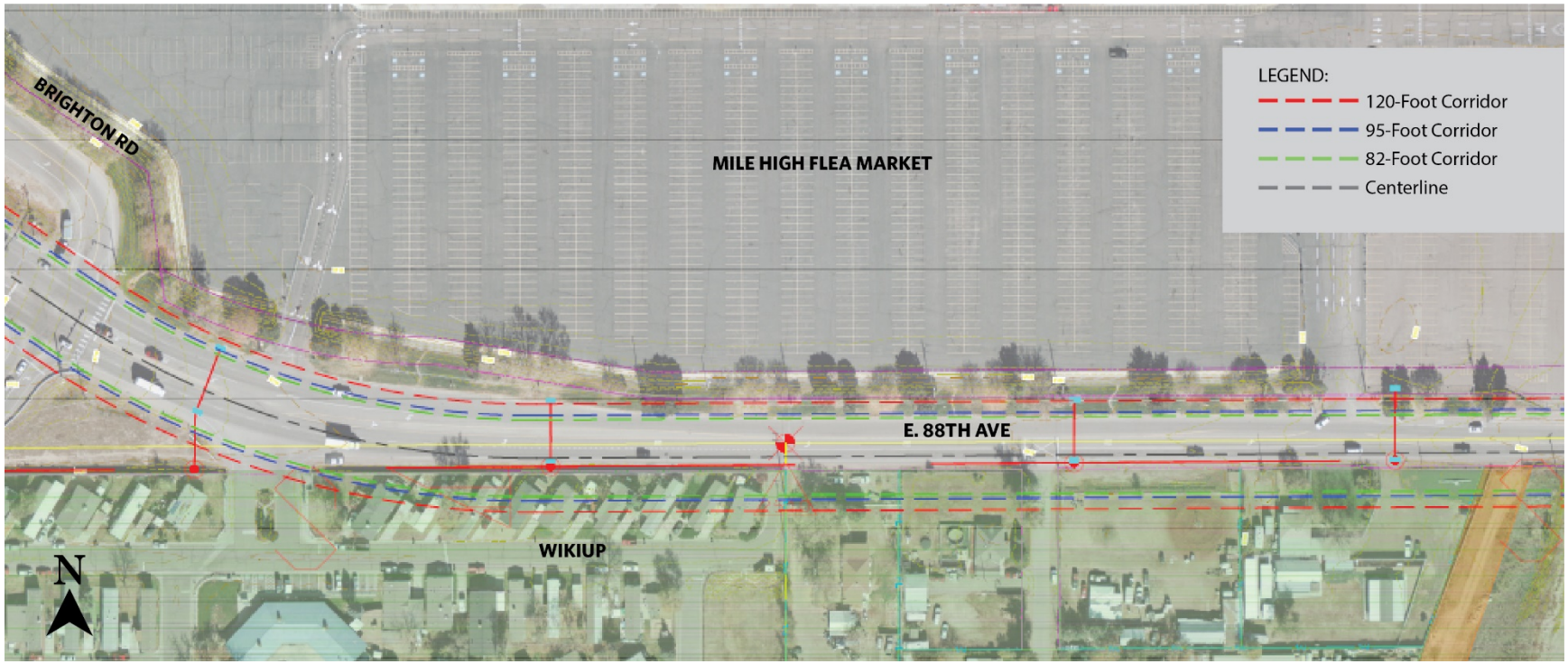


### Alignment Option 3: Widen to the South

This option would widen the roadway by shifting the E. 88th Avenue centerline to the south, as shown below in Figure 12.

**Not Retained.** Although the alignment would meet the Purpose and Need, this alignment would require the most residential relocations from the Wikiup Mobile Home Park. As discussed under Alignment Option 1, the Wikiup Mobile Home Park is considered an environmental justice population resource. Design decisions were made to avoid and minimize impacts to environmental justice populations. The Environmental Justice Analysis for the Project is included in the *Community Understanding Report*, located in Appendix A of the Environmental Assessment.

**Figure 12. Alignment Option 3: Widen to the South from Brighton Road to the O'Brian Canal**



### 5.1.3 Multiuse Path and Sidewalk

The Design Element 1 typical section options included a multiuse path and sidewalk. Options 1 and 2 in this section address the placement of the multiuse path and sidewalk.

#### Multiuse Path and Sidewalk Option 1: Multiuse Path on North Side and Sidewalk on South Side

This option would locate the multiuse path on the north side of E. 88th Avenue and sidewalk on the south side.

**Retained.** This option would meet the Purpose and Need. Placing the multiuse path on the north side of E. 88th Avenue would allow nearly continuous operations on the path, avoiding a conflict point at the E. 88th Avenue and Rosemary Street intersection. Users would cross the signalized main entrance to the Mile High Flea Market and other driveways along the north side of E. 88th Avenue.

#### Multiuse Path and Sidewalk Option 2: Multiuse Path on South Side and Sidewalk on North Side

This option would locate the multiuse path on the south side of E. 88th Avenue and sidewalk on the north side.

**Not Retained.** This option would meet the Purpose and Need. However, a multiuse path on the south side of E. 88th Avenue would cross a busy Rosemary Street, where path users could have to stop at the signal crossing or cross heavy traffic, slowing their trip and incorporating a major conflict point.

## 5.2 Design Element 2: Local Access to E. 88th Avenue Between Brighton Road and the O'Brian Canal

Design Element 2 considered options for proposed local access to E. 88th Avenue between Brighton Road and Rosemary Street.

Breaks in the proposed raised median on E 88th Avenue (Design Element 1) for local access were not considered (with the exception of the existing Mile High Flea Market Entrance design option and the Quince Street Extension intersection design option), because the openings in the raised median would not meet the overall Purpose and Need. Options were broken into two categories: South Side Access (Wikiup, Laurel Drive, and other Local Access on the south side of E. 88th Avenue) and North Side Access (Mile High Flea Market and Quince Street).

Note that Design Options 2 and 3 that have a Quince Street Extension alignment and intersection with E. 88th Avenue are only applicable if the grade separation option at the O'Brian Canal and UPRR is retained in Design Element 3.]

### 5.2.1 South Side Access

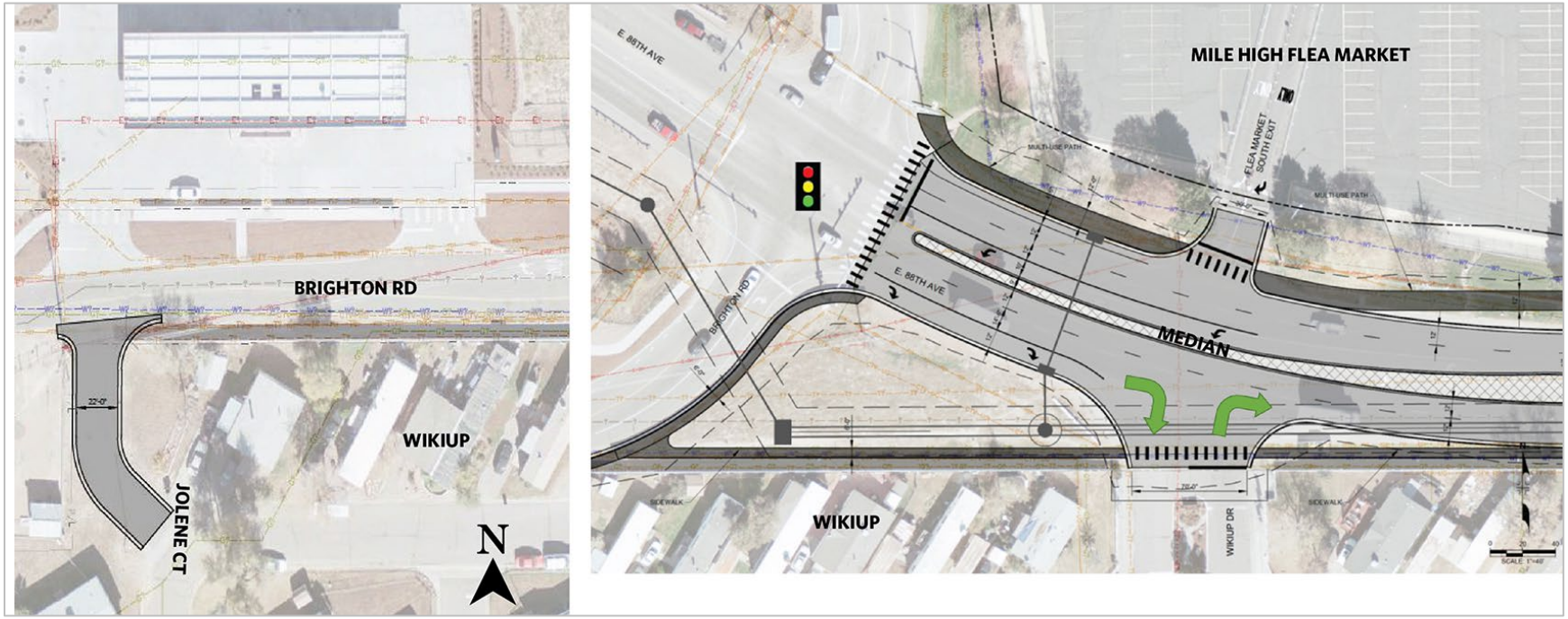
Currently, residents on the south side of E. 88th Avenue can directly access eastbound and westbound E. 88th Avenue. However, each typical section and alignment considered for Design Element 1 has a raised median that prevents left-turn movements onto E. 88th Avenue. Options 1 to 4 in this section are access modifications to adjacent properties and Laurel Drive on the south side of E. 88th Avenue. Four options for access along the south side of E. 88th Avenue were considered and are not mutually exclusive, and it is feasible to retain more than one of these options to best meet the Purpose and Need. These four options are detailed below.

### South Side Access Option 1: Convert Wikiup E. 88th Avenue Entrance to Right-In/Right-Out and Improve the Wikiup Jolene Court Entrance

This option would allow right-in and right-out movements from the Wikiup entrance on E. 88th Avenue. Left turns in and out at this location would no longer be possible. Access to E. 88th Avenue would be from Brighton Road (via Jolene Court) at the existing signalized intersection. The entrance to Wikiup at Jolene Court would be improved to accommodate increased future traffic accessing E. 88th Avenue from Wikiup. Figure 13 illustrates the Jolene Court and E. 88th Avenue Wikiup entrance improvements under this option.

**Retained.** This option would meet the Purpose and Need. Rerouting traffic to an improved Wikiup entrance at Jolene Court and then to the existing signalized intersection of Brighton Road and E. 88th Avenue would improve safety for left-turn movements onto E. 88th Avenue.

**Figure 13. South Side Access Option 1: Convert Wikiup E. 88th Avenue Entrance to Right-in/Right-out and improve the Wikiup Brighton Road Entrance at Jolene Court**

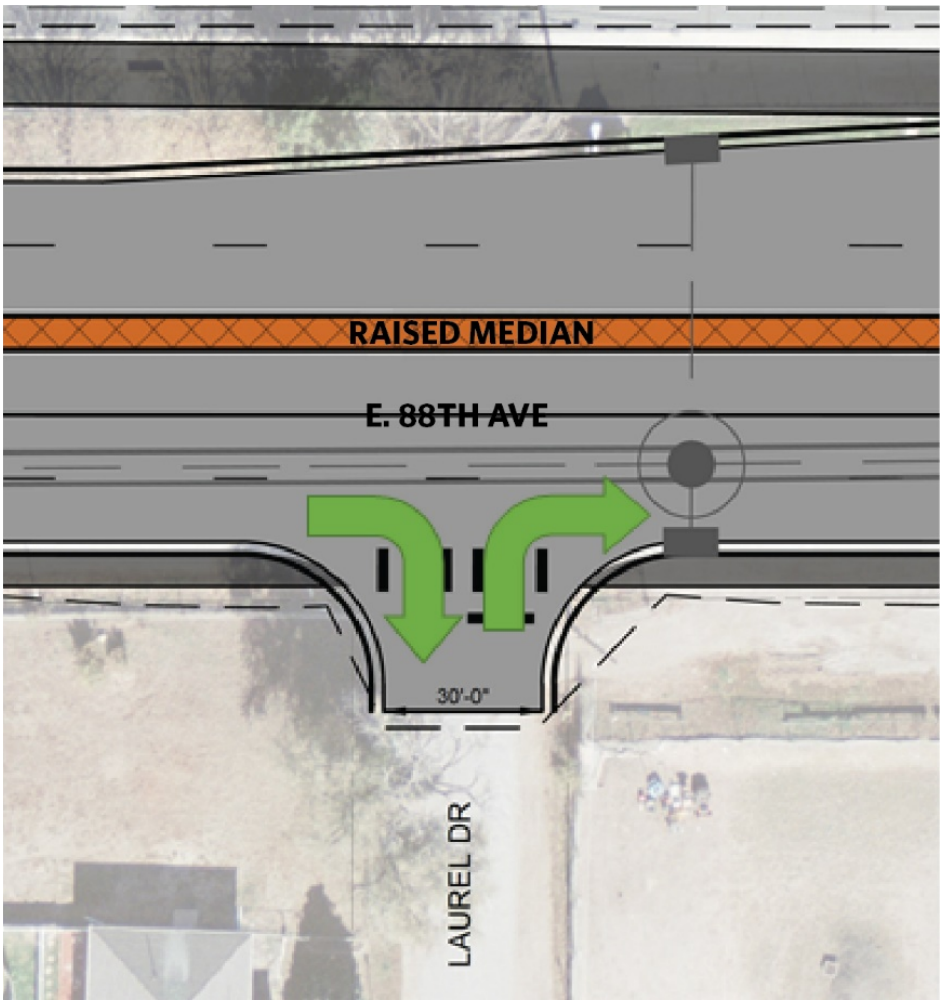


### South Side Access Option 2: Convert Laurel Drive Intersection to Right-in/Right-out

This option would allow right-in and right-out movements from Laurel Drive to E. 88th Avenue. Direct left-turns to and from Laurel Drive would no longer be possible. Figure 14 illustrates this option.

**Retained.** This option would meet the Purpose and Need. During the public meeting on March 27, 2019, Laurel Drive residents stated that turning left was extremely difficult under existing conditions. The proposed raised median on E. 88th Avenue would not allow left turns to or from Laurel Drive, and creating access across the raised median would conflict with access to the Mile High Flea Market. Combined with protected U-turns at Brighton Road and the proposed signalized E. 88th Avenue, and Mile High Flea Market entrance intersection (Option 4), residents would maintain access to and from westbound E. 88th Avenue with minimal out-of-direction travel and protected movements.

**Figure 14. South Side Access Option 2: Convert Laurel Drive to Right-in/Right-out**



### South Side Access Option 3: New Signalized Intersection at Laurel Drive

This option would add a signal at the existing T-intersection of E. 88th Avenue and Laurel Drive. This would allow full movement to and from E. 88th Avenue at Laurel Drive. Figure 15 illustrates this option.

A variation of this option was also considered that relocates the Mile High Flea Market entrance to a signalized intersection with E. 88th Avenue and Laurel Drive.

**Not Retained.** The amount of traffic entering and exiting Laurel Drive would not meet the warrants required to implement a signal at this location. Additionally, creating a new signalized intersection with the relocated Mile High Flea Market entrance would allow less space for left-turning event traffic to queue which would perpetuate existing problems with event traffic queuing on E. 88th Avenue.

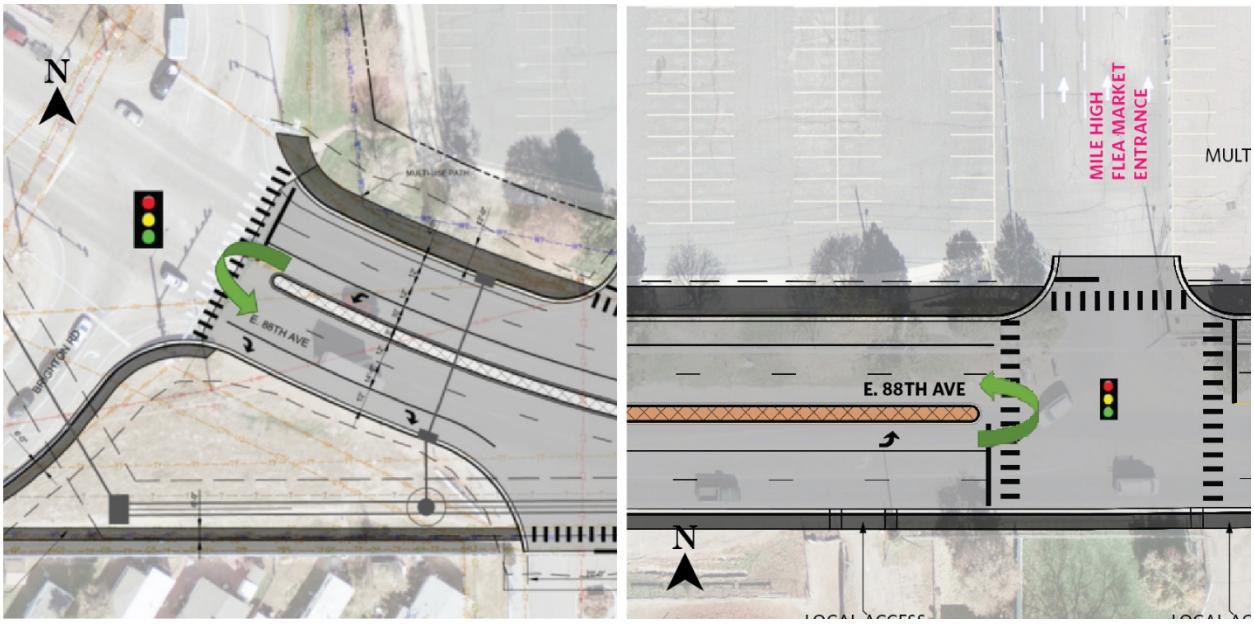
**Figure 15. South Side Access Option 3: New Signalized Intersection at Laurel Drive**

### South Side Access Option 4: Protected U-Turns

This option would provide protected U-turns for westbound E. 88th Avenue traffic at the intersection of Brighton Road and for eastbound traffic at the intersection with the Mile High Flea Market entrance. Figure 16 illustrates this option.

**Retained.** This option would meet the Purpose and Need. Protected U-turn movements at Brighton Road and the intersection of E. 88th Avenue and the Mile High Flea Market entrance would provide a safe means for westbound traffic to turn around to travel eastbound and access properties on the south side of E. 88th Avenue. The protected U-turn movements would also allow eastbound traffic to turn around to travel westbound and access Brighton Road and I-76.

**Figure 16. South Side Access Option 4: Protected U-Turns**




## 5.2.2 North Side Access

Design options were considered that would maintain or provide similar access to the Mile High Flea Market as currently exists. Under design options with grade separation at the UPRR in Design Element 3, businesses on Quince Street would need a new way to access E. 88th Avenue; therefore, new alignment options for a Quince Street extension were considered north and south of E. 88th Avenue for Design Element 2. Design options with a Quince Street Extension alignment and intersection with E. 88th Avenue are only applicable if the grade separation option at the O'Brian Canal and UPRR is retained in Design Element 3. Options 1 and 2 are compatible with Options 3, 4 and 5.

### North Side Access Option 1: Double Eastbound to Northbound Left-Turn Lanes to Mile High Flea Market

This option would have two travel lanes for eastbound E. 88th Avenue traffic and two 730-foot-long left-turn lanes at a new signalized intersection at the Mile High Flea Market entrance. The 730-foot-long left-turn lanes would match the length of the existing left-turn lane and provide a taper. The left-turn lanes

would accommodate eastbound event traffic entering the Mile High Flea Market. This intersection configuration could be implemented at the existing Mile High Flea Market entrance or at a relocated entrance. Figure 17 illustrates this option.

**Not Retained.** This option would meet the Purpose and Need. Mile High Flea Market event traffic currently backs up on E. 88th Avenue and the additional left-turn capacity would ease that conditions, while allowing for through traffic. However, the two standard left-turn lanes would require more right of way than North Side Access Option 2, while the two intersection options would have the same operational performance.

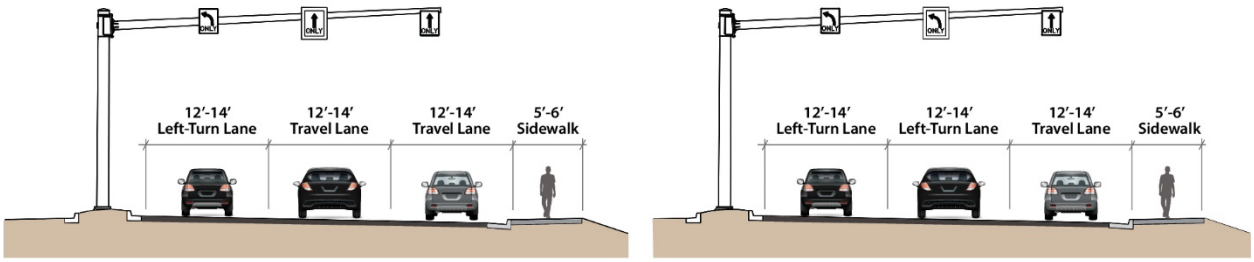
**Figure 17. North Side Access Option 1: Double Eastbound to Northbound Left-turn Lanes to Mile High Flea Market**

### North Side Access Option 2: Single Eastbound to Northbound Left-Turn Lane and Dynamic Lane Assignment

During normal operations, this option would have two travel lanes and a single approximately 730-foot-long left-turn lane at a new signalized intersection at the Mile High Flea Market entrance. During high-volume event traffic at the Mile High Flea Market, the inside travel lane would be "dynamically" repurposed and used as a left-turn lane, which would maintain one travel lane for through traffic. The permanent left-turn lane and dynamic left-turn lane would accommodate eastbound event traffic entering the Mile High Flea Market. Figure 18 illustrates this option.

**Retained.** This option would meet the Purpose and Need. The dynamically assigned lane has the benefits of Option 1 without the right-of-way needed for an additional lane.

**Figure 18. North Side Access Option 2: Single Eastbound to Northbound Left-turn Lane and Dynamic Lane Assignment**

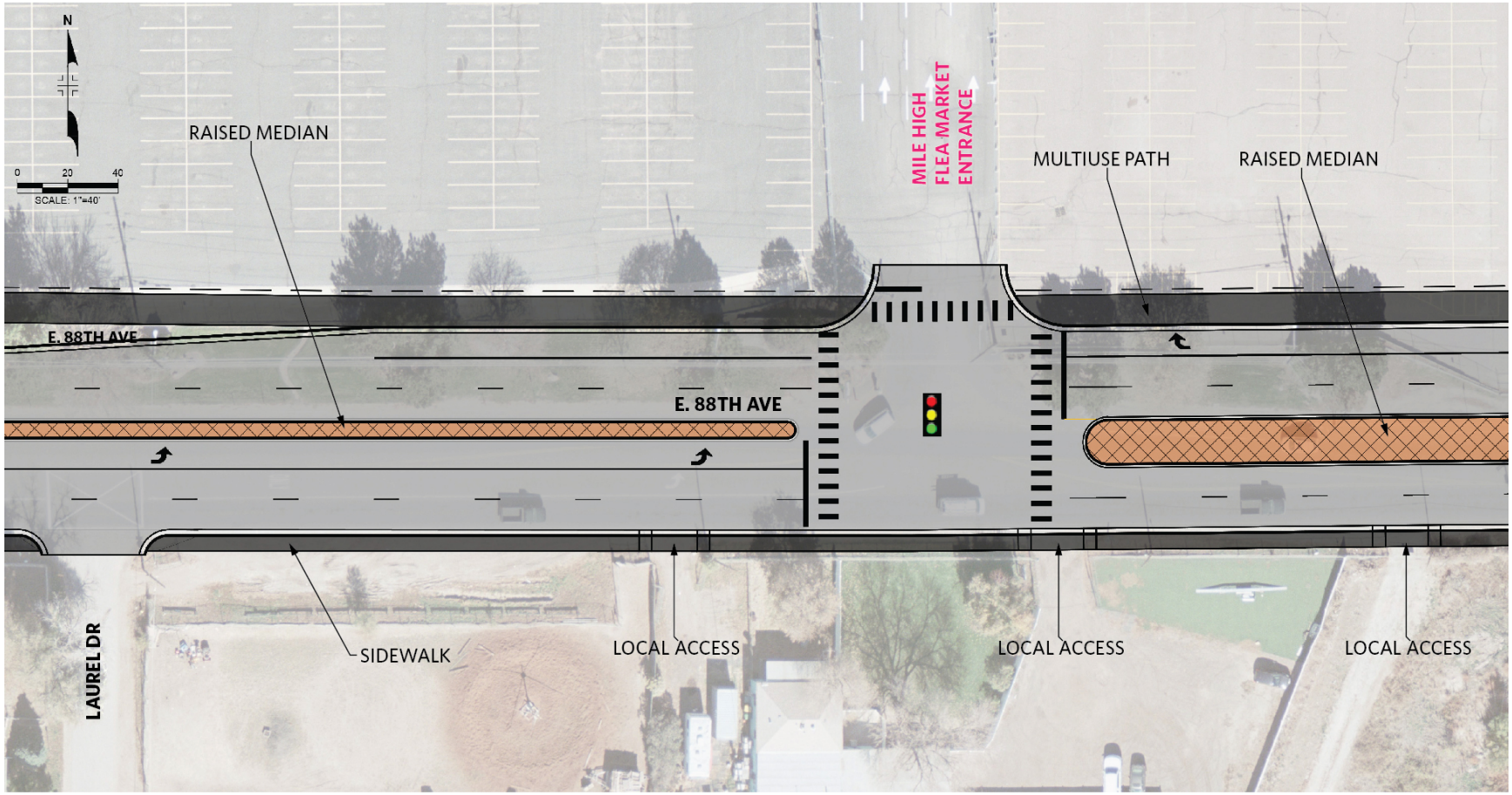



### North Side Access Option 3: Improve Mile High Flea Market Entrance and Potential Offset Quince Street Extension Intersection

This option would improve the existing E. 88th Avenue and Mile High Flea Market entrance. The intersection would remain a T-intersection; however, it would be signalized, a left-turn lane would be added, and it would be widened sufficiently to accommodate the typical section retained for Design Element 1. The option could be implemented with or without the Quince Street Extension, depending on which design option is retained in Design Element 3: at-grade crossings at the O'Brian Canal and UPRR track or a grade-separated crossing of the O'Brian Canal and/or UPRR track.

If at-grade crossings at the O'Brian Canal and UPRR track are retained in Design Element 3, then no Quince Street Extension would occur, and existing Quince Street would continue to tie directly into E. 88th Avenue. Section 5.3.3 describes the at-grade and grade-separated options for Design Element 3. Figure 19 illustrates this design option without an offset Quince Street Extension intersection.

**Figure 19.North Side Access Option 3: Improved Mile High Flea Market Entrance with Signalized Intersection**

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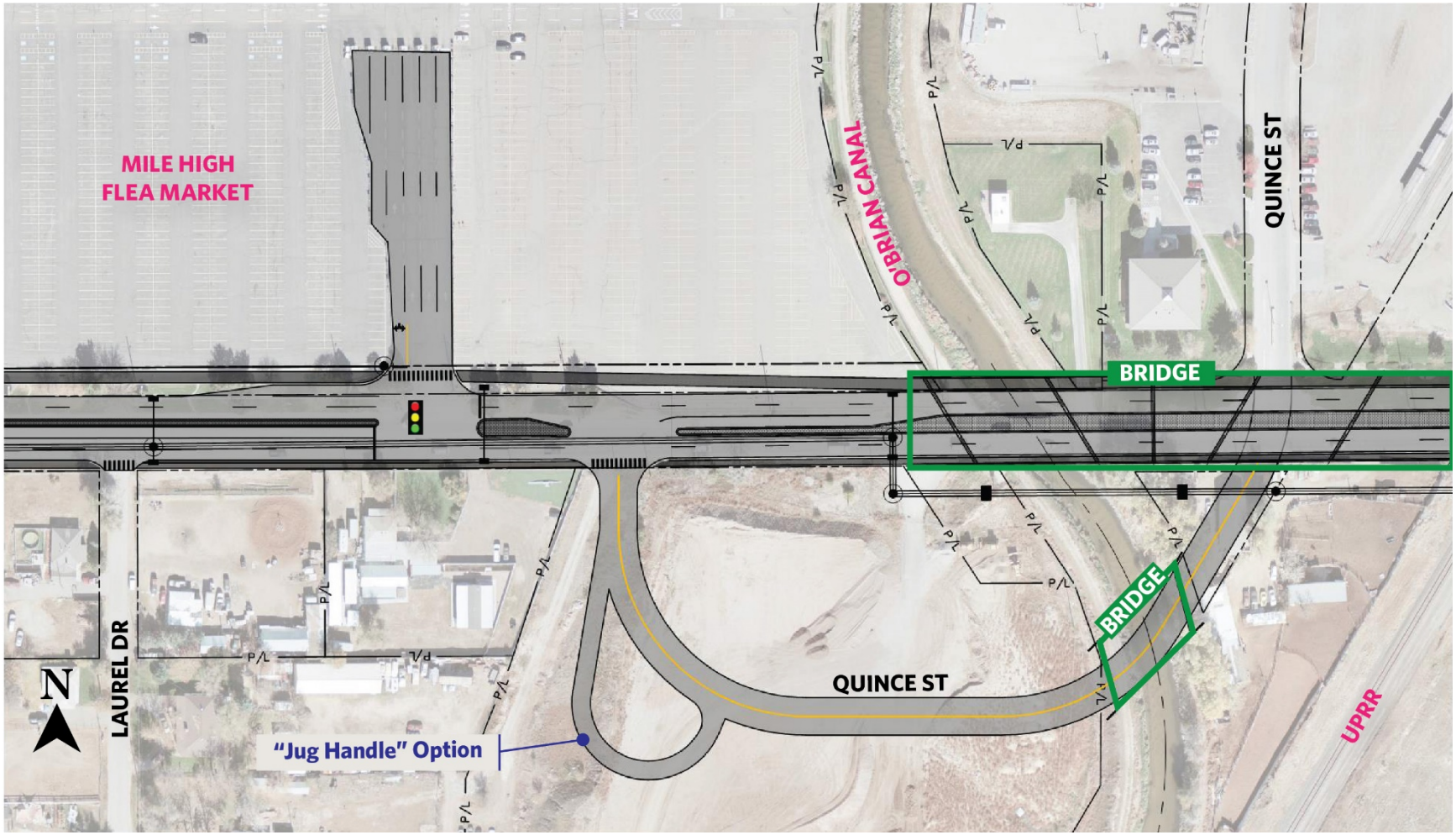
If a grade-separated crossing of the O'Brian Canal and UPRR tracks is retained in Design Element 3, then a new alignment of Quince Street would extend to the south under the new E. 88th Avenue grade-separated bridge. Quince Street would cross the O'Brian Canal on a new bridge and continue west and north to connect to E. 88th Avenue at a new T-intersection. The Mile High Flea Market entrance would be maintained in its existing location. This option could include a "jug handle," which is an additional lane that provides space for traffic to turn around. Eastbound E. 88th Avenue traffic would turn right onto the Quince Street Extension and use the jug handle to make a U-turn and turn left onto westbound E. 88th Avenue. Figure 20 illustrates this design option with the Quince Street Extension intersection and the "jug handle" option.

**Retained**. The option to improve the Mile High Flea Market entrance at its current location would meet the Purpose and Need with fewer impacts to Mile High Flea Market Operations than other North Side Access Options. Because the grade-separated crossing of the O'Brian Canal and UPRR track is not retained as a part of Design Element 3, the corresponding Quince Street Extension and intersection is not included in this retained design option. Figure 19 illustrates this design option without an offset Quince Street Extension intersection.

**Figure 20. North Side Access Option 3: Improved Mile High Flea Market Entrance with Signalized Intersection and Offset Quince Street Extension Intersection with 88th Avenue**



### North Side Access Option 4: Consolidate Mile High Flea Market and Quince Street Extension Access—North Alignment

This option would extend Quince Street to the west north of E. 88th Avenue across a new bridge over the O'Brian Canal, and consolidate the Mile High Flea Market entrance and Quince Street access to E. 88th Avenue at a new T-intersection. Figure 21 illustrates this option. This design option is only applicable if grade separation is retained in Design Option 3.

**Not Retained.** This option would meet the Purpose and Need. This option would result in the acquisition of approximately 4.75 acres of the Mile High Flea Market parking lot and additional right of way from businesses along existing Quince Street. Consolidating access points causes logistical concerns during events at the Mile High Flea Market. Because the grade-separated crossing of the O'Brian Canal and UPRR track is not retained as a part of Design Element 3, the corresponding Quince Street Extension is not applicable.

### North Side Access Option 5: Consolidate Mile High Flea Market and Quince Street Extension Access—South Alignment

This option would extend Quince Street to the south under the new E. 88th Avenue grade-separated bridge across a new bridge over the O'Brian Canal, and continue west and north to connect to E. 88th Avenue at a new signalized intersection. The existing Mile High Flea Market entrance would be relocated at the north leg of the new intersection. Figure 22 illustrates this option. This design option is only applicable if grade separation is retained in Design Option 3.

**Not Retained.** This option would meet the Purpose and Need. However, it would require the relocation of the Mile High Flea Market entrance, causing impacts to that business, and it would require 0.8 acre of right-of-way acquisition south of E. 88th Avenue for the Quince Street Extension alignment, including one residential displacement. Because the grade-separated crossing of the O'Brian Canal and UPRR track is not retained as a part of Design Element 3, the corresponding Quince Street Extension is not applicable.

**Figure 21. North Side Access Option 4: Consolidate Mile High Flea Market and Quince Street Extension Access—North Alignment**

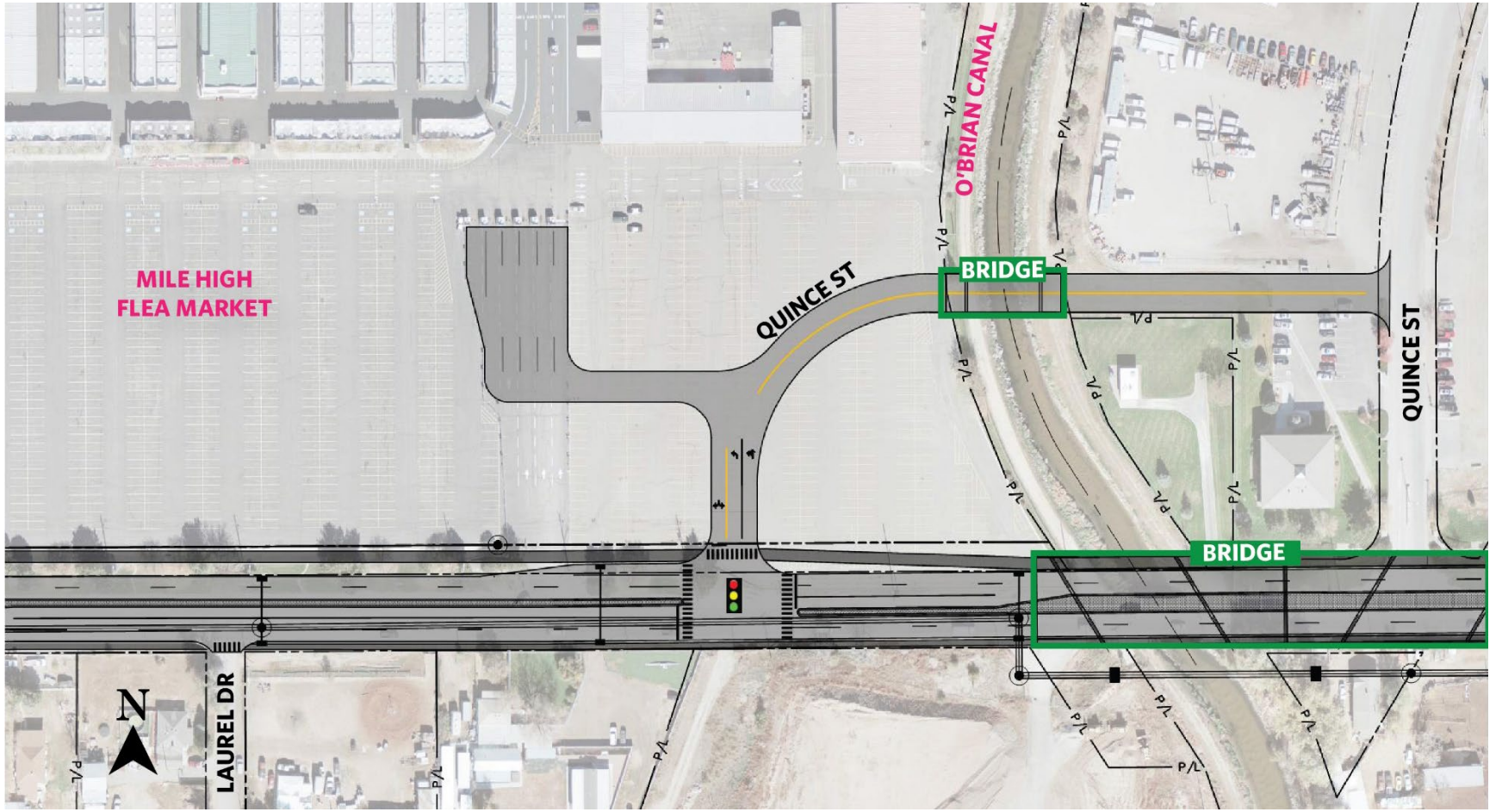
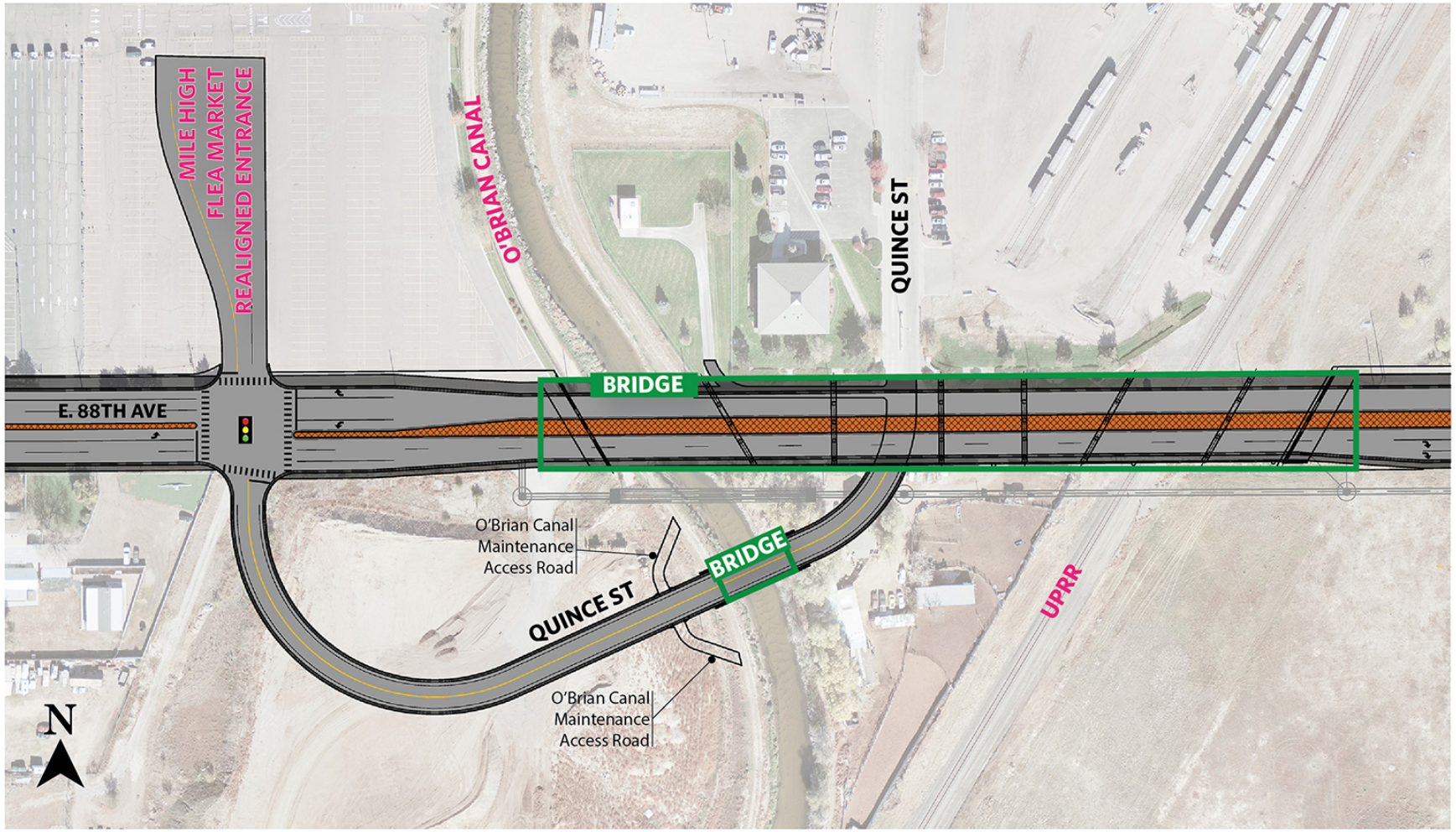


**Figure 22. North Side Access Option 5: Consolidate Mile High Flea Market and Quince Street Extension Access—South Alignment**



## 5.3 Design Element 3: O'Brian Canal and UPRR Track Crossings

Grade-separated and at-grade crossing types were considered at the O'Brian Canal and UPRR tracks.

### 5.3.1 O'Brian Canal and UPRR Track Crossings, Grade Separated

Multiple options for a grade separation of the UPRR track and E. 88th Avenue were considered. Two of these were dismissed early on:

- Reconstructing E. 88th Avenue to pass under the UPRR track would not be feasible without permanent impacts to the O'Brian Canal because of its proximity and parallel orientation to the railroad track. E. 88th Avenue can't pass over the O'Brian Canal and then under UPRR tracks without impacting the alignment of the O'Brian Canal; therefore, this option was dismissed.
- Reconstructing the UPRR over E. 88th Avenue would be very expensive because of how long the railroad bridge structures would be on the north and south sides of E. 88th Avenue and would have economic impacts to businesses that rely on at-grade access to the railroad; therefore, this option was dismissed.

Additional options for grade separation were then considered, including E. 88th Avenue going over the UPRR on a bridge and the UPRR going under E. 88th Avenue through an underpass. The options for grade separation also determine how Quince Street access can be maintained.

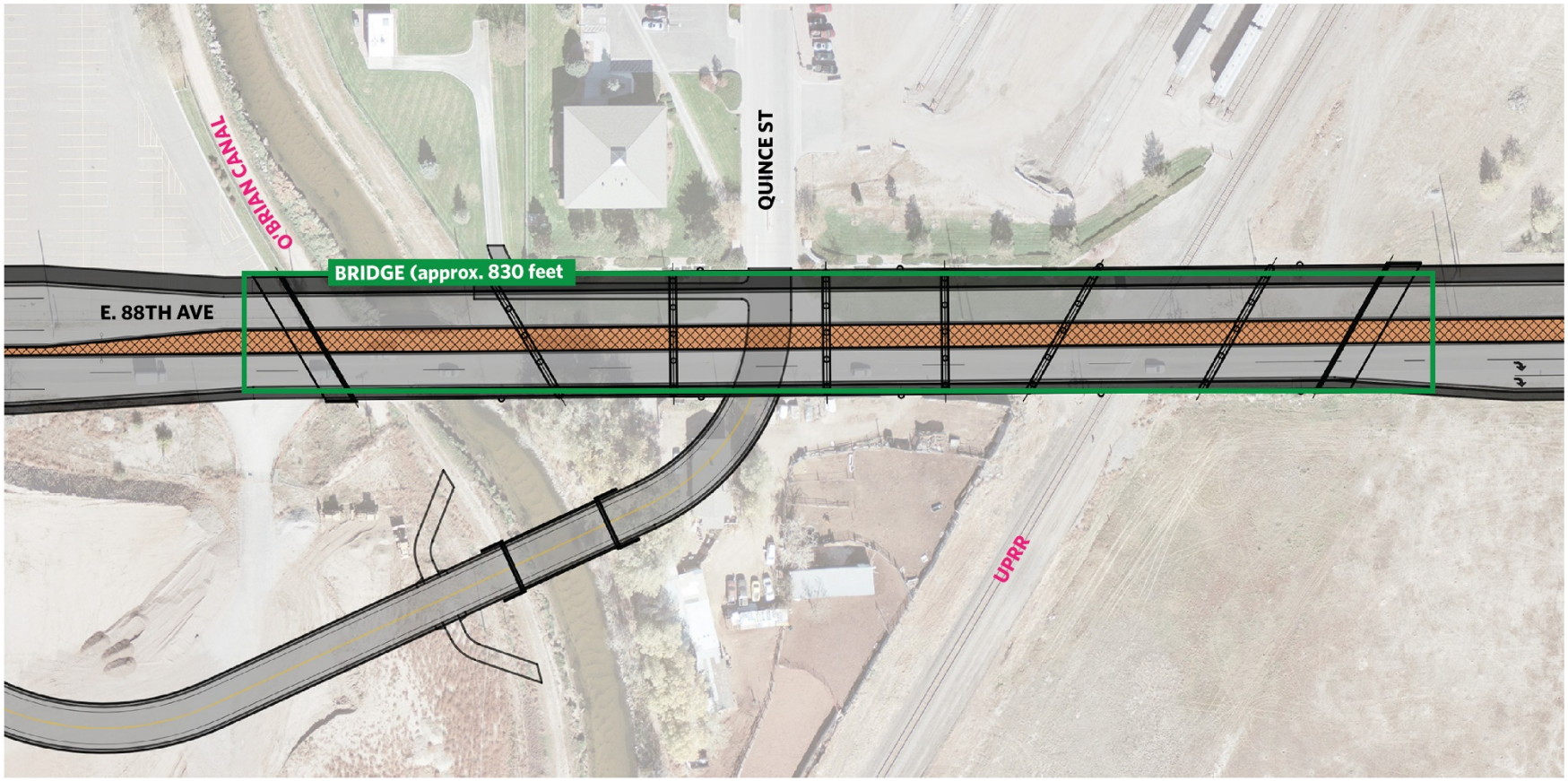
#### Crossing Option 1: E. 88th Avenue Grade-Separated Bridge Over UPRR Track

This option would construct a new bridge immediately north of the existing E. 88th Avenue crossing of O'Brian Canal. The bridge would begin just west of the O'Brian Canal, span over the O'Brian Canal, a new Quince Street extension, and the UPRR track, and terminate west of Rosemary Street. The bridge would have a minimum clearance of 23 feet 4 inches over the railroad for maintenance and operation of the track. Figure 23 illustrates this option. Access to Quince Street would be relocated but maintained.

**Not Retained.** This option would meet the Purpose and Need. Although it would avoid freight train conflicts with E. 88th Avenue and have fewer economic impacts to the railroad and companies during and after construction compared to Options 2 and 3, it would have more impacts to protected historic resources and substantially higher overall cost (over 65% increase in overall cost) than Option 3.

Based on a project-specific survey of freight train crossings at this location and limited fiscal resources to address the issue, grade-separation at this location would not be practical. This UPRR corridor intersects with several cross streets in Commerce City. Commerce City is currently conducting a study to prioritize which crossings would most benefit from local investment in grade separations. Early indications from the study to prioritize UPRR crossings are that the E. 88th Avenue crossing is not likely to be recommended by the study as a top crossing for traffic delays and therefore, not a priority investment for grade-separation. Additionally, during meetings with stakeholders, comments were received that grade separation at this location would not be as beneficial as at other locations in Commerce City.

**Figure 23. Crossing Option 1: E. 88th Avenue Grade-Separated Bridge over UPRR Track**



### Crossing Option 2: UPRR Track Under E. 88th Avenue

This option would reconstruct the UPRR track under E. 88th Avenue, as an underpass. This option would maintain a minimum clearance of 23 feet 4 inches over the railroad and require reconstructing approximately 6,600 linear feet of UPRR track to achieve a 1% grade for freight train movement. Figure 24 illustrates this option.

**Not Retained.** This option would meet the Purpose and Need. It would require grading and reconstruction of the UPRR track to achieve the minimum required clearance under E. 88th Avenue. Changing the grade of the track north of E. 88th Avenue would impact operations of adjacent businesses that rely on access to the railroad.

**Figure 24. Crossing Option 2: UPRR Track Under E. 88th Avenue**

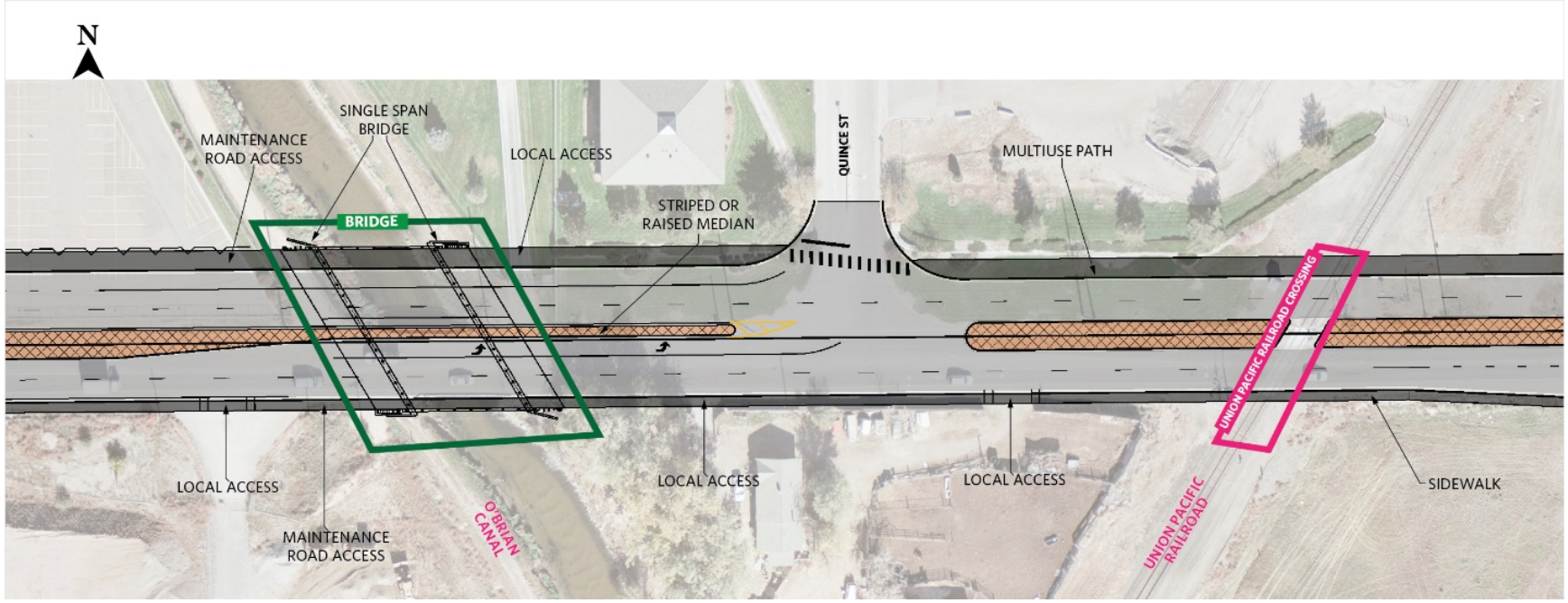
### 5.3.2 O'Brian Canal and UPRR Track Crossings, At Grade

**Crossing Option 3: E. 88th Avenue At-Grade Bridge Over O'Brian Canal and At-Grade Crossing of UPRR track**

This option would construct a new E. 88th Avenue single-span bridge with a widened typical section to replace the existing bridge over the O'Brian Canal. The typical section would have two travel lanes in each direction and the sidewalk and multiuse path features described under Design Element 1 (the median may be striped instead of raised), an acceleration lane for westbound vehicles from existing Quince Street, and a left-turn lane for eastbound traffic entering Quince Street; there would be no buffer between the roadway and multiuse path. The widened E. 88th Avenue would then cross the existing UPRR tracks at-grade with a raised median directly on each side of the track crossing. Figure 25 illustrates this option.

**Retained.** This option would meet the Purpose and Need. At-grade crossings would minimize social and economic impacts and substantially reduce project cost compared to the other Design Element 3 options. The increased roadway capacity would reduce queue length and raised medians would prevent illegal U-turns. Comments from stakeholder input in the corridor also suggests that the delays caused by freight trains at this location have decreased recently. Three structure types were considered for the E. 88th Avenue at-grade bridge over the O'Brian Canal: a box culvert, a pre-cast arch, and a single-span bridge. The single-span bridge was chosen because it caused fewer effects to the historic O'Brian Canal resource.

**Figure 25. Crossing Option 3: E. 88th Avenue At-Grade Bridge Over O'Brian Canal and At-Grade Crossing of UPRR Track**



### 5.3.3 Typical Section and Alignment for Crossings

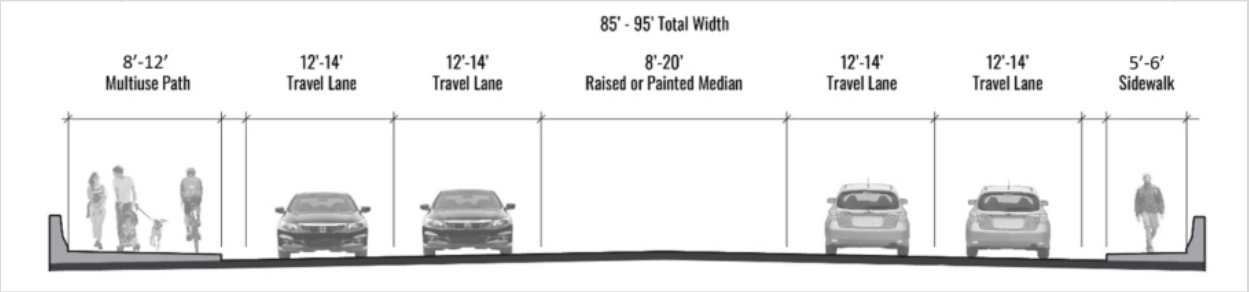
Only a Modified Minor Arterial Typical Section option was considered for Design Element 3 because the alignment and typical section for Design Element 3 would generally match the alignment and typical section retained for Design Element 1.

#### Design Element 3, Typical Section Option 1: Reduced Modified Minor Arterial Typical Section

This option would have two travel lanes in each direction and the sidewalk and multiuse path features described for each typical section option under Design Element 1; however, the width of the median and buffer between the roadway and multiuse path would be reduced. Figure 26 illustrates this option. If implemented with an at-grade crossing of the O'Brian Canal, an acceleration lane for westbound vehicles from existing Quince Street and a left-turn lane for eastbound traffic entering Quince Street would be included (Figure 23), which would increase the roadway width to approximately 104 feet.

**Retained.** This option would meet the Purpose and Need. The reduced width of the typical section across a grade-separated bridge or at-grade crossing would minimize impacts to the O'Brian Canal while accommodating the roadway, bicycle, and pedestrian features retained for Design Element 1 to accommodate bicycle and pedestrian improvements the length of the project.

**Figure 26. Design Element 3, Typical Section Option 1: Reduced Modified Minor Arterial Typical Section**




## 5.4 Design Element 4: E. 88th Avenue and Rosemary Street Intersection

There are two options for the Rosemary Street approach to the E. 88th Avenue intersection. This intersection would be widened to accommodate the projected traffic volume in 2040. Either option could be implemented with an at-grade or grade-separated crossing at the O'Brian Canal and/or UPRR in Design Element 3.

### Rosemary Street Approach Option 1: Short Option

This option would reconstruct the E. 88th Avenue and Rosemary Street intersection as a T signalized intersection, matching its current configuration. The centerline of the Rosemary Street approach to E. 88th Avenue would be shifted approximately 25 to 30 feet to the west to limit impacts to the 88 Drive-In Theatre, and the wider typical section would taper down to the existing Rosemary Street typical section and alignment after approximately 800 feet. The widened Rosemary Street approach would have two left-turn lanes and one right-turn lane northbound and one lane southbound. The existing private access east of the intersection for the 88 Drive-In Theatre exit traffic would be maintained. Figure 27 illustrates this option.

**Not Retained.** This option would meet the Purpose and Need. This option would not accommodate a dedicated left-turn to the 88 Drive-in Theatre entrance on Rosemary Street and would not result in the same improved level of traffic operation improvements on the Rosemary Street approach to E. 88th Avenue as Option 2.

**Figure 27. Rosemary Street Approach Option 1: Short Option**

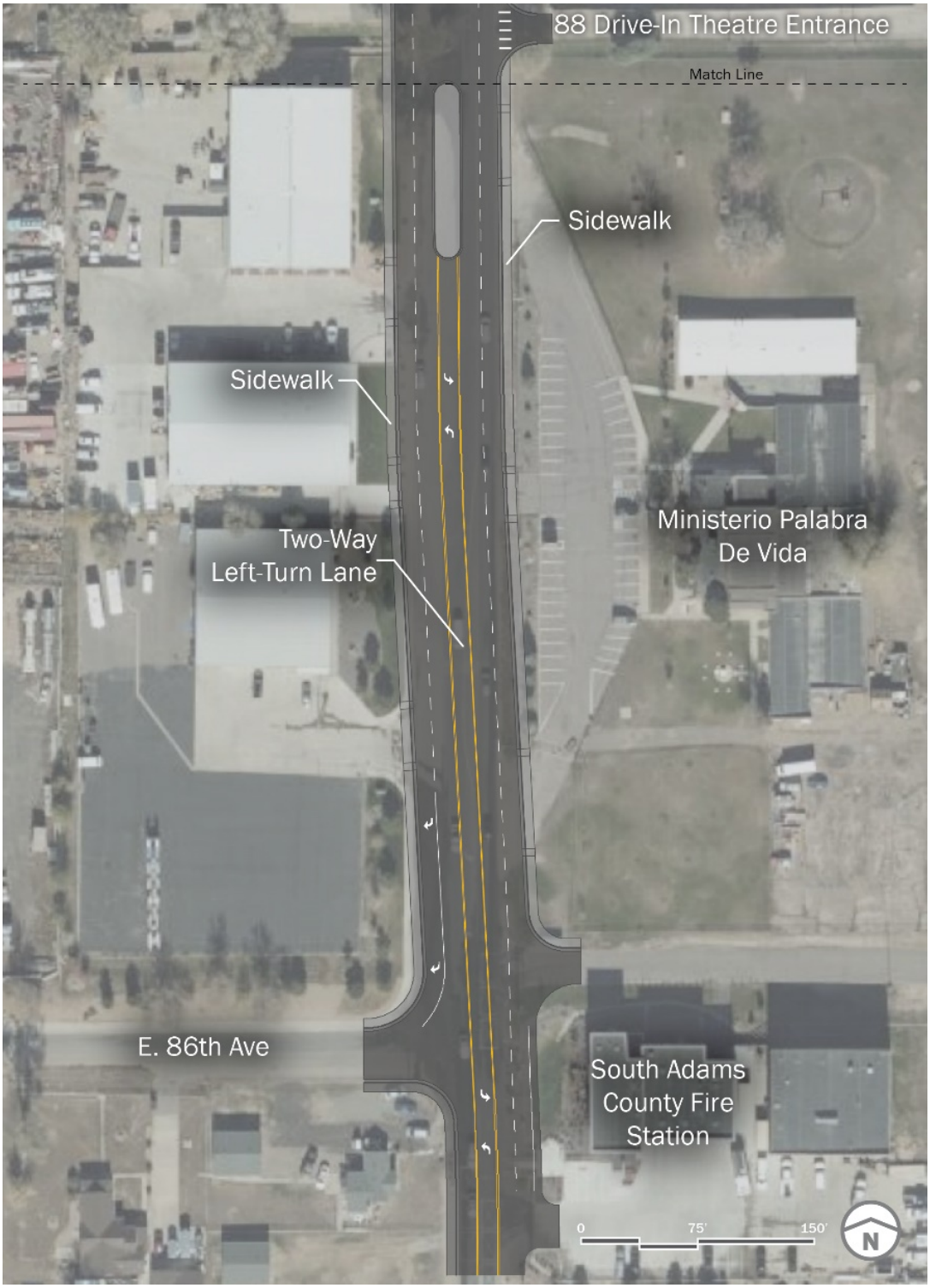
### Rosemary Street Approach Option 2: Long Option

This option would reconstruct the intersection of Rosemary Street and E. 88th Avenue as a T signalized intersection, matching its current configuration. The centerline of the Rosemary Street approach to E. 88th Avenue would be shifted approximately 25 to 30 feet to the west to limit impacts to the 88 Drive-In Theatre. The typical section with four through lanes and a center turn lane on Rosemary Street would taper down at E. 86th Avenue approximately 1,750 feet south of E. 88th Avenue. At the intersection, Rosemary Street would have two left-turn lanes and a right-turn lane northbound and two lanes southbound. The existing private access east of the intersection for the 88 Drive-In Theatre exit traffic would be maintained. A left-turn lane on southbound Rosemary Street would accommodate event traffic to the 88 Drive-In Theatre. Figure 28a and Figure 28b illustrate this option.

**Retained.** This option would meet the Purpose and Need. Although this option would require more right-of-way acquisition than Option 1, it would improve traffic operations and would have a dedicated left-turn to the 88 Drive-in Theatre. Further, increased capacity on the Rosemary Street approach would provide better access from properties adjacent to Rosemary Street to E. 88th Avenue, including the South Adams County Fire Department.

**Figure 28a. Rosemary Street Approach Option 2: Long Option**

**Figure 28b. Rosemary Street Approach Option 2: Long Option**



## 5.5 Design Element 5: E. 88th Avenue Typical Section and Alignment Between Rosemary Street and Highway 2

As noted in Section 3.0, the DRCOG 2015 and project-specific projected 2040 travel demand model traffic volumes for E. 88th Avenue are three times higher west of Rosemary Street than they are to the east. The eastern corridor between Rosemary Street and Highway 2 is surrounded by industrial land use on the north side and a mix of industrial and residential land uses on the south side with many direct access points onto E. 88th Avenue. Existing conditions warranted consideration of Commerce City's Local Industrial Collector Typical Section template (Commerce City, 2017) to determine if it could meet the Purpose and Need while reducing the need for right-of-way acquisition and access modification. Both Minor Arterial Typical Section and Local Industrial Collector Typical Section Options were considered.

### Design Element 5, Typical Section Option 1: Minor Arterial Typical Section

This option would construct E. 88th Avenue as a Minor Arterial, similar to Design Element 1, Typical Section Options 1, 2, and 3. The Minor Arterial typical section has two travel lanes in each direction separated by a raised median to form a four-lane typical section. The typical section would include a sidewalk on one side of E. 88th Avenue and a multiuse path on the other side. The multiuse path would be located on the same side of E. 88th Avenue as it is under the retained option from Design Element 1. The multiuse path would be separated from the roadway by a buffer area, which could be vegetated. The width of this typical section option would be approximately 82 to 120 feet, the same range of widths screened for Design Element 1, Options 1, 2, and 3.

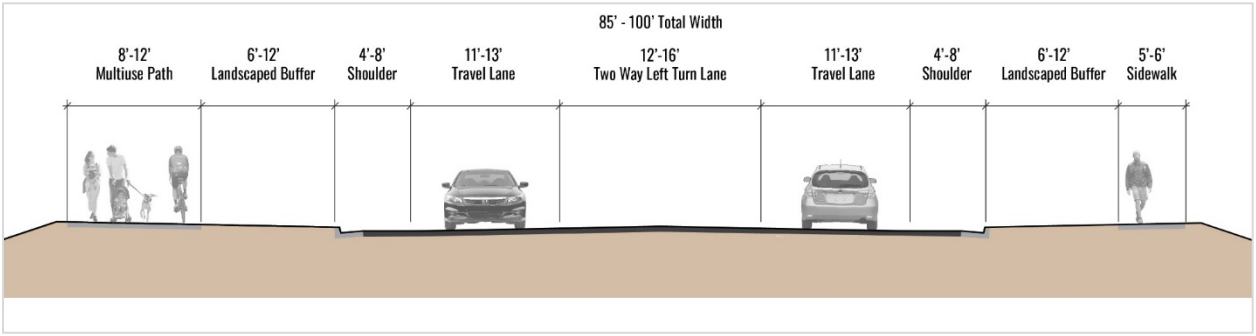
**Not Retained.** This option would meet the Purpose and Need. However, existing and projected traffic counts within this section of E. 88th Avenue are lower than what a Minor Arterial roadway is typically recommended to accommodate. Additionally, because of the raised median, many left-turn bays would be needed and some access would need to be consolidated to achieve the required spacing between access points.

### Design Element 5, Typical Section Option 2: Modified Local Industrial Collector Typical Section

This option would construct E. 88th Avenue as a modified Local Industrial Collector ranging from 85 to 100 feet wide. Both directions of E. 88th Avenue would have an 11- to 13-foot-wide travel lane with a 4- to 8 -foot-wide shoulder. This section would also have a 12- to 16-foot-wide two-way left-turn lane. One side would have a 5- to 6-foot-wide sidewalk with a 6- to 12-foot-wide buffer and the other would have an 8- to 12-foot-wide multiuse path with a 6- to 12-foot-wide buffer. Both buffers could be vegetated. The multiuse path would be located on the same side of E. 88th Avenue as it is under the retained option from Design Element 1. The alignment of E. 88th Avenue would be widened approximately 4 to 12 feet to the north to accommodate the wider typical section. Commerce City's standard typical section for Major Collector/Local Industrial collector includes bike lanes; however, for the E. 88th Avenue project, the multiuse path would accommodate bicycles, so bike lanes are not included in the design. Figure 29 illustrates this option.

**Retained.** This option would meet the Purpose and Need. The land use and current and projected traffic counts within this section of E. 88th Avenue would support a Local Industrial Collector typical section. The two-way left-turn lane would maximize access.

**Figure 29. Design Element 5, Typical Section Option 2: Modified Local Industrial Collector Typical Section**




## 5.6 Design Element 6: E. 88th Avenue, BNSF Tracks, and Highway 2 Intersection

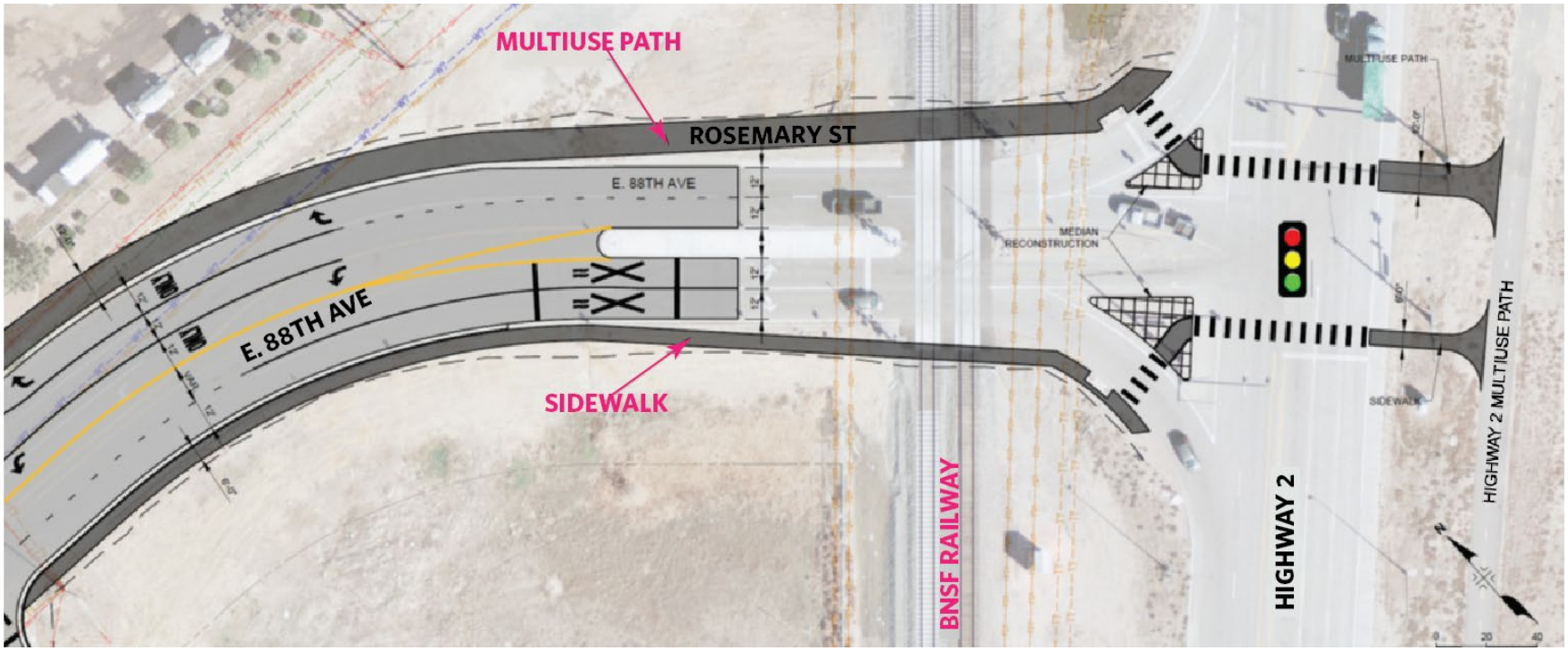
Design Element 6 includes bicycle and pedestrian improvements and signal timing updates at the intersection of E. 88th Avenue, the BNSF tracks, and Highway 2. No roadway improvements would be made to E. 88th Avenue or Highway 2 other than pavement markings. Detailed design and safety decisions will be made during a subsequent engineering phase that includes coordination with BNSF.

### BNSF Crossing Option 1: At-Grade BNSF Tracks and Highway 2 Crossings on Both Sides

This option would construct an at-grade pedestrian crossing on each side of E. 88th Avenue across the BNSF tracks and Highway 2. Figure 30 illustrates this option.

**Retained.** This option would meet the Purpose and Need. Without any demonstrated demand for a grade-separated crossing because there are no existing bicycle or pedestrian facilities at this location, at grade crossings would be the most appropriate to connect to the Perimeter Trail on the east side of Highway 2.

**Figure 30. BNSF Crossing Option 1: At-Grade BNSF Tracks and Highway 2 Crossings on Both Sides**



# 6.0 SUMMARY OF RETAINED DESIGN OPTIONS

Options retained in Section 6 were packaged into a single alternative and carried into the Environmental Assessment as the Proposed Action. In summary, the following options were retained:

- Design Element 1: E. 88th Avenue typical section and alignment between Brighton Road and the new E. 88th Avenue bridge.
  - Typical Section, Option 2: Modified Minor Arterial
  - Alignment, Option 2: Widen to the North
  - Multiuse Path and Sidewalk, Option 1: Multiuse Path on North Side and Sidewalk on South Side
- Design Element 2: Local access to E. 88th Avenue between Brighton Road and the O'Brian Canal.
  - South Side Access, Option 1: Convert Wikiup's E. 88th Avenue Entrance to Right-in/Right-out and improve Wikiup's Brighton Road Entrance.
  - South Side Access, Option 2: Convert Laurel Drive Intersection to Right-in/Right-out.
  - South Side Access, Option 4: Protected U-Turns.
  - North Side Access, Option 2 Single Eastbound to Northbound Left-turn Lane and Dynamic Lane Assignment.
  - North Side Access, Option 3: Improve Mile High Flea Market Entrance
- Design Element 3: Proposed E. 88th Avenue Bridge and UPRR Track Crossing.
  - O'Brian Canal and UPRR Track Crossings, Option 3: At-grade Bridge over O'Brian Canal and At-Grade Crossing of UPRR Track.
  - Typical Section and Alignment, Option 1: Reduced Modified Minor Arterial Typical Section.
- Design Element 4: E. 88th Avenue and Rosemary Street Intersection.
  - Option 2: Rosemary Street Approach—Long Option
- Design Element 5: E. 88th Avenue Typical Section and Alignment between Rosemary Street and Highway 2.
  - Option 2: Modified Local Industrial Collector Typical Section.
- Design Element 6: E. 88th Avenue, BNSF Tracks, and Highway 2 Intersection.
  - Option 1: At-grade BNSF Tracks and Highway 2 Crossings for Multiuse Path and Sidewalk.

# 7.0 REFERENCES

City of Commerce City (Commerce City). 2010. *C3 Vision Transportation Plan*. https://www.c3gov.com/home/showdocument?id=7016.

City of Commerce City (Commerce City). 2017. Engineering Construction Standards, Roadway and Parking Details Typical Sections. https://www.c3gov.com/home/showdocument?id=1910.