Littleton Colorado

Mineral & Santa Fe Intersection

Future Concepts

1/22/2019

Keith Reester, Public Works Director

Request of City Council

- City staff is working to develop solutions both short and long term for the Mineral Ave & Santa Fe intersection
- The presentation will outline the status of the work thus far and seek City Council guidance on action steps
- Why? Understanding the best alternatives for future construction allows the city and other partners to preserve needed right-of-way and contemplate interim solutions that support the ultimate solution

Littleton
Colorado

Background

- The intersection of Mineral Avenue and Santa Fe Drive is one of the most congested and highest accident intersections in the city.
  - 90,000 ADT through the intersection
  - 59 accidents in 2017
  - Volume is projected to increase to 120,000 ADT by 2040
- In the future, traffic congestion is expected to worsen as development occurs both in the immediate vicinity and throughout the region.
  - Evergreen
  - Sterling Ranch
- The Alternatives Analysis serves as a precursor to the Planning & Environmental Linkages (PEL) study to be conducted in the future.

Littleton
Colorado

Stakeholders & The Community

- Stakeholders
  - CDOT
  - Arapahoe County
  - RTD
  - SSPRD
  - Evergreen Development
  - Douglas County

- Public Engagement
  - Public Meetings
  - Website
  - On Line Survey

- Meeting Materials
  - Mineral/Santa Fe Slides
- Public Input Report
  - Mineral/Santa Fe Public Comment Report

Littleton Colorado

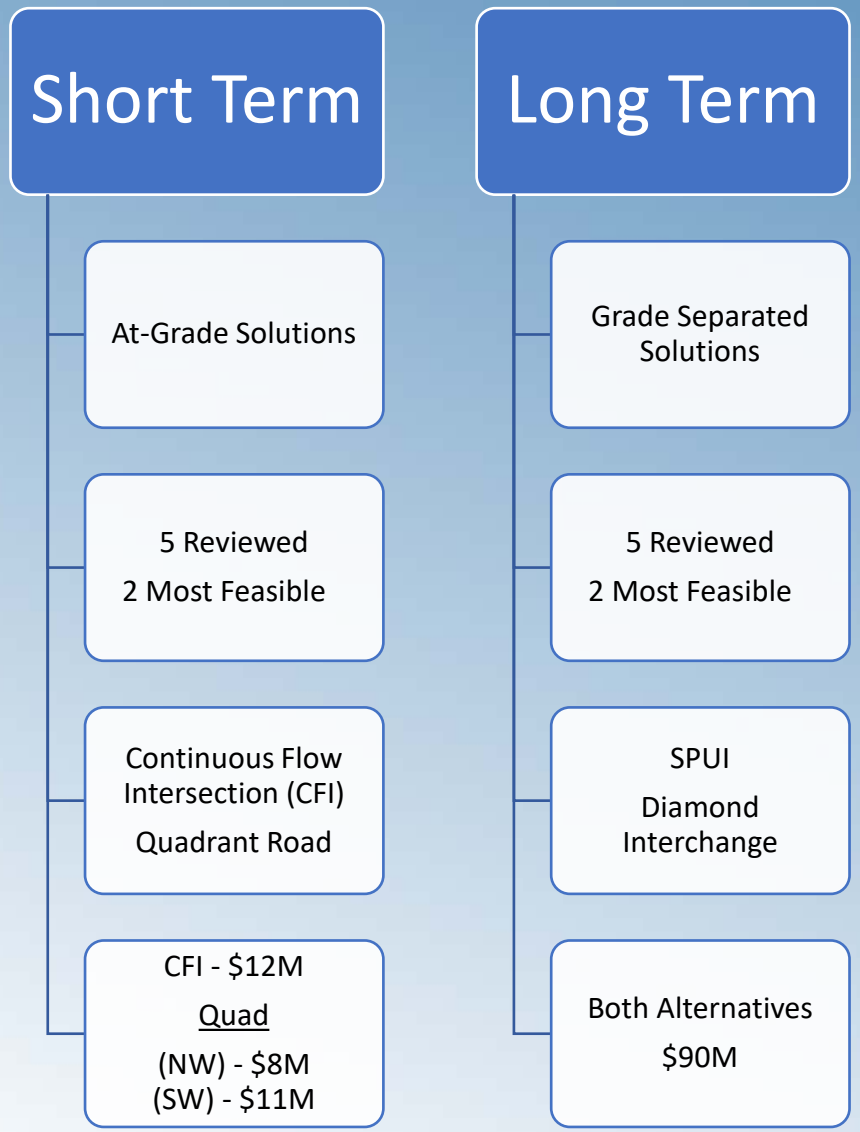
How do we get to a solution?

Littleton Colorado

Project Location

Littleton
Colorado

Alternatives Analysis



Littleton Colorado

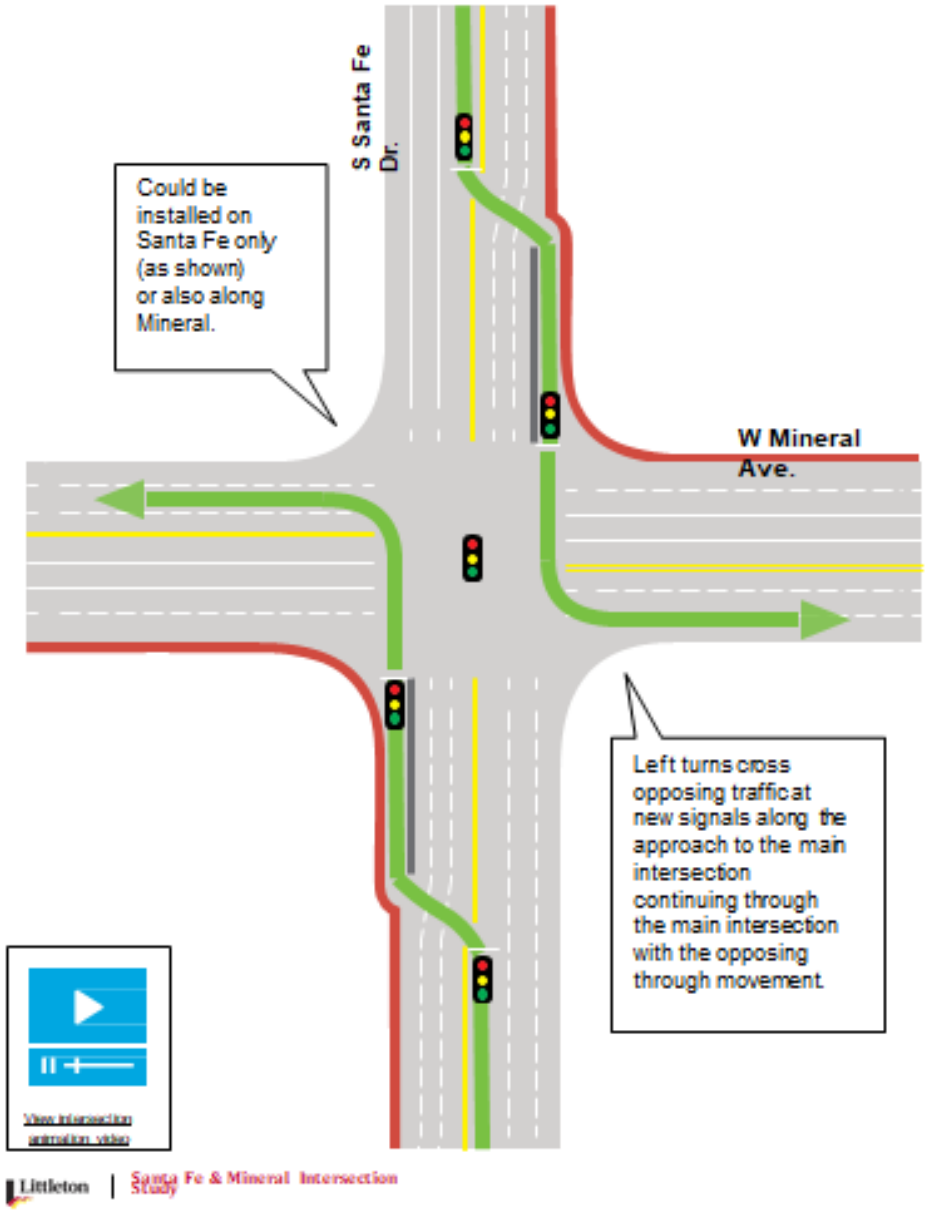
Littleton
Colorado

Short Term
At-Grade Solutions

CFI Visualization Video

[CFI Visualization]

Loveland & Colorado Springs have CFIs



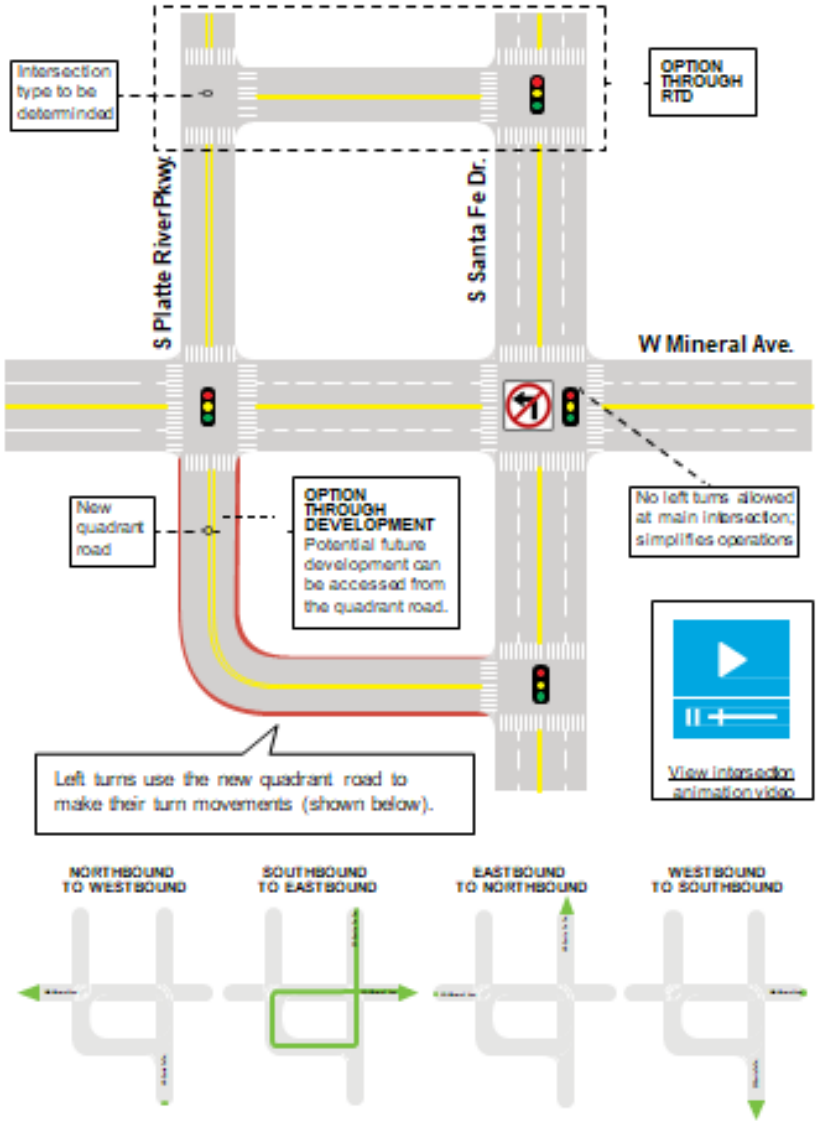
Continuous Flow Intersection

The main feature of this alternative intersection is the relocation of the left-turn movement on an approach to the other side of the opposing roadway, which consequently eliminates the left-turn signal phase for this approach at the main intersection. As shown in the illustration, traffic that would normally turn left at the main intersection first crosses the opposing through lanes at a signal-controlled intersection several hundred feet upstream of the main intersection. Left-turning vehicles then travel on a new roadway parallel to the opposing lanes and execute the left-turn maneuver simultaneously with the through traffic at the main intersection. Traffic signals are present at the main intersection and at the locations of the left-turn crossovers. The traffic signals are operated in a coordinated manner.

EVALUATION SUMMARY

- ⊕ Reduces number and severity of left-turn conflicts
- ⊕ Minimal impacts to adjacent property or RTD parking lot
- ⊕ Improves traffic operations with increased capacity
- ⊕ Improves transit operations due to lower congestion
- ⊖ Requires multi-stage pedestrian crossings
- ⊖ Large amount of "throwaway" infrastructure if future grade separation occurs

Littleton Colorado



Quadrant Intersection

The primary objective of a Quadrant Intersection (QR) intersection is to reduce delay at a severely congested intersection and to reduce overall travel time by removing left-turn movements. A QR intersection can provide other benefits as well, such as making it shorter and quicker for most pedestrians at the intersection. A QR intersection can be among the least costly of the alternative intersections to construct and maintain.

At a QR intersection, all four left-turn movements at a conventional four-legged intersection are rerouted to use a connector roadway in one quadrant. Left turns from all approaches are prohibited at the main intersection, which consequently allows a simple two-phase signal operation at the main intersection. Each terminus of the connector road is typically signalized. These two secondary signal-controlled intersections usually require three phases.

EVALUATION SUMMARY

- ⊕ Simple construction at low cost
- ⊕ Greatest improvement to traffic operations among at-grade alternatives
- ⊕ Improves transit operations due to lower congestion
- ⊕ Reduces left-turn conflicts
- ⊖ Requires longer travel distance for some left-turning vehicles especially when there is little to no congestion
- ⊖ Increases turning movement volumes at adjacent intersection
- ⊖ Requires right-of-way acquisition from RTD or development property

Littleton Colorado

Continuous Flow Intersection

$12M

Littleton
Colorado

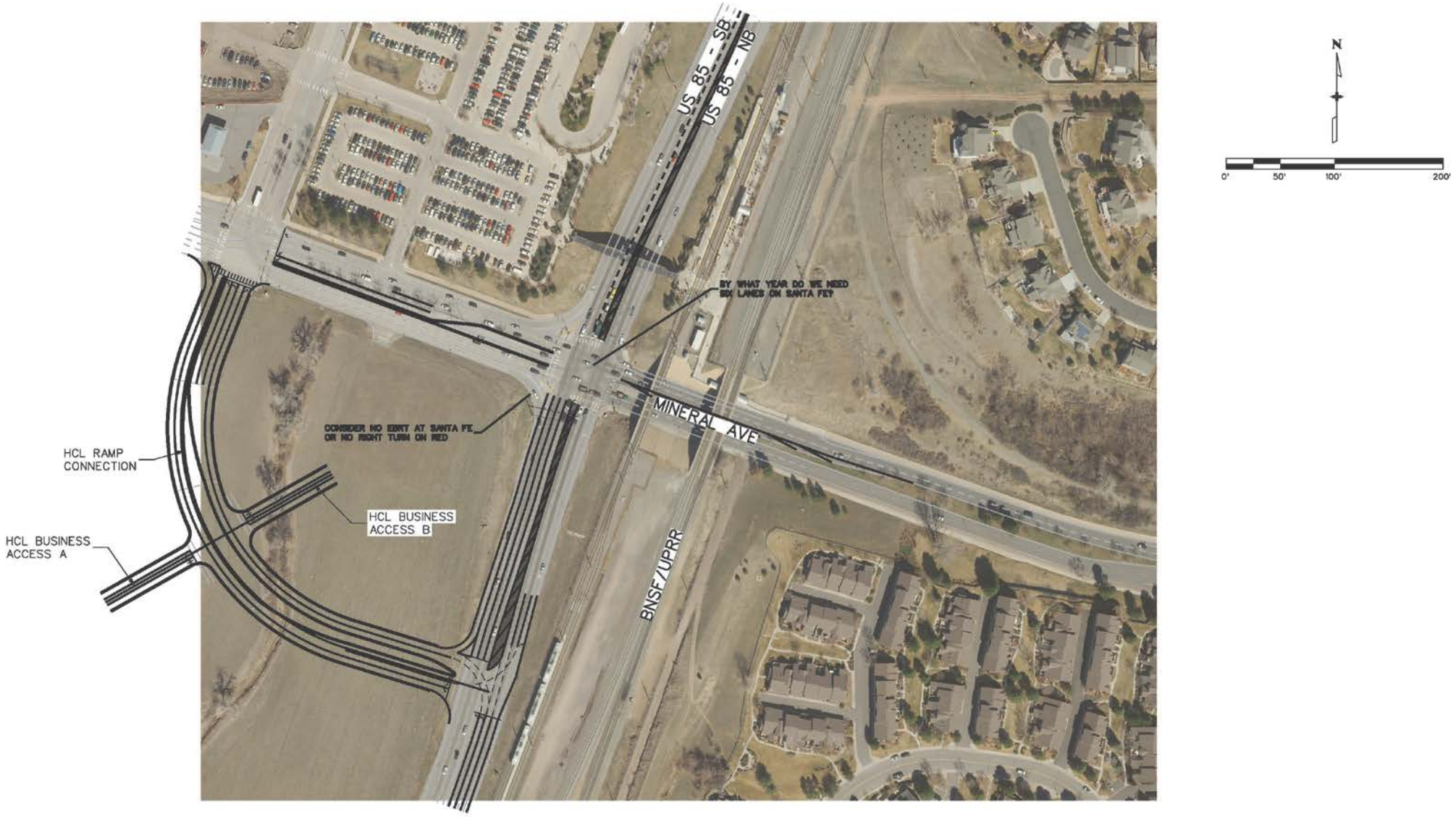
Northwest Quadrant Road

$8M

Littleton
Colorado

Southwest Quadrant Road

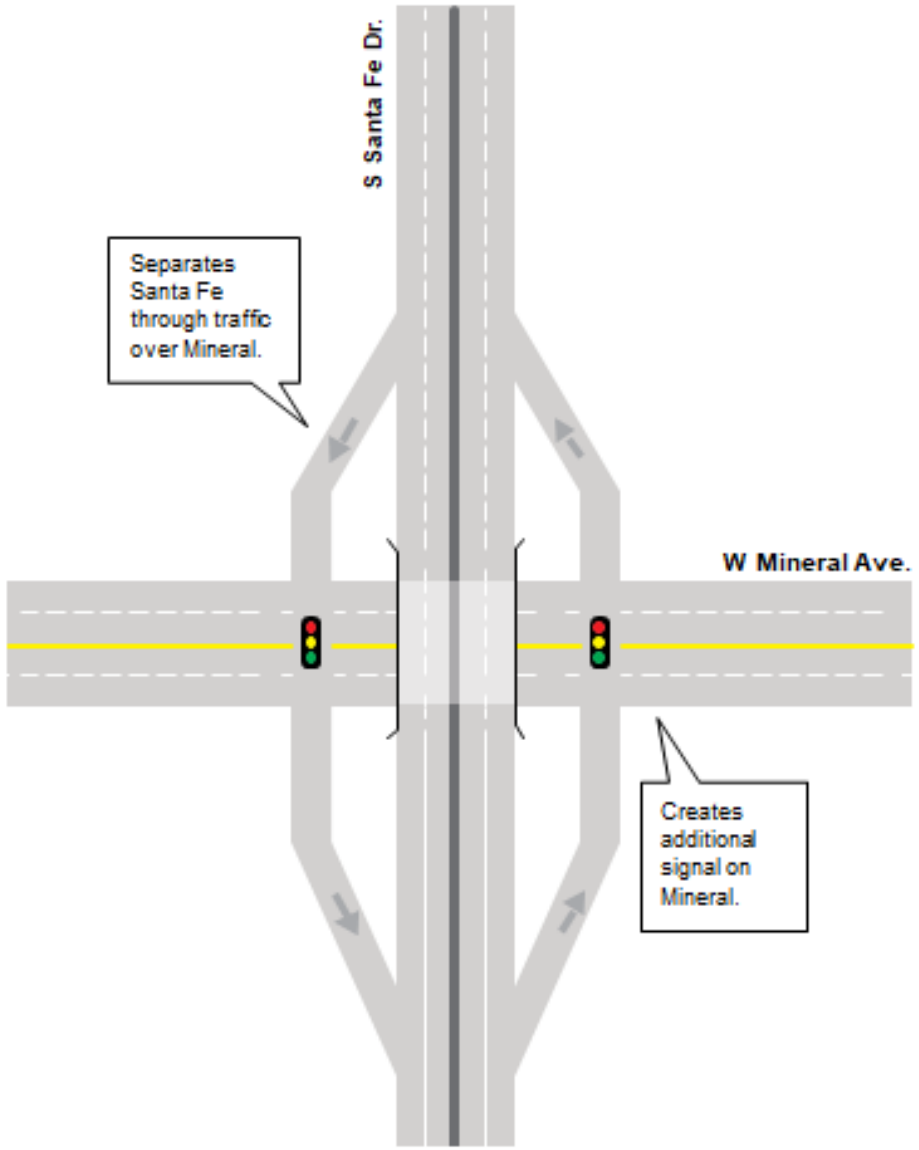
$11M



Littleton Colorado

Littleton
Colorado

Long Term
Grade Separated Solutions



Diamond Interchange

The tight diamond interchange, a type of compressed diamond interchange, is used in urban and suburban areas where right-of-way is a constraint. As the illustration shows, a tight diamond has two closely spaced signalized intersections at the crossing of the ramp terminals and side street. Typical designs provide 200 to 400 ft. of separation between the signal-controlled intersections.

EVALUATION SUMMARY

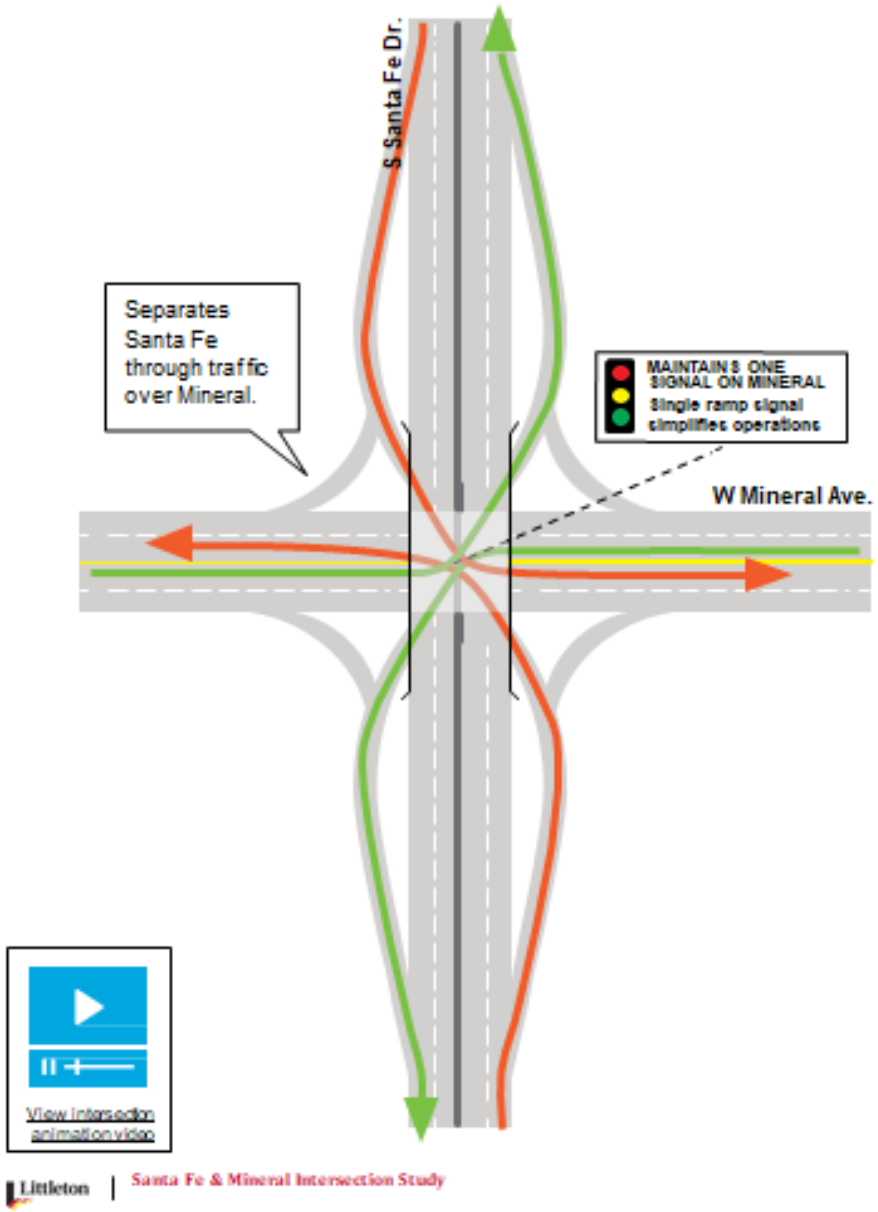
- (+) Improves traffic/transit operations more than at-grade alternatives
- (+) Separates major traffic flow, improving safety for most users
- (+) Relatively minimal right-of-way requirements
- (−) Long, multi-phased construction period
- (−) Significantly higher cost than at-grade alternatives

Littleton Colorado

SPUI Visualization Video

[SPUI Visualization]

Belleview &
Santa Fe



Single Point Urban Interchange

The Single Point Urban Interschange (SPUI), another variant of the compressed diamond interchange, was developed in 1970 to improve traffic capacity and operations while requiring less right-of-way than the standard diamond interchange. The configuration of a typical SPUI is shown in the illustration. The turning movements of the major road ramps and all the movements of the minor road are executed in one central area that is either on the overpass or underpass.

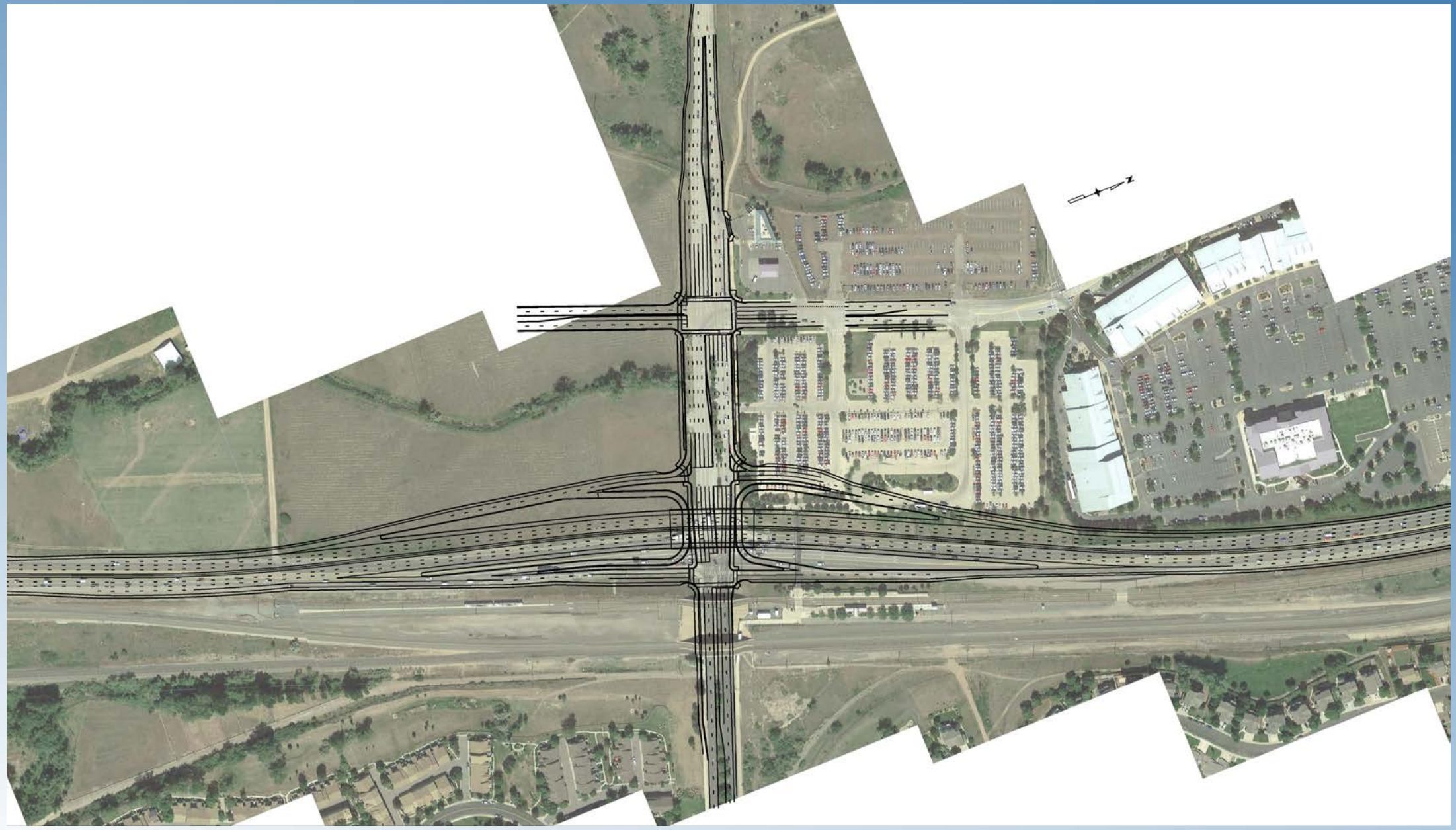
EVALUATION SUMMARY

- ⊕ Significantly improves traffic/transit operations
- ⊕ Separates major traffic flow, improving safety for most users
- ⊕ Relatively minimal right-of-way requirements
- ⊖ Long, multi-phased construction period
- ⊖ Significantly higher cost than at-grade alternatives

Littleton Colorado

Diamond Interchange

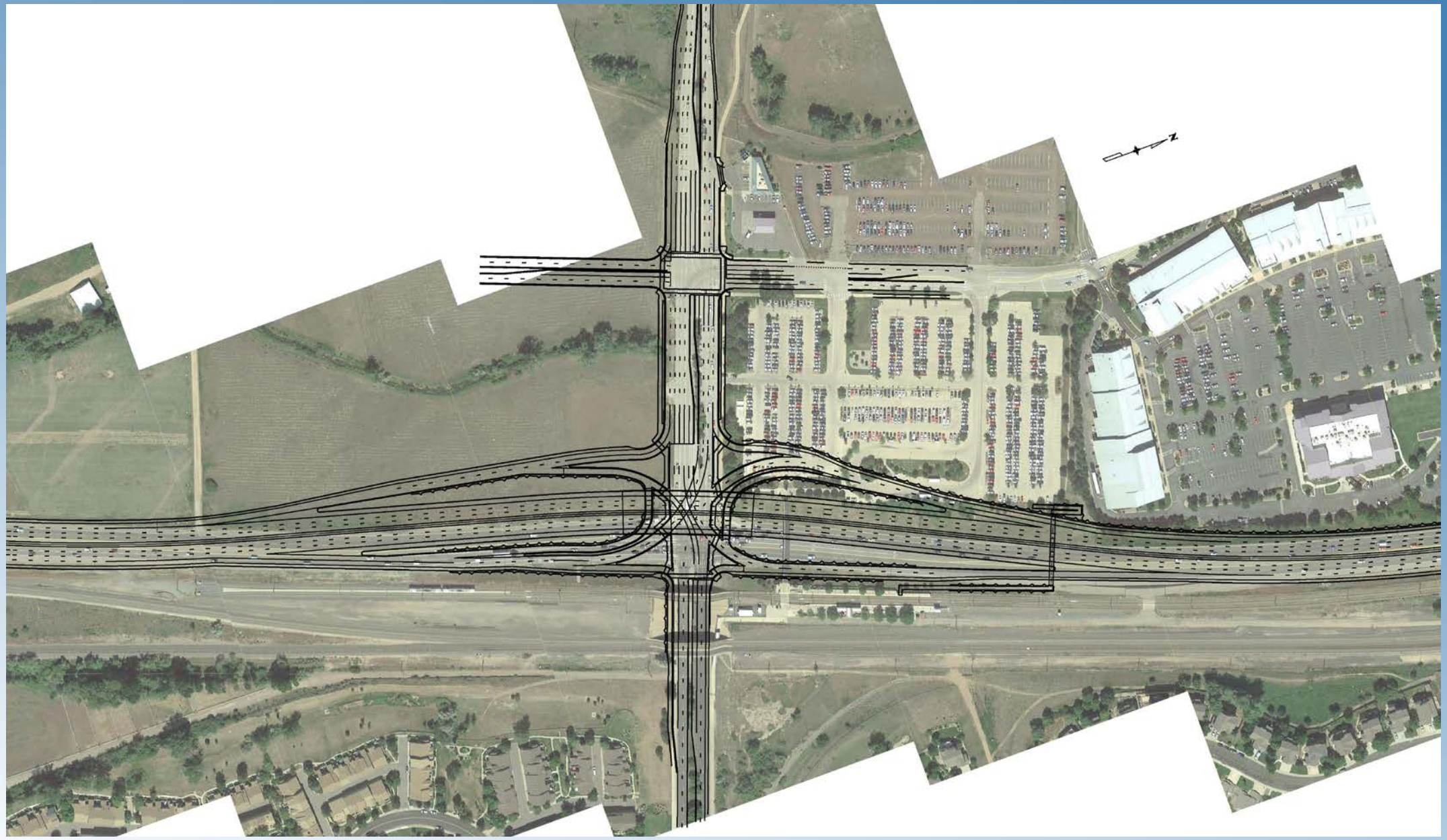
$90M



Littleton Colorado

Single Point Urban Interchange (SPUI)

$90M



Littleton Colorado

Challenges & Considerations (Short Term)

- Improvements may only shift congestion elsewhere
  - County Line Road
  - Bowles Avenue
- The entire corridor may already be near capacity

- Traffic Operation Improvements
- Bicycle/Pedestrian Flow
- Right-of-Way Requirements
- Property Owner Coordination
- Construction Impacts
- Cost
- Future Adaptability
- Overall

Littleton Colorado

Discussion

- Short Term Alternatives
  - Preferred?
  - Development Impacts
  - Sub-Regional TIP Project Submission
  - Local Match ($2.2M)

Littleton
Colorado