

-Fourth Street-
-Cedar Avenue-
-Lockett Road-
Roundabout

May 31, 2022





Fourth & Cedar/Lockett Roundabout

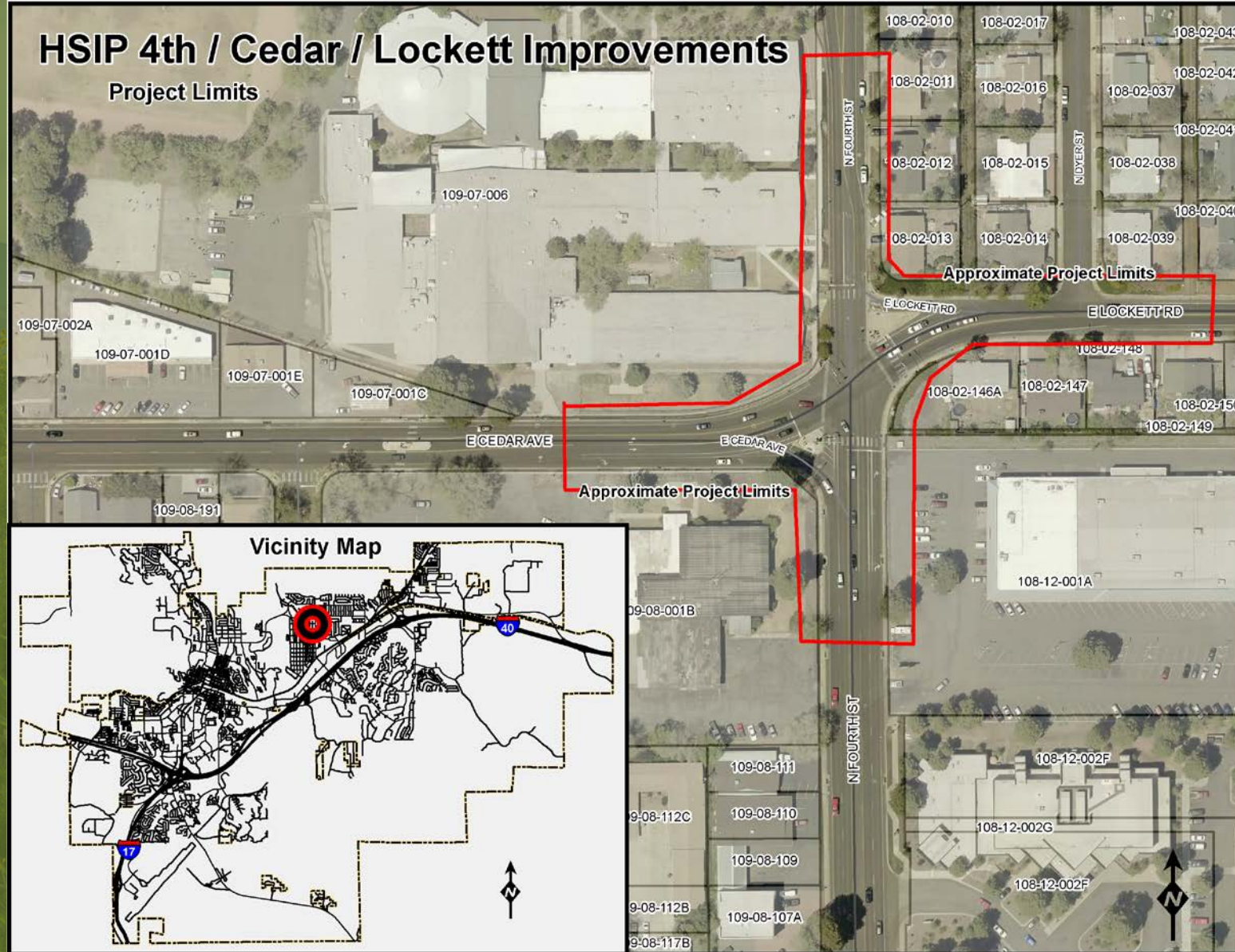


Presentation Outline

- Project Background and History
- Public Outreach
- Roundabout Benefits and Design Considerations
- Pedestrian Safety
- Bicycle Safety
- Schools and Roundabouts
- Educational Engagement

Project Location

- North Country HealthCare
- East Flagstaff Library
- Coconino Community College
- Pine Forest School
- Mount Elden Middle School and Puente de Hozho School
- Greenlaw and Sunnyside





Highway Safety Improvement Program (HSIP)



- Purpose:
 - “to achieve a significant reduction in traffic fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements.”
- Other Flagstaff HSIP Projects:
 - City-wide Sign Inventory and Replacement program
 - City-wide Pavement Markings
 - Beulah Bike Lanes
 - Switzer & Turquoise Roundabout
 - City-wide Guardrail Replacement
 - Countdown Pedestrian Signal Heads



Financial Impact

Design

- HSIP Federal Funds \$450,000
- City share \$103,000

ROW/TCE Acquisition- Estimated

- HSIP Federal Funds \$92,398
- City share \$530,813

Construction-Estimated

- HSIP Federal Funds \$1,385,968
- City share \$1,614,225

Notes:

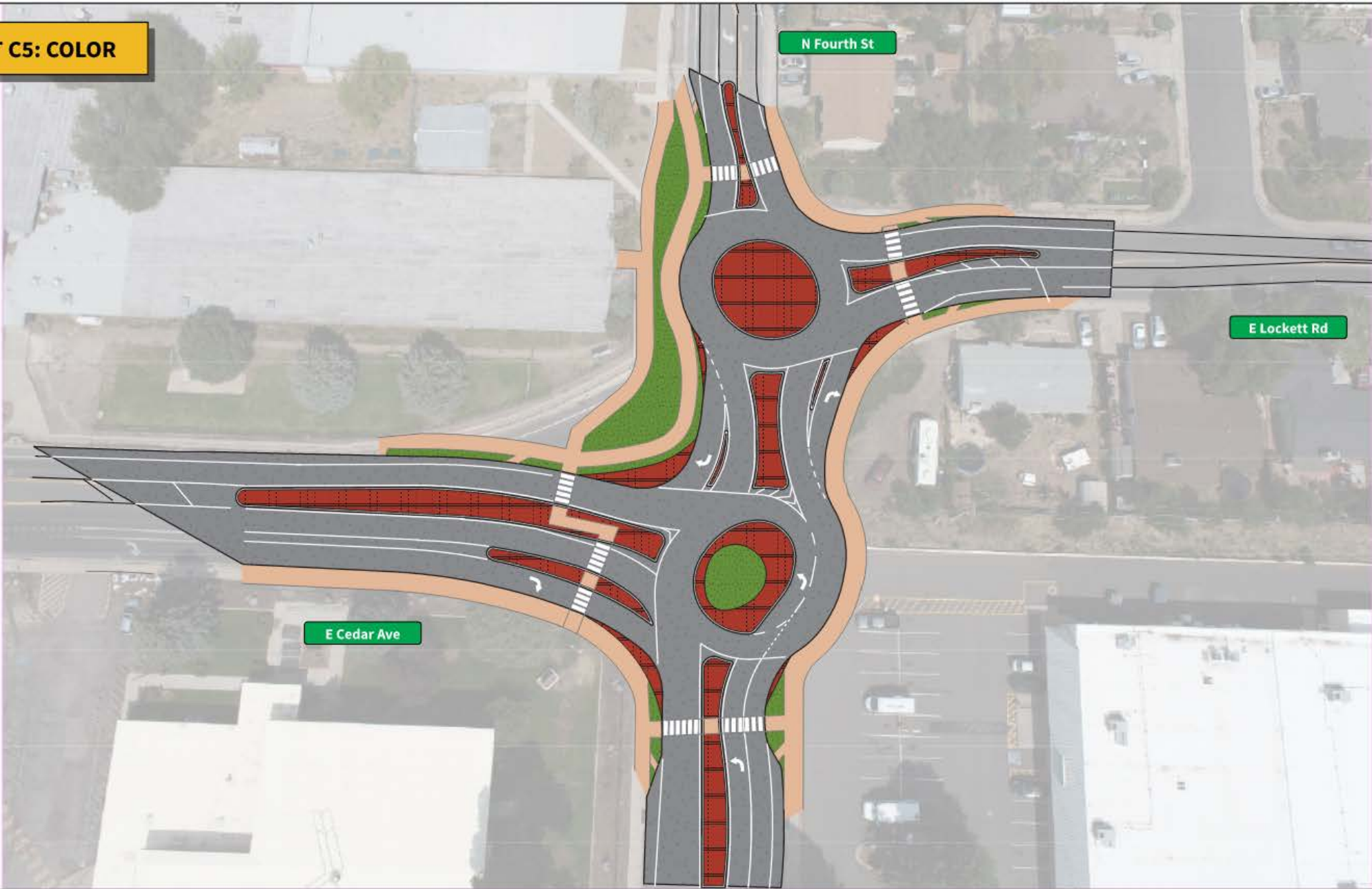
- City is responsible for any project costs in excess of the current HSIP grant award of \$1,928,366
- Total Project currently estimated at \$4,176,405
- Total City Share estimated at \$2,248,038
- Should the project be canceled, ADOT's position is that the City will be responsible to repay all federal grant monies expended to date, currently estimated at \$450,000. The City Attorney's Office has not yet had the opportunity to review this assertion.



Public Outreach

- Bike Advisory Committee (BAC) and Pedestrian Advisory Committee (PAC) in January 2021
- Transportation Commission (TC) - February 2021
- City Council- February 2021
 - Reviewed alternatives and decision matrix and direction was to move forward with single roundabout design
 - Required acquisition of Single-Family Residence
- City Council- April 2022
 - IGA Amendment #1-Updated scope, costs and responsibilities

ALT C5: COLOR



N Fourth St. @
E Cedar Ave. & E Lockett Rd.
Flagstaff, AZ



MTJ CONCEPT DESIGN
ALT C5: COLOR WITH AERIAL



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Fourth/Cedar/Lockett Roundabout

ALT B4: COLOR



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Scale= 1:50

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Decision Matrix Summary



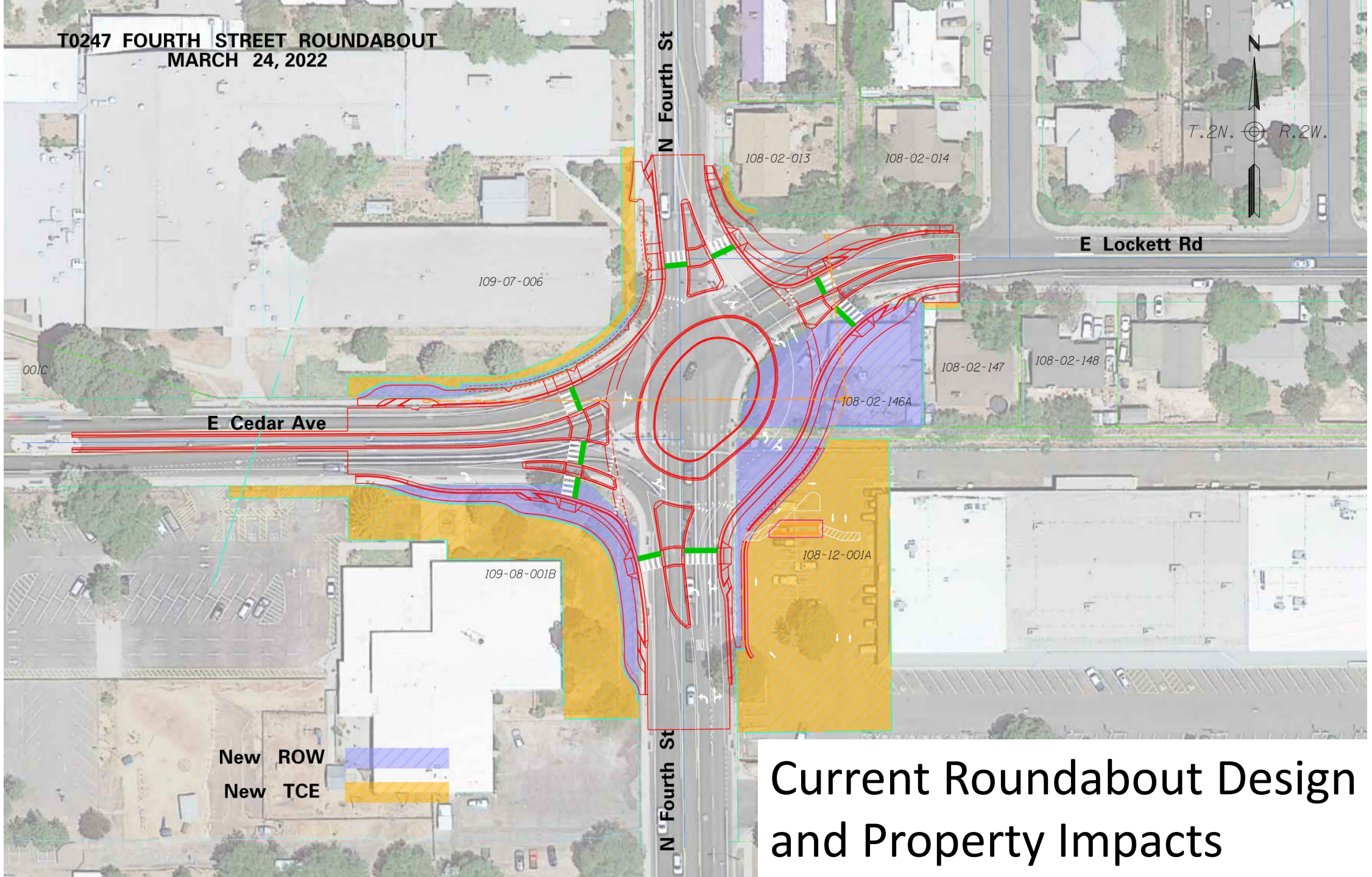
- Considered and scored alternatives based on multiple factors:
 - Safety for all modes, Operations for all modes, Environmental Factors, Buildings and Structures Impacts, Right of Way needs, Stakeholder Feedback and more.

Criteria Rating
1 - Strong Disadvantage
2 - Some Disadvantage
3 - Neutral
4 - Some Advantage
5 - Strong Advantage

EVALUATION CRITERIA	Design Alternative		
	B4 - Single Roundabout	C5 - Double Roundabout	Existing Signal
Total Net Effect:	74	68	62

- Single roundabout was preferred alternative identified by Council, TC, PAC, and BAC .

**T0247 FOURTH STREET ROUNDABOUT
MARCH 24, 2022**



**Current Roundabout Design
and Property Impacts**



Multilane Roundabout

Multilane Roundabout

- Multiple lanes into and through roundabout
- More challenging for bikes and pedestrians





Turbo Roundabout



Turbo Roundabout

- Alternative to a multilane roundabout
- Spiraling lanes
- Raised curbs
 - Reduced ability to change lanes
- Drivers choose path before entering





Dutch Bicycle Priority Roundabout

Dutch Roundabout

- Separated circular bikeway
- Bikes and Pedestrians have the right of way
- 3X more bike crashes than conventional design





Fourth/Cedar/Lockett Roundabout



Traffic Circle

- Larger than roundabout
- Stop signs or traffic signals within circle
- Relatively high speeds





Fourth/Cedar/Lockett Roundabout

Protected Intersection

- Signalized Intersection
- Separated, protected facilities for bikes and pedestrians
- Priority crossing for bikes and pedestrians
- Does not provide any additional safety for vehicle/vehicle crashes





Fourth/Cedar/Lockett Roundabout



Protected Intersection



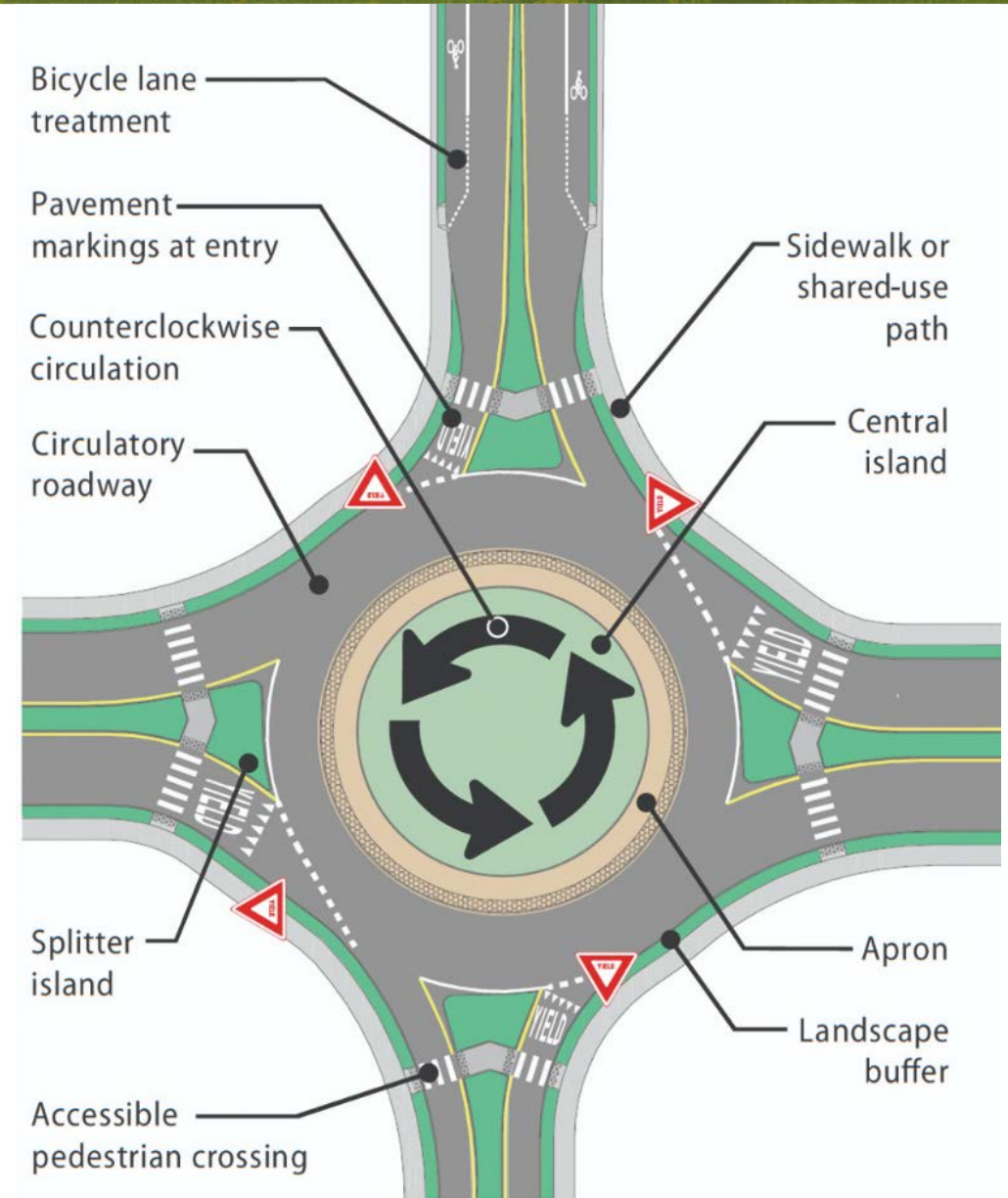


Fourth/Cedar/Lockett Roundabout



Modern Roundabout

- Yield control at all entry points
- Circular or non-circular
- Vehicle Deflection
- Pedestrians crossing one direction / one lane
- Speeds typically less than 20 mph





Fourth/Cedar/Lockett Roundabout



Modern Roundabout





8 Modern Roundabout Myths

1. They are the same as circles
2. Bad for older drivers
3. Take up too much land
4. Bicyclists and pedestrians are poorly served
5. Cannot work in a series
6. Not good for trucks or emergency responders
7. Visibility needed through the center
8. They hurt local businesses



Common Site Applications

- A modern roundabout should be considered anywhere a traffic signal or stop control is under consideration – ‘Roundabouts First Policy’
- Schools: Reduce vehicle speeds
- Corridors: Opportunity to shape cross sections - transitional
- Intersections with existing high crash severity and frequency patterns



Photo: Lee Rodegerdis (used with permission)



Photo: Lee Rodegerdis (used with permission)



Benefits of Roundabouts

- **Safety – Reduced Crashes**

- Total crashes by 35%
- Pedestrian Crashes by 40%
- Injury crashes by 76%
- Fatalities by 90%

- **Traffic Calming**

- Reduced vehicle speeds
- Transitional element

- **Pedestrian Safety**

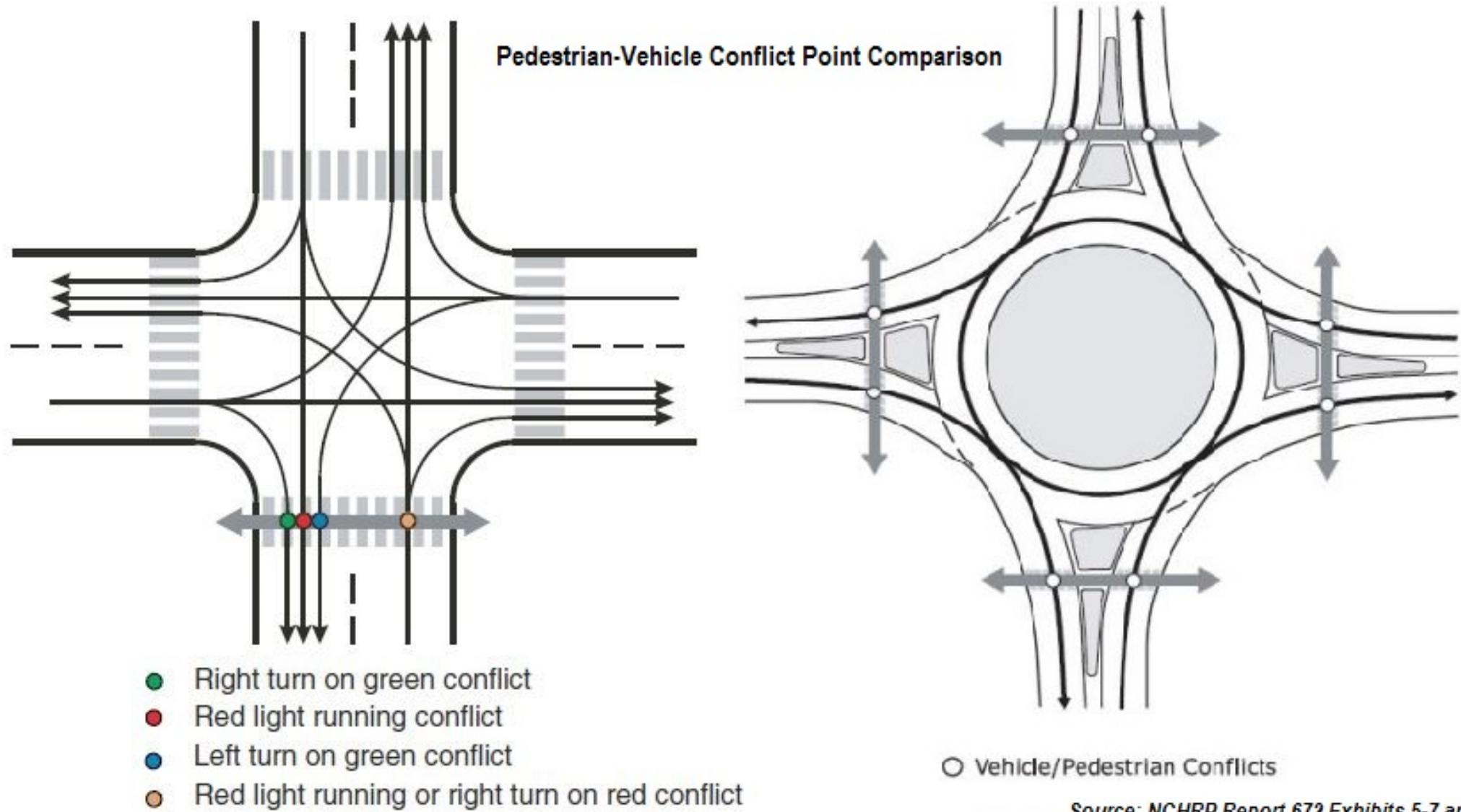
- Reduced vehicle speeds
- Reduced crossing distances
- Crossings focus on one traffic stream at a time - visibility

- **Bicycle Safety**

- Reduced vehicle speeds
- Two options
 - Take the lane
 - Separated/Protected facility



Safety – Reduce the Conflicts

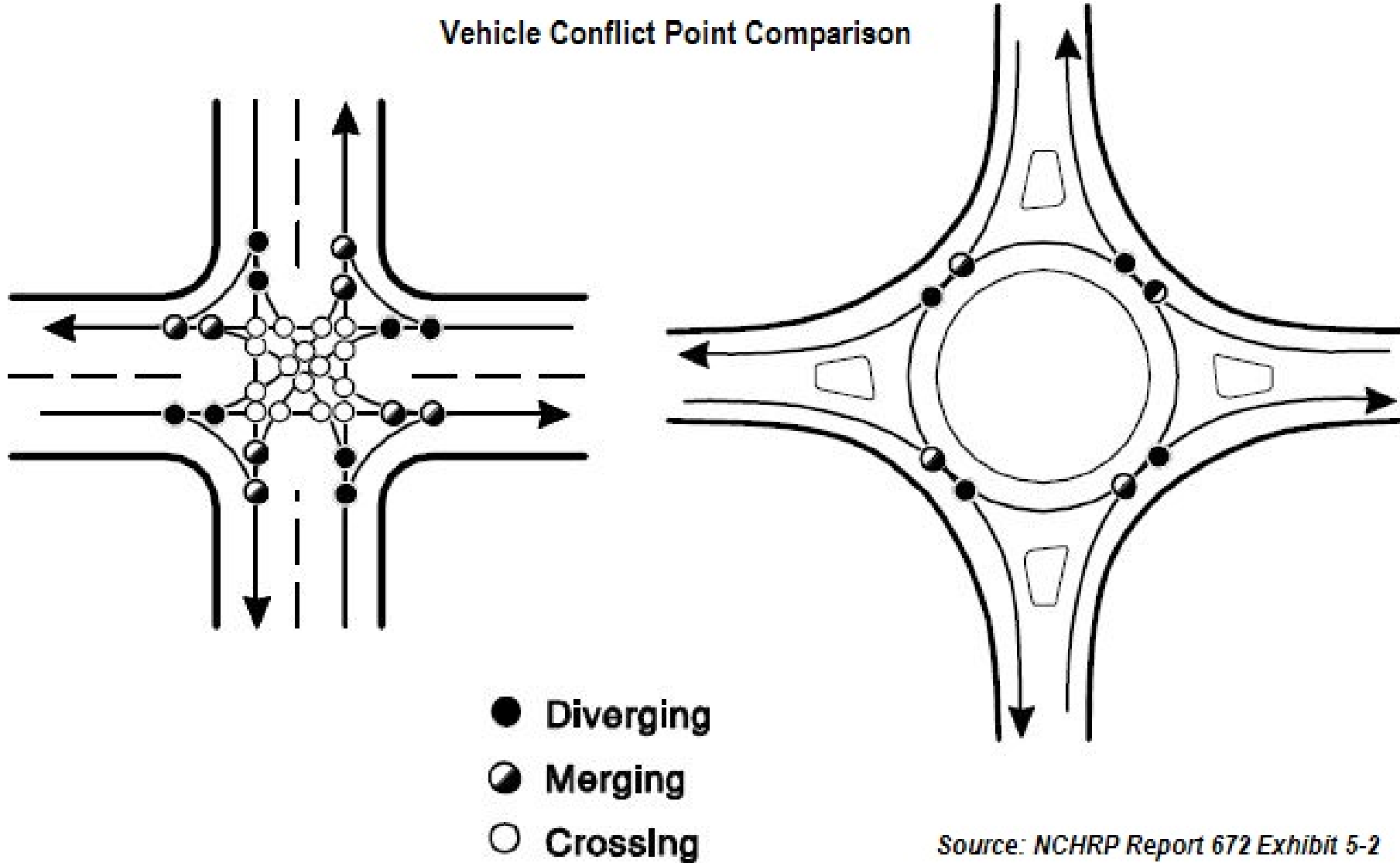


Source: NCHRP Report 672 Exhibits 5-7 and 5-8



Safety – Reduce the Conflicts

Vehicle Conflict Point Comparison



Source: NCHRP Report 672 Exhibit 5-2



Existing Conditions



Pedestrian Safety

The geometric design provides slow vehicle speeds at pedestrian crossings.



Pedestrian Safety

Crosswalks pass through the splitter islands, allowing pedestrians to cross one direction of traffic at a time.



Pedestrian Safety

The geometric design provides good sight lines from pedestrian to driver and vice versa.



Pedestrian Safety

Crosswalks are set back from the yield line by one or more car lengths where vehicle speeds are slow, which promotes yielding of motorists to non-motorized users





Bicycle Use – The Basics

- Bicycle lanes end in advance of roundabouts
- Bicyclist may utilize the adjacent multi use pathway -or-
- Bicyclists may 'take the lane' as a vehicle in this slow speed environment





Bicycle Ramps



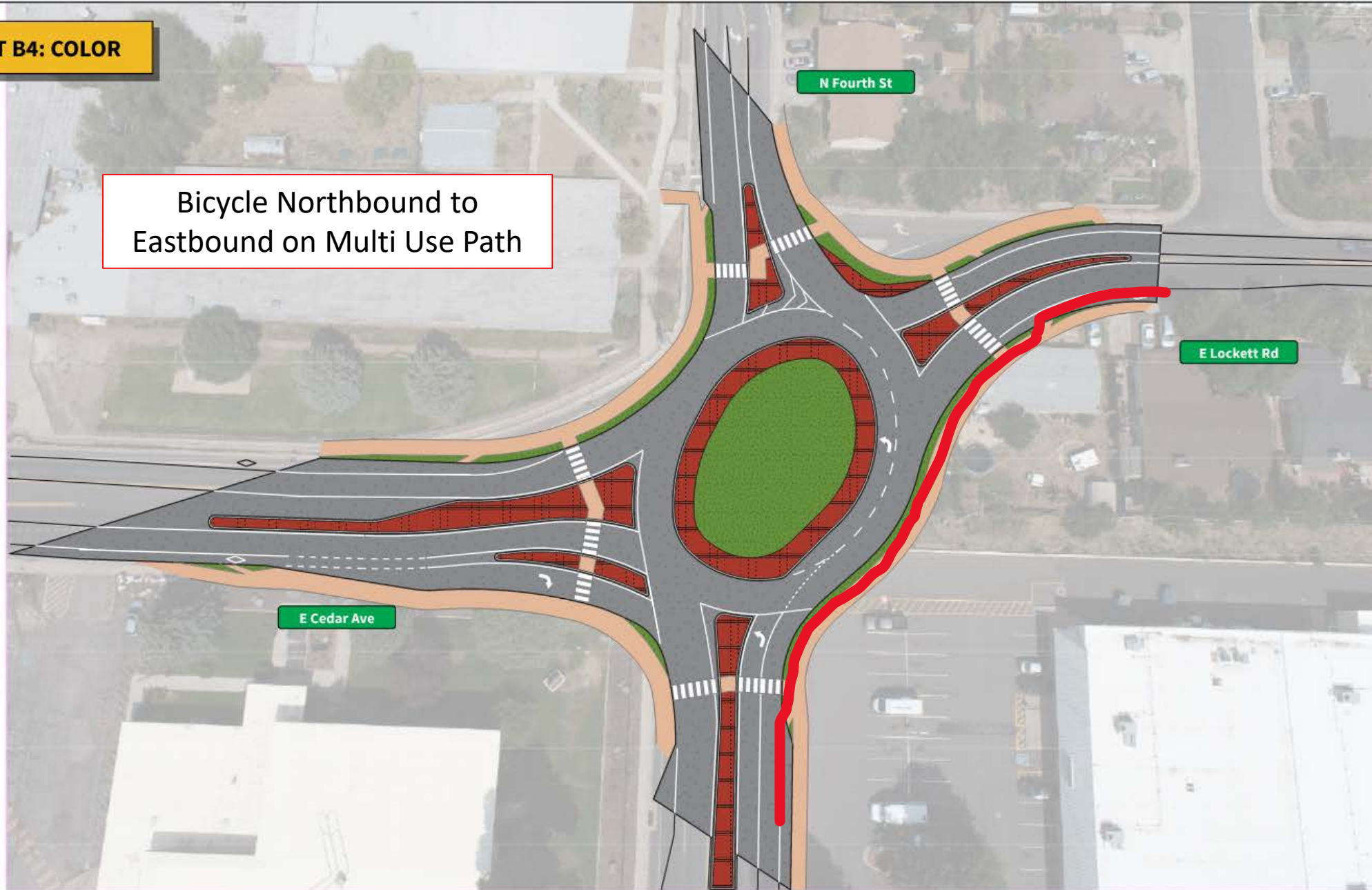


Bicycle Pavement Markings



ALT B4: COLOR

Bicycle Northbound to
Eastbound on Multi Use Path



N Fourth St. @
E Cedar Ave. & E Lockett Rd.
Flagstaff, AZ



Scale= 1:50

12.17.20

MTJ CONCEPT DESIGN
ALT B4: COLOR WITH AERIAL

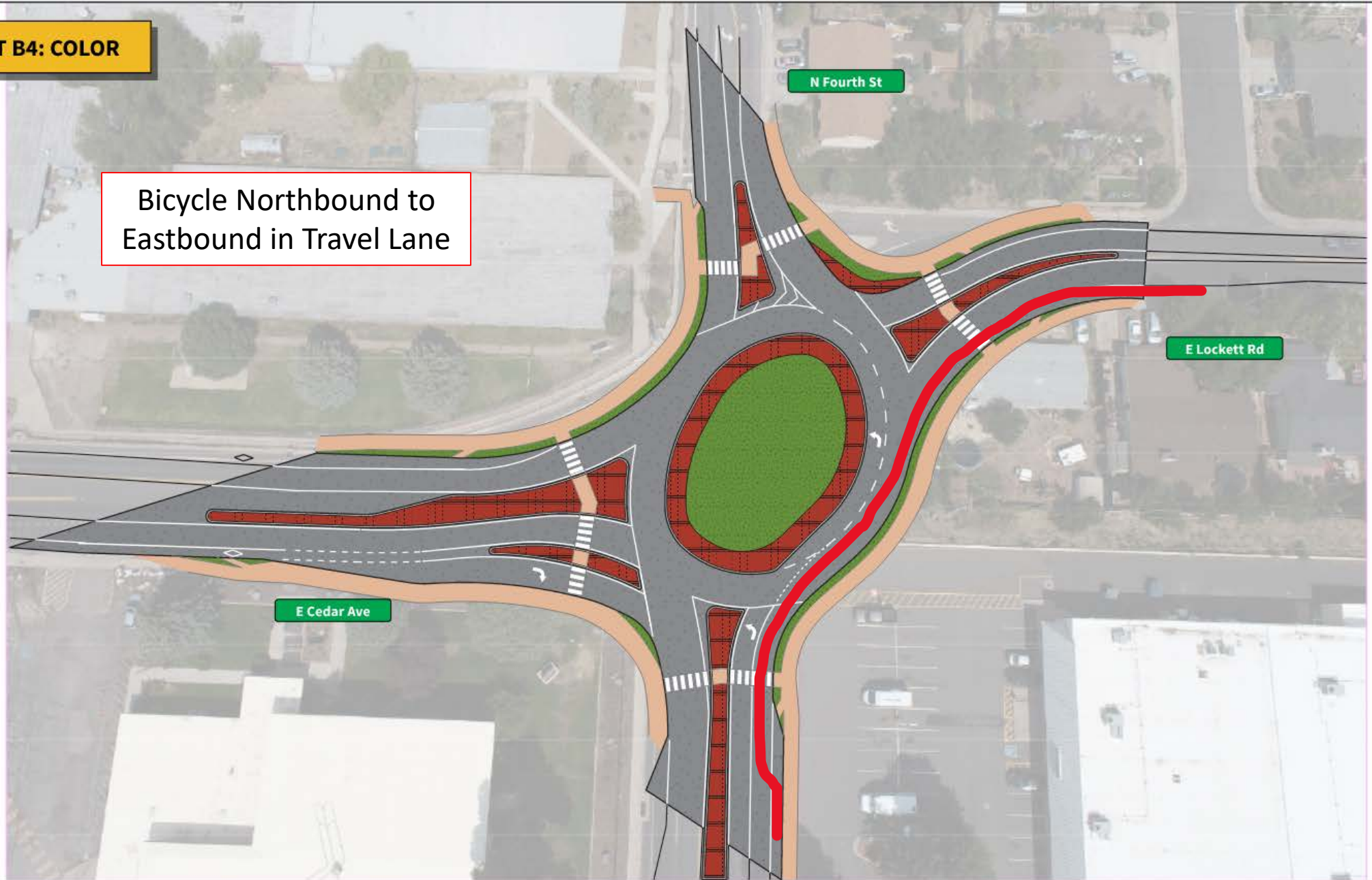


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ALT B4: COLOR

Bicycle Northbound to
Eastbound in Travel Lane



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Scale= 1:50

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ALT B4: COLOR WITH AERIAL

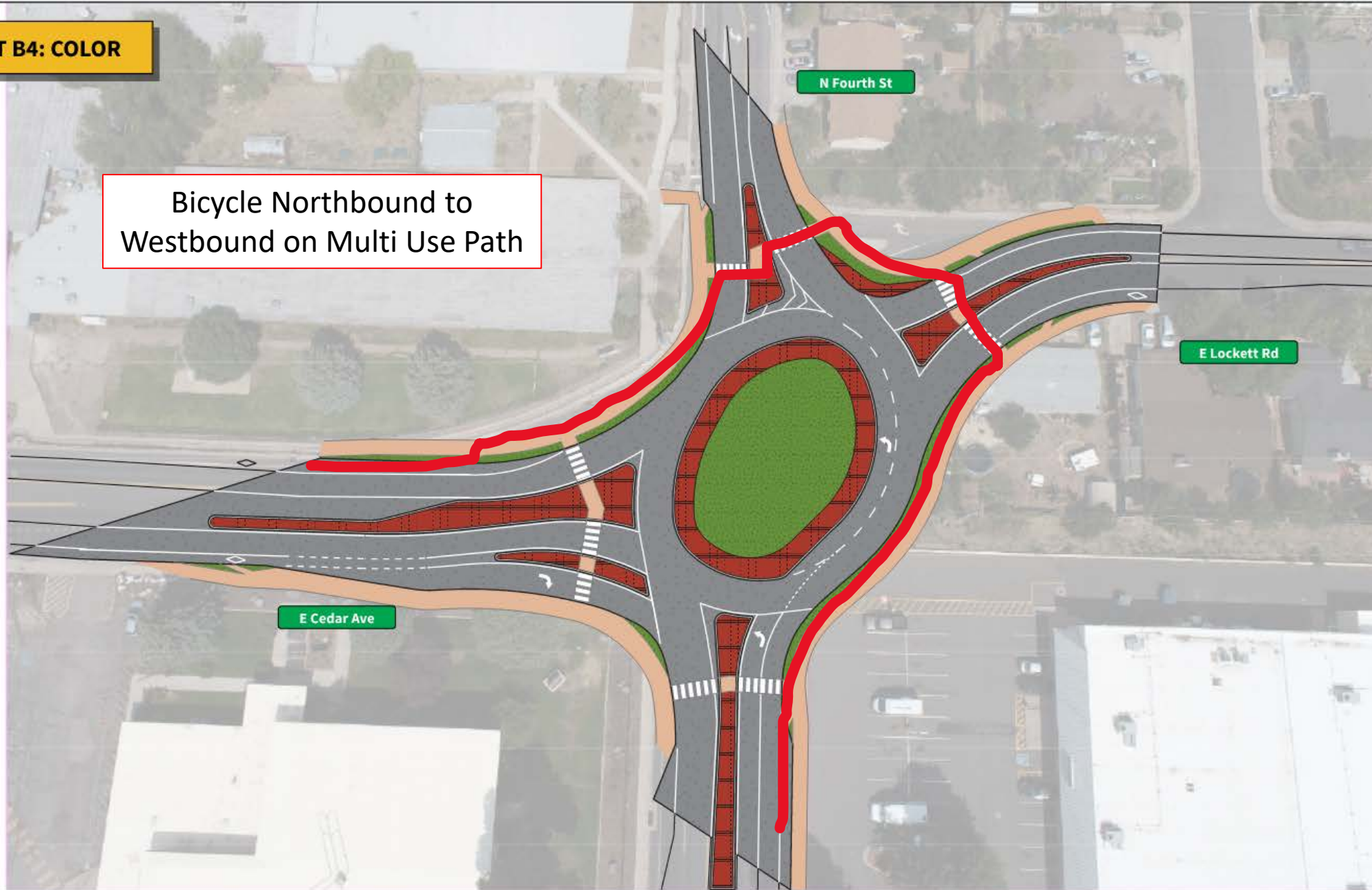


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Bicycle Northbound to
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ALT B4: COLOR WITH AERIAL

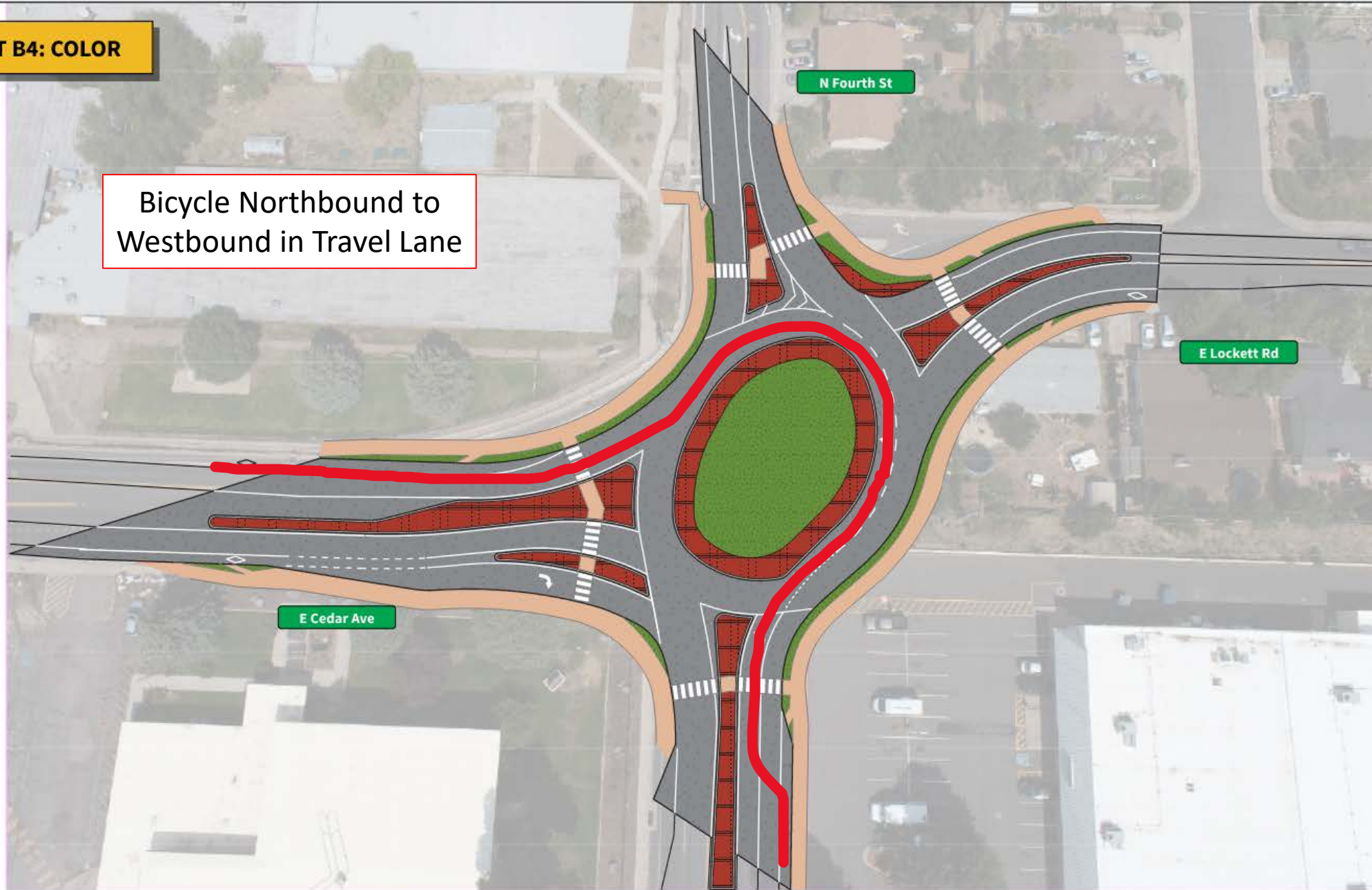


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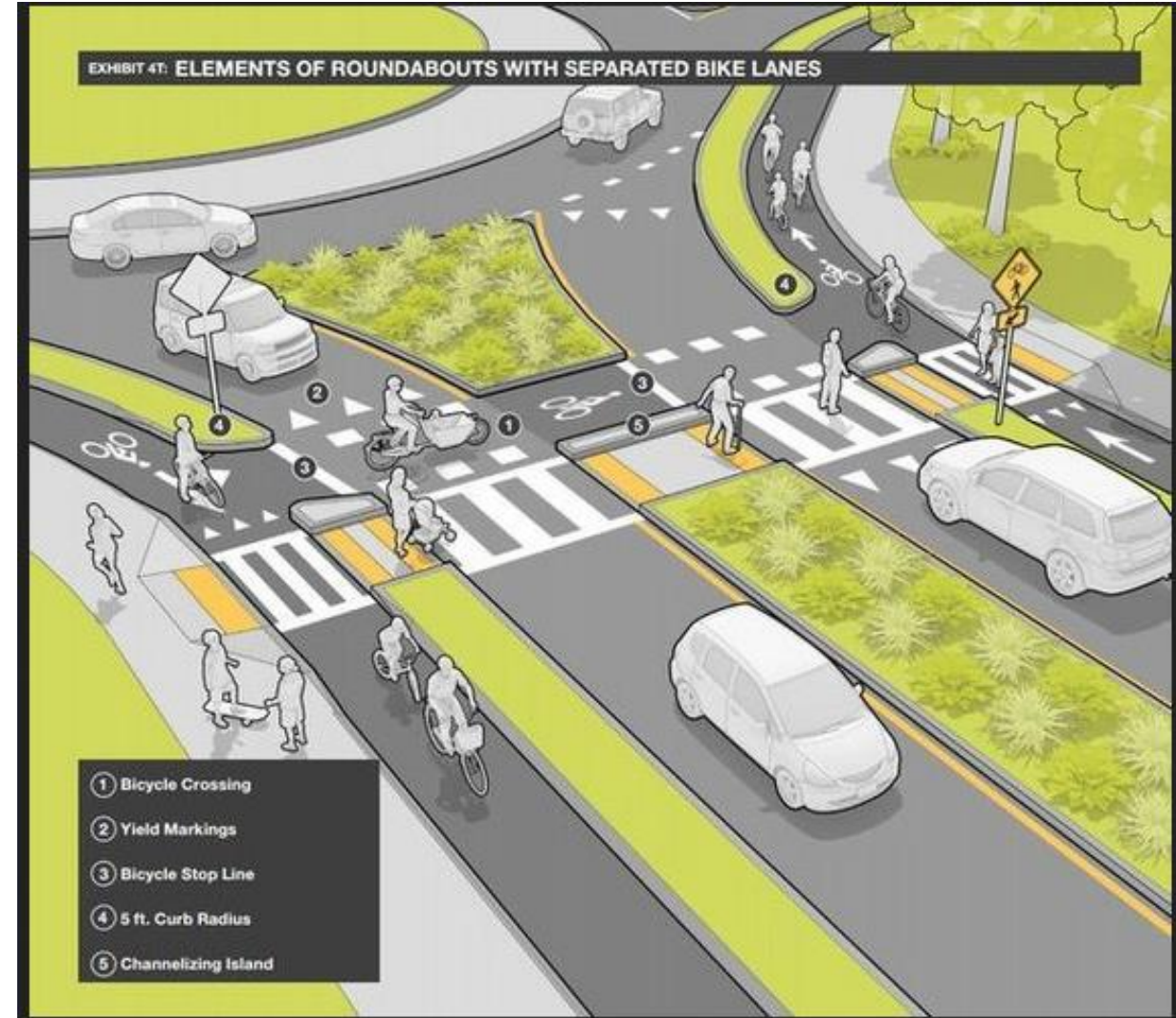


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Conceptual Bicycle Pavement Markings





Bikes and Pedestrians





Auto/Bus/Truck Operations

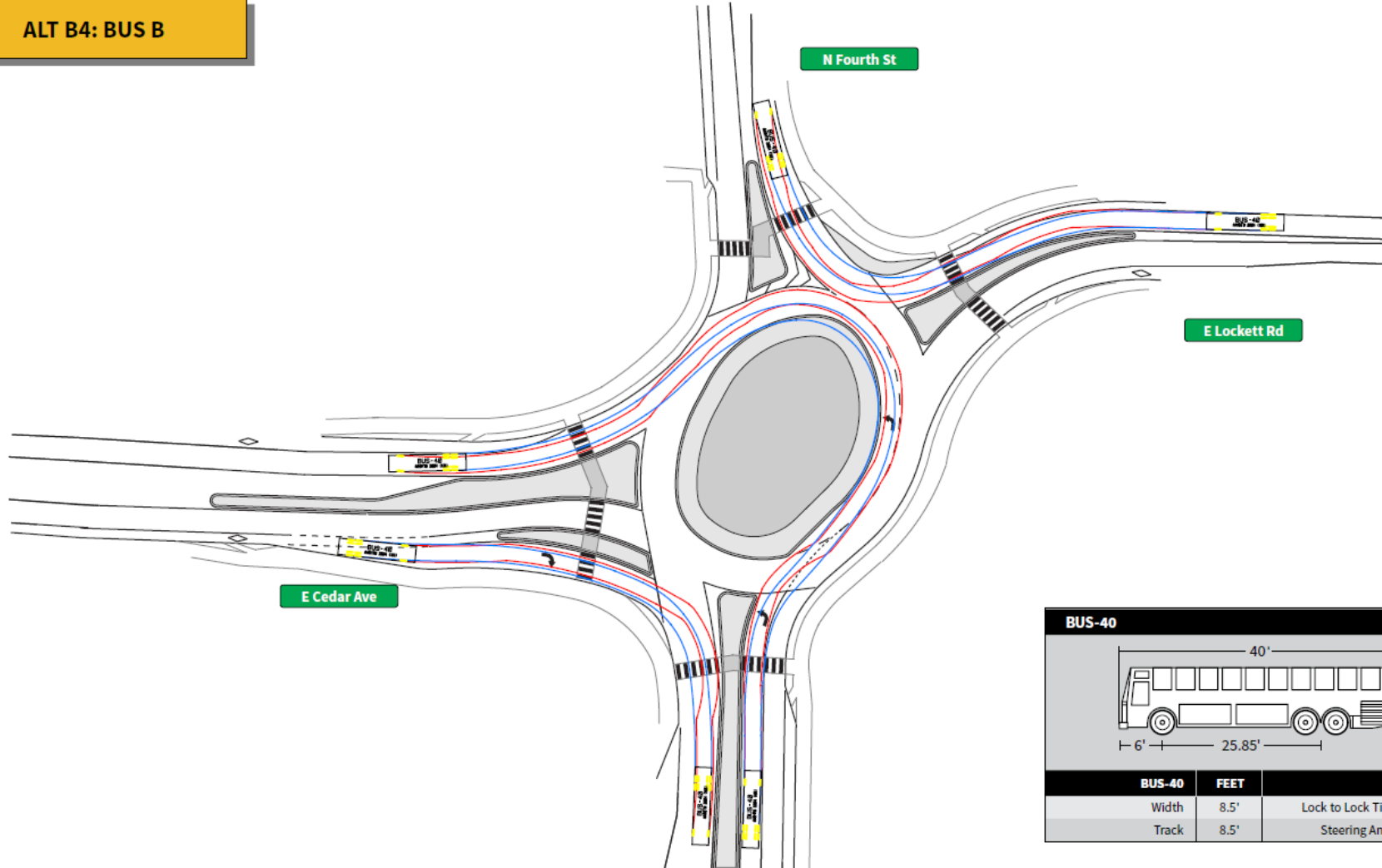
- Operational Performance
 - Lower overall delay than other controlled intersections
 - Operational trade-offs of laneage
- Ongoing Operations and Maintenance
 - Lower life cycle operating and maintenance costs
- Approach Roadways
 - Does not require lengthy turn lanes
 - Total lane count 15 to 10
 - Greater right-of-way needs at the intersection quadrants



Design Vehicles – Buses and Trucks



ALT B4: BUS B



BUS-40

BUS-40	FEET		
Width	8.5'	Lock to Lock Time	6.0
Track	8.5'	Steering Angle	39.3

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Scale= 1:50

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ALT B4: BUS B



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Existing Conditions





Fourth/Cedar/Lockett Roundabout



Schools and Roundabouts

Children face special challenges to safely crossing a street. Factors include:

- Impulsiveness
- Slower walking speeds
- Small body size that limits their visibility
- Less experience with traffic
- Still-developing cognitive abilities that make it difficult to accurately judge vehicle speed and traffic stream gaps
- General perception drivers will be able to stop instantly



Fourth/Cedar/Lockett Roundabout

Schools and Roundabouts

- In settings with large numbers of children, lowering vehicle speed has great potential for injury prevention. Pedestrian crashes involving a child most often result from the child's error, thus slower speeds give motorists more time to react and can lessen injuries when crashes do occur (Retting, Ferguson, & McCartt, 2003)
- Near elementary and middle schools, single-lane roundabouts are generally preferable to multiple-lane roundabouts due to lower vehicle speeds, simpler crossings for children and the greater comparative crash safety benefit (Rodergerdts et al., 2010).
- There are now roundabouts at more than 160 schools nationwide. This is up from zero in 1990. There have been no serious injuries reported in these 18 years. (Burden, Designing Roundabouts to Support Walkability and Smart Growth, 2008)



Fourth/Cedar/Lockett Roundabout



Schools and Roundabouts

- Pedestrian Actuated Beacons at southern roundabout leg
 - Only instance where multiple lanes to cross
- Although not warranted at this time, install conduit for future flashing beacons at all crossings.

Fig. 2 Rectangular Rapid Flashing Beacon (RRFB) at Crossing Martin Luther King Roundabout, Springfield, OR



Photo courtesy City of Springfield, OR



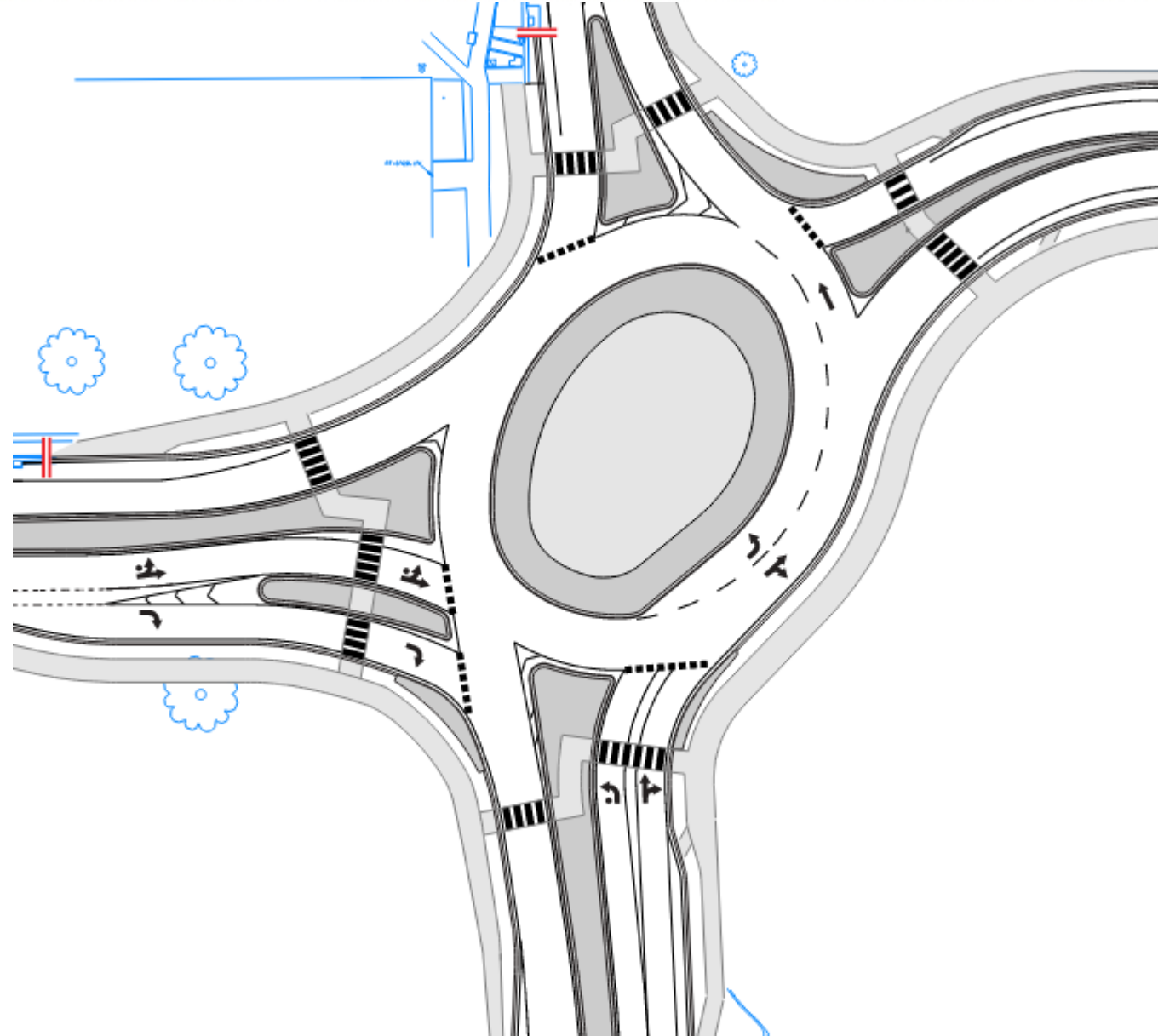
Fourth/Cedar/Lockett Roundabout

Schools and Roundabouts

- Illumination-Streetlights
- Z-Crossings

SPEED MATTERS

20 mph = 15% Fatal
25 mph = 23% Fatal
30 mph = 45% Fatal
45 mph = 85% Fatal





Fourth/Cedar/Lockett Roundabout

Educational Engagement

- Outreach to schools
- Flyers
- Workshops
- Social media



LET'S TALK ABOUT THIS ROUNDABOUT!
OHIO DRIVE & WARREN PARKWAY

PEDESTRIANS & BICYCLISTS

Traveling through the roundabout:

BICYCLISTS on the road

Experienced bicyclists travel through the roundabout using the same general rules that apply to motorists, as explained below.

1. On your approach, choose the proper lane for your route. Always yield to pedestrians in the crosswalks. Yield to traffic in the roundabout; only enter when there is a safe gap in traffic.
2. Stay in your lane and maintain a good pace. Don't hug the curb; using the middle of the lane helps drivers see you.

BICYCLISTS on the sidewalk

Dismount at the sidewalk ramp and walk your bicycle. Use the sidewalks and crosswalks, following the same rules that apply to pedestrians.

Crossing as a PEDESTRIAN

1. Approach the crosswalk and pause at the ramp. Look towards approaching traffic.
2. Show your intent to cross by standing next to the road and making eye contact with drivers.
3. Wait for approaching vehicles to yield, and then cross the road.
4. After reaching the median, repeat this process to cross the other half of the road.

FRISCO



Fourth/Cedar/Lockett Roundabout



Next Steps

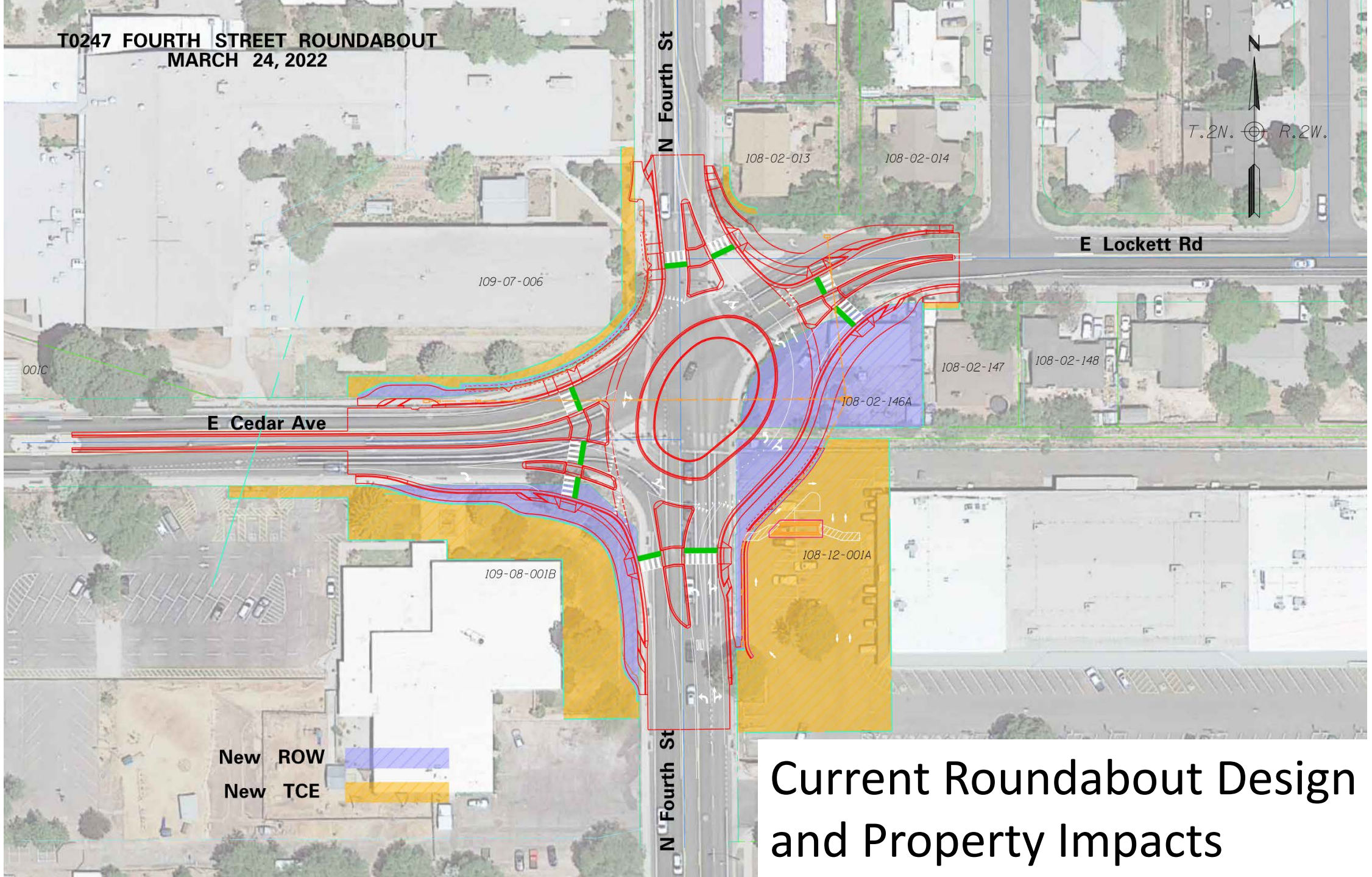
- Right-Of-Way/Temporary Construction Easement Acquisition
- Public Information Meeting
 - East Flagstaff Library
 - Date TBD (Mid/Late August)
- Utility Relocations
- Finalize Design and Cost Estimate
- Prior to Bid/Project Advertisement City will pay share of construction costs.
- Construction in 2023



Questions and Discussion



**T0247 FOURTH STREET ROUNDABOUT
MARCH 24, 2022**



**Current Roundabout Design
and Property Impacts**