

Separated Bicycle Lane Infrastructure





Agenda

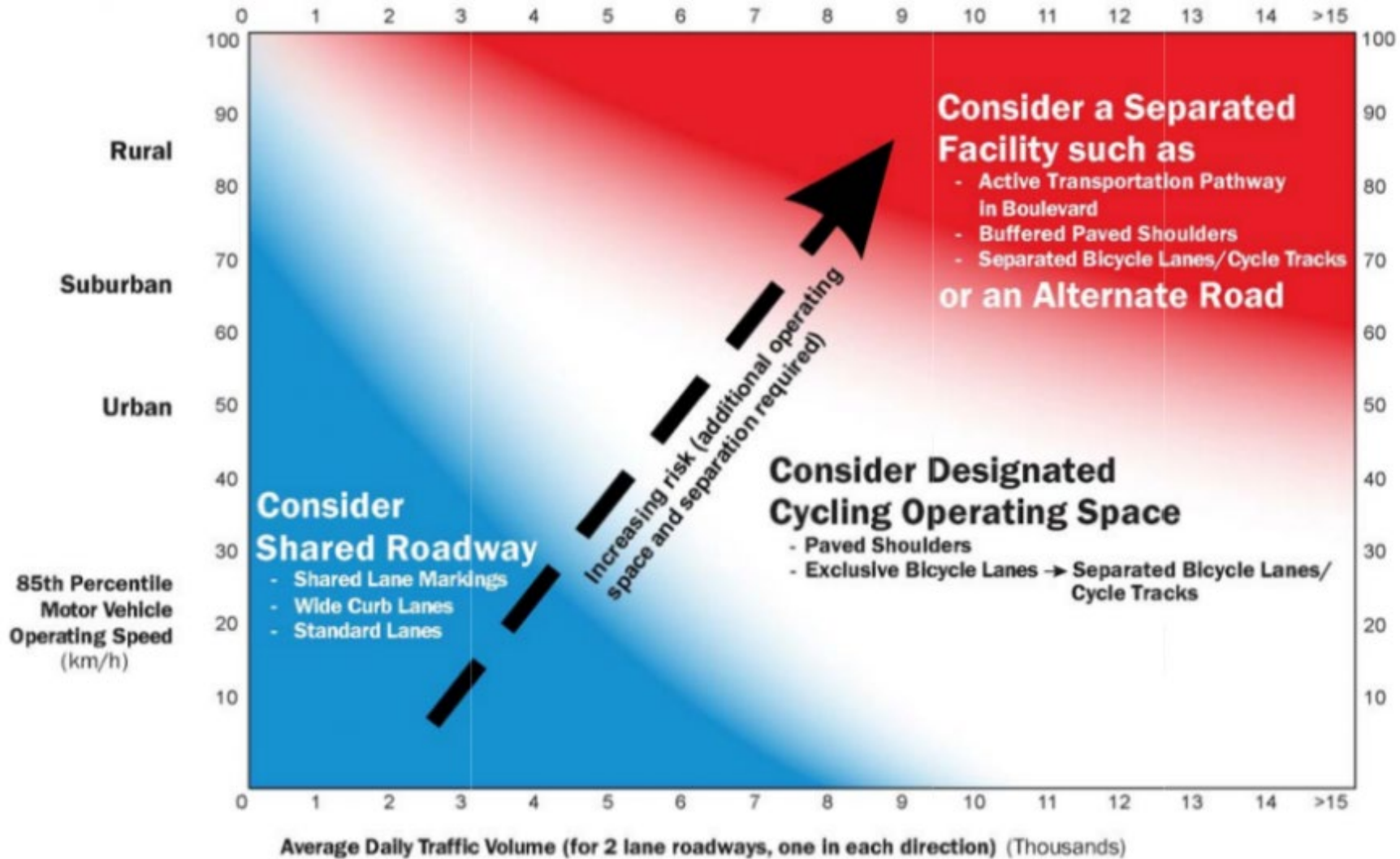
- Separated Bike Lane Pilot projects
 - Bike Facilities
 - Pilot Projects phases 1 and 2
 - Construction delivery and timeline
 - Public Works & Operations
 - Pilot Evaluation and Outreach
 - Discussion
- Separated Bikeways
 - Overview of Future Bikeways Plan



Bike Facility Selection



Desirable Bicycle Facility Pre-selection Nomograph



Separated Bike Lanes compared to other bicycle facility types

Least Separation

Signed Routes (No Pavement Markings)
A roadway designated as a preferred route for bicycles.

Shared Lane Markings
A shared roadway with pavement markings providing wayfinding guidance to bicyclists and alerting drivers that bicyclists are likely to be operating in mixed traffic.

On-Street Bike Lanes
An on-road bicycle facility designated by striping, signing, and pavement markings.

On-Street Buffered Bike Lanes
Bike lanes with a painted buffer increase lateral separation between bicyclists and motor vehicles.

Separated Bike Lanes
A separated bike lane is an exclusive facility for bicyclists that is located within or directly adjacent to the roadway and that is physically separated from motor vehicle traffic with a vertical element.

Off Street Trails / Sidepaths
Bicycle facilities physically separated from traffic, but intended for shared use by a variety of groups, including pedestrians, bicyclists, and joggers.

Most Separation



Separated Bike Lanes

Separated Bike Lanes – Protected Bike Lanes / Cycletracks

- Exclusive facility for bicycles
- Physically separated from vehicles
- One-way or Two-way
- Integration or separation at intersections
- More comfortable experience
- Important piece of network



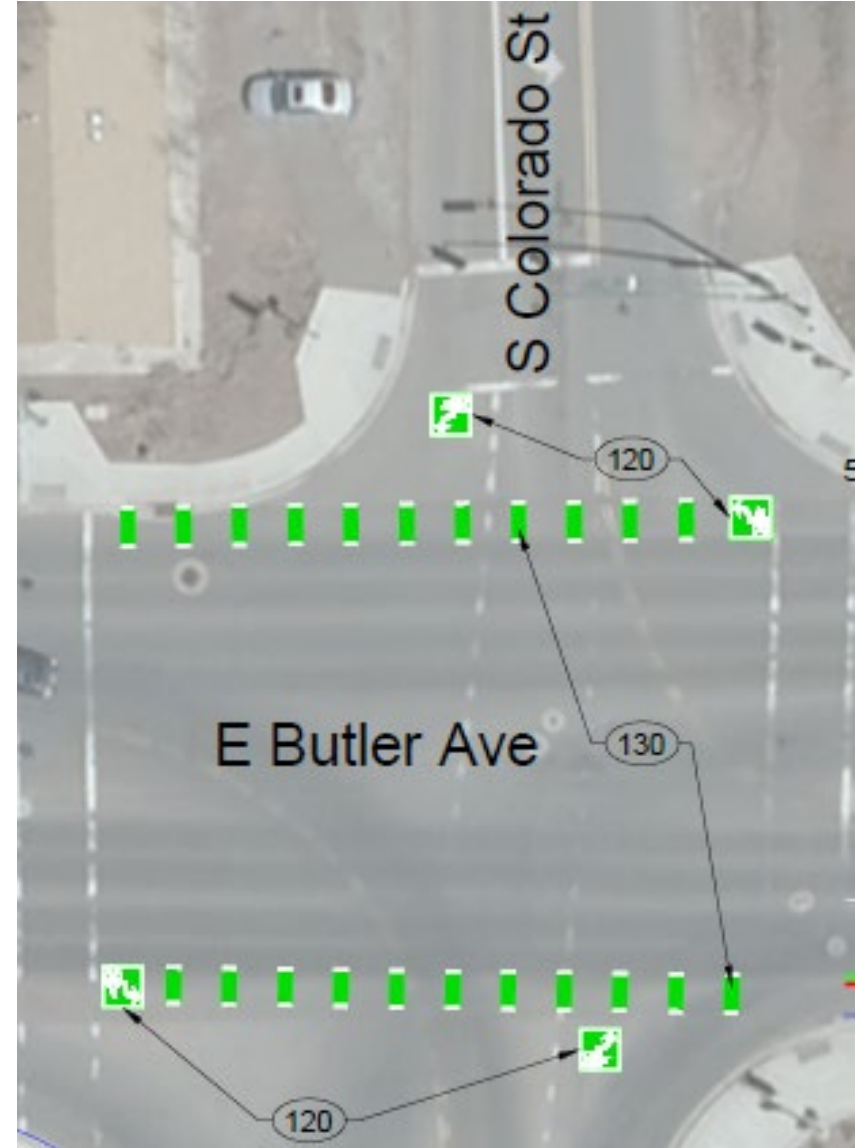


Butler Phase I Pilot Program

Pilot Separated Bike Lanes +

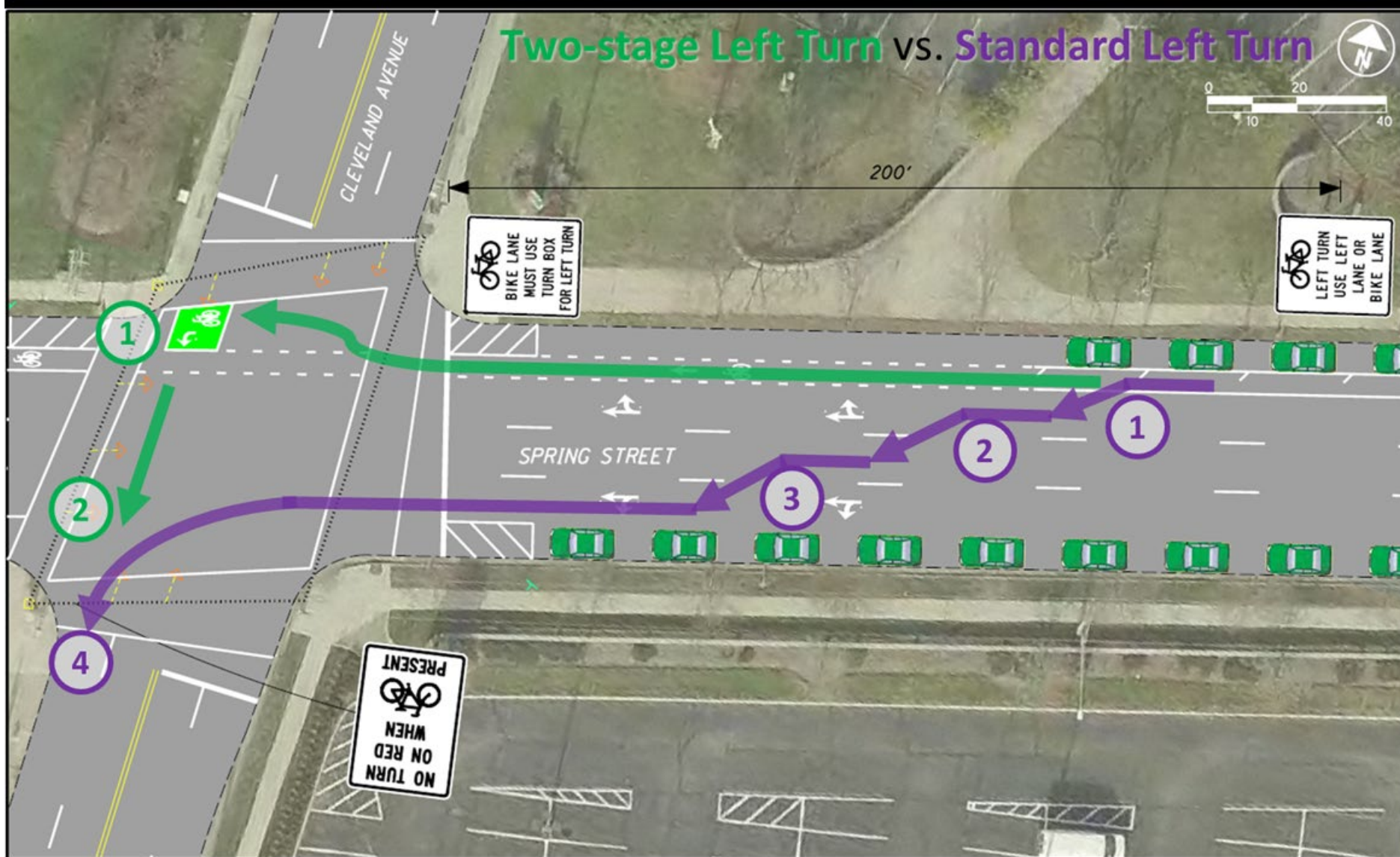
- Butler Avenue

- 0.9 miles in length
- Eastbound and Westbound
- Parking curb barrier
- Two-stage left boxes
- Intersection conflict zone markings
- Task Order signed with Eagle Mountain Construction in August





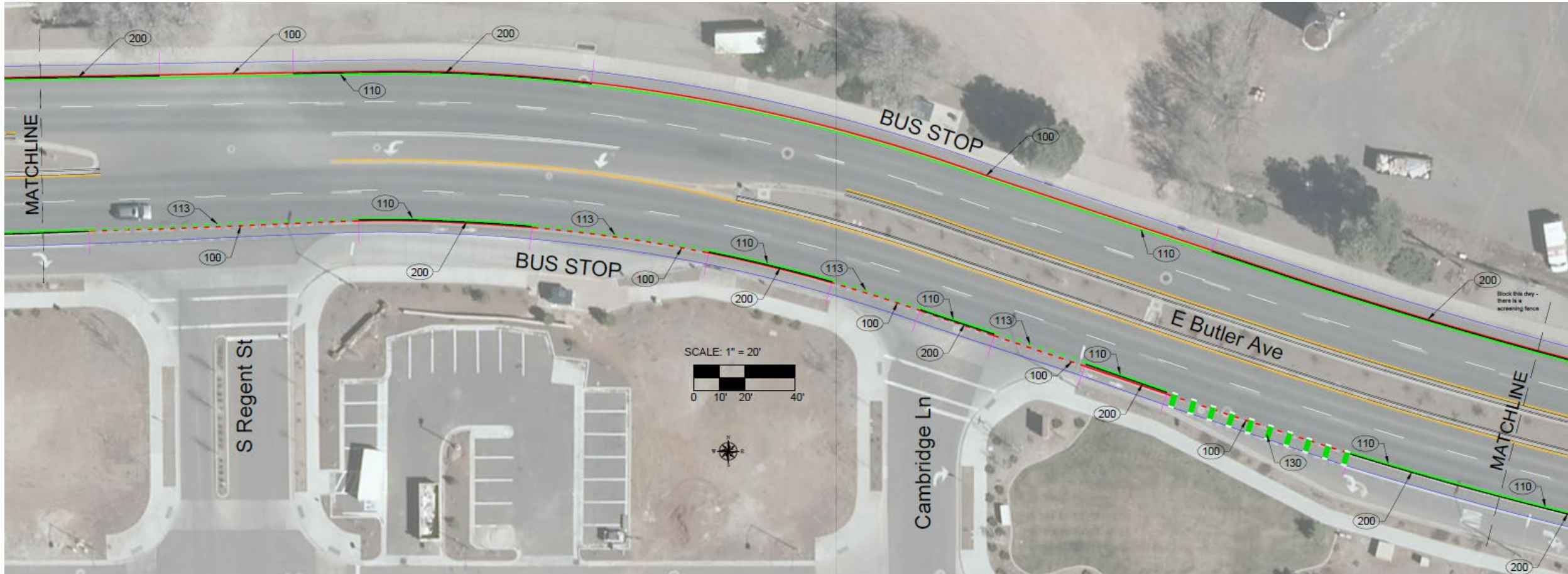
Two stage left boxes





Butler Phase I Pilot Program

Typical Block on Butler





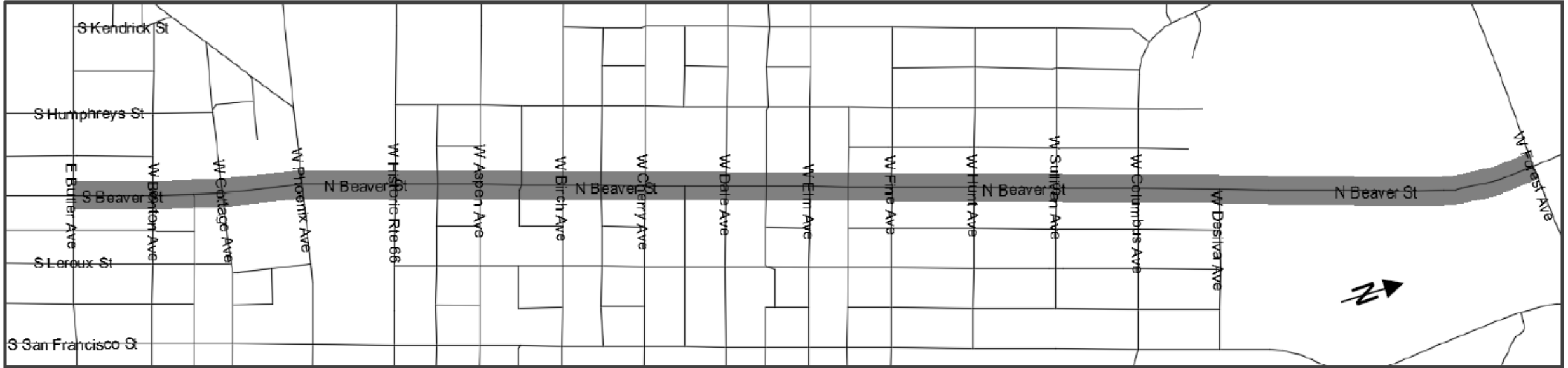
Pilot Project Status

Contract awarded to Eagle Mountain Construction

- Council direction received July 6th
- City internally developed concepts and completed design
- Project bid August 13th - 27th
- Task Order with Eagle Mountain Construction in early September
- \$ 538,650 for Butler Phase I
- Current Status
 - Materials ordered - 775 parking curbs is challenging
 - Scheduling sub-contractors – pavement obliteration and markings
 - Completion December 2021



Beaver Phase II Pilot Program





Beaver Phase II Pilot Program

Pilot Separated Bike Lanes +

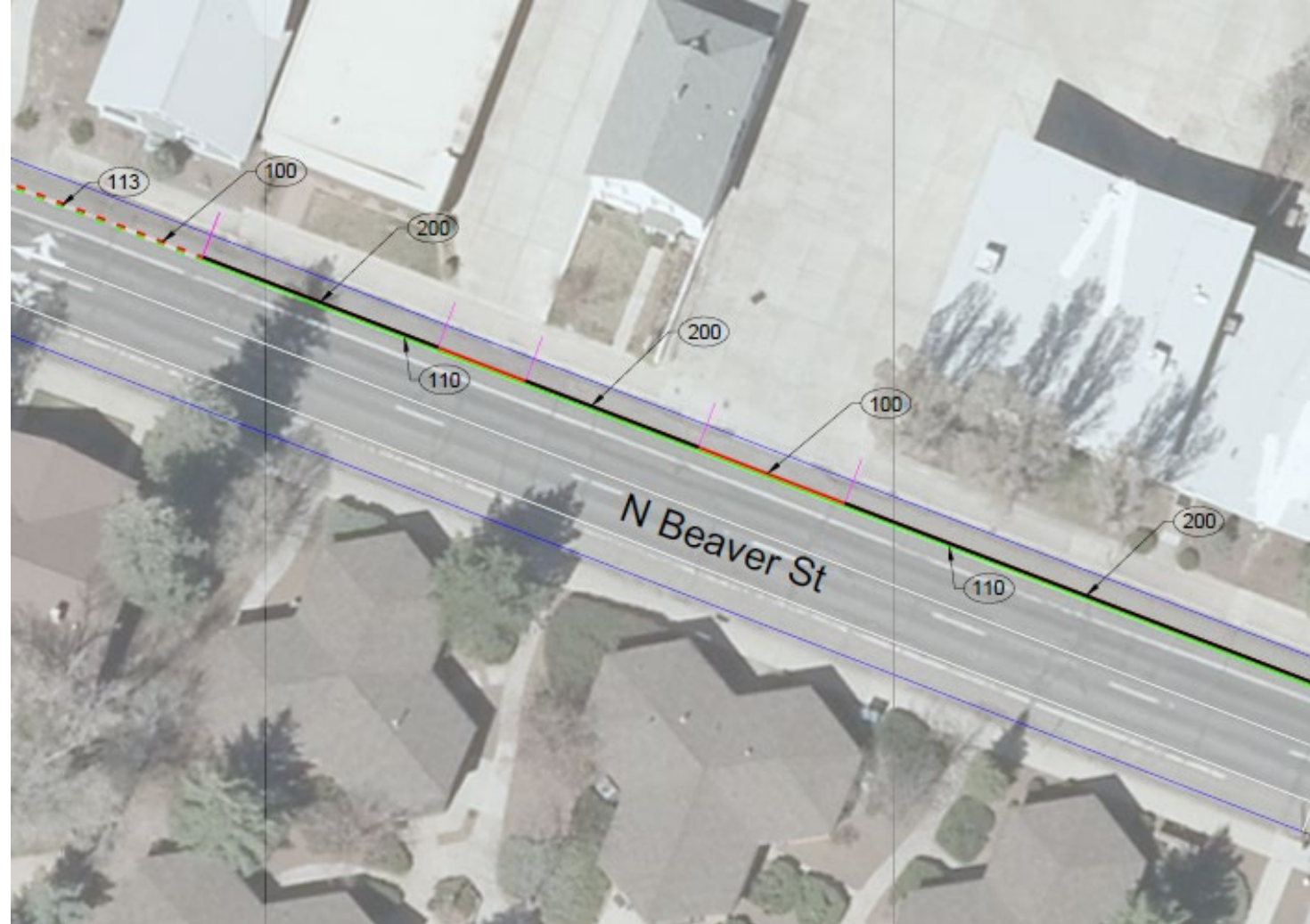
- Beaver Street
 - 1.2 miles in length
 - Two-way north of Columbus
 - One-way south of Columbus
 - Parking curb barrier
 - Two-stage left boxes
 - Intersection conflict zone markings





Beaver Phase II Pilot Program

Typical block between Cherry and Forest





Pilot Project Status

Contract awarded to Eagle Mountain Construction

- City internally developed concepts and completed design for phase I and then moved to phase II
- Phase II design completed September 15th
- Current Status
 - Eagle Mountain Construction Phase II cost proposal - \$350,000
 - Combined the Phase I and Phase II projects
 - Completion December 2021



Pilot Project Maintenance Operations

- Current snow operation in this area
- Proposed snow operation
- Proposed operational and one-time costs





Current Snow Operation





Current Snow Operation

Butler Ave and Beaver Street

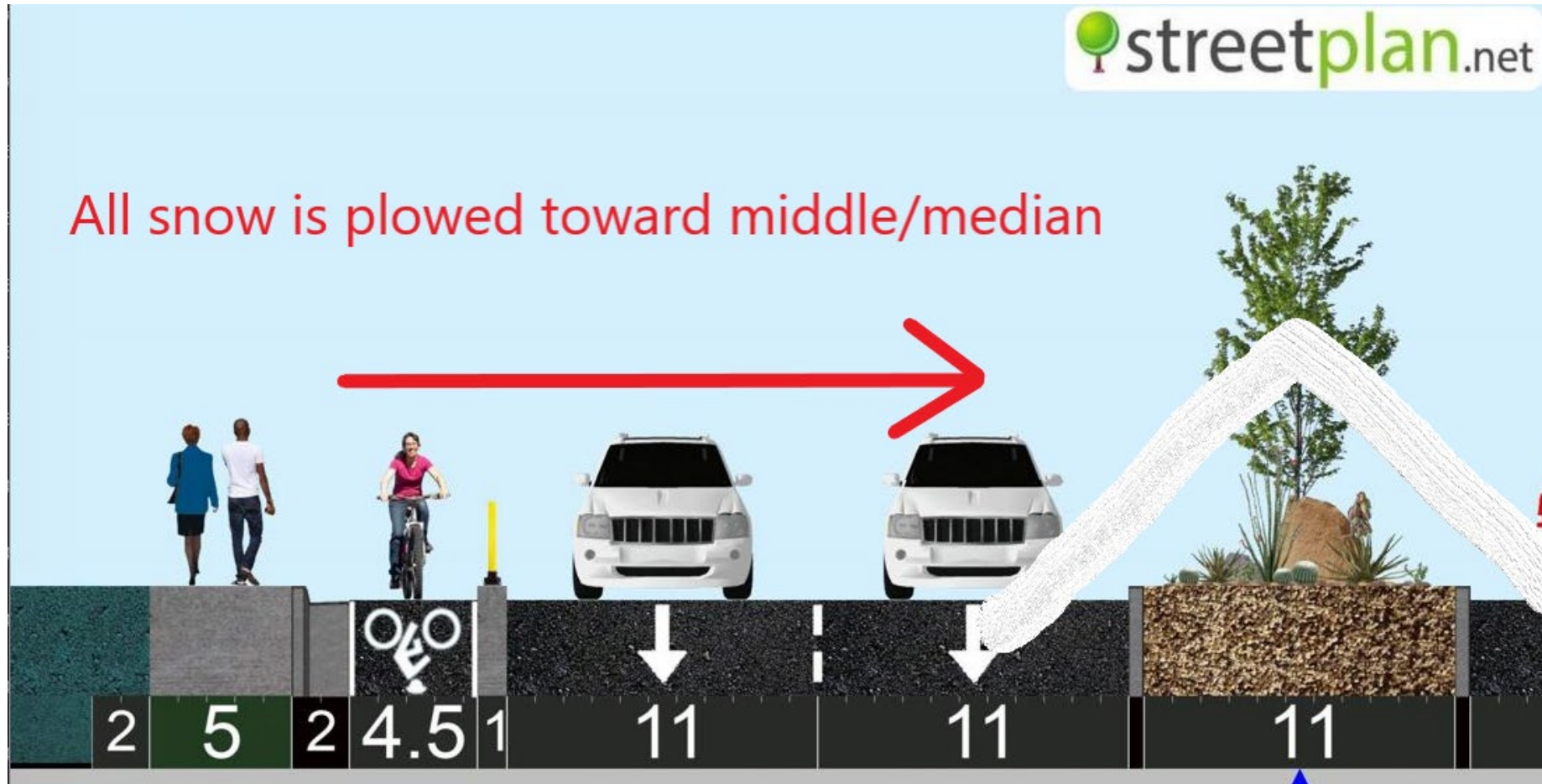
- Streets plow truck route coupled with other roadway routing totaling 25 lane miles
- No dedicated bicycle lane snow operation
- Snow is pushed toward the bicycle lane and adjacent sidewalk creating a windrow
- Ice cinders utilized for traction control as needed
- Differing storm event types



Proposed Snow Operation

Butler Ave Plow and Haul

- Proposal includes a high level of service
- Operational overview
- Pros and cons to operations





Proposed Snow Operation





Proposed Snow Operation





Proposed Snow Operation



Proposed Snow Operation

Beaver Street

- Similar strategy will be utilized comparable to Butler Ave
- Concerns and additional obstacles with two-way traffic turning into one-way, on-street parking, solid waste services
- Pros and cons of operation



Proposed Operational & One-Time Costs



- Highest/new level of service – dedicated equipment, staffing
- One-Time Equipment - \$650,000
 - Two Toolcats \$140,000 (\$70,000 each with attachments)
 - One Loader Blower attachment \$160,000
 - One Plow Truck \$350,000 (pilot to use existing fleet)
- Equipment operator labor, fuel - \$27,000 per 24-hour period
 - 12-hour day shift, 3 operators
 - 12-hour night shift, 9 operators
 - Moving the snow multiple times, hauling away
- Equipment availability, staffing, funding



Pilot Project Evaluation and Reporting

- Maintenance operation will require continuous evaluation and tweaking real time for best efficiencies and results
- Overall Pilot Program evaluation
 - Before and after bike counts
 - Before and after vehicle speed study
 - Survey to bicyclists on their experiences
 - Drainage concerns
 - Damage to barriers and delineators



Separated Bicycle Lane Infrastructure

Discussion

Separated bikeways

Outline...

- Bikeways plan summary
- Separation from traffic
- Bikeway facilities
- Prioritization
- Near-term separated bikeways
- Horizontally separated

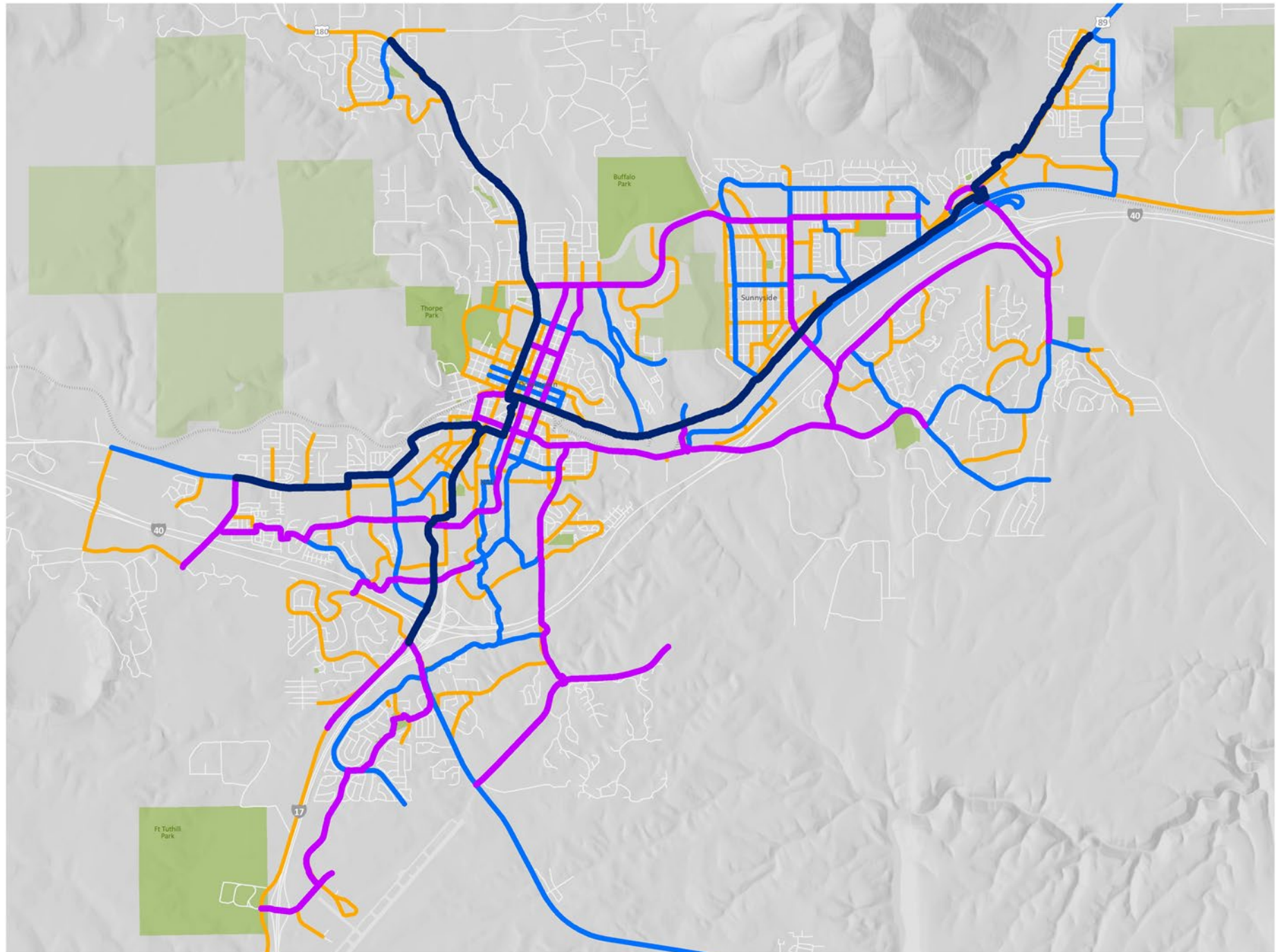






Bikeways plan

- Hierarchical, focus on primary and secondary bikeways
- Made up a variety of facilities
- Works best as a comprehensive system
- Signage, branding, and wayfinding help make the system cohesive
- Intended to appeal to “interested but concerned” segment of population



Active Transportation
Master Plan
**Bikeways
by hierarchy**



- Class**
-  1 Primary
 -  2 Secondary
 -  3 Third
 -  4 Fourth



City of Flagstaff
September 2021



Separation from traffic

- Bicyclists share space on low speed/volume streets
- Bike lanes provide dedicated space on moderate speed/volume
- Buffered bike lanes as speeds and volumes increase
- High speed/volume streets may require separation



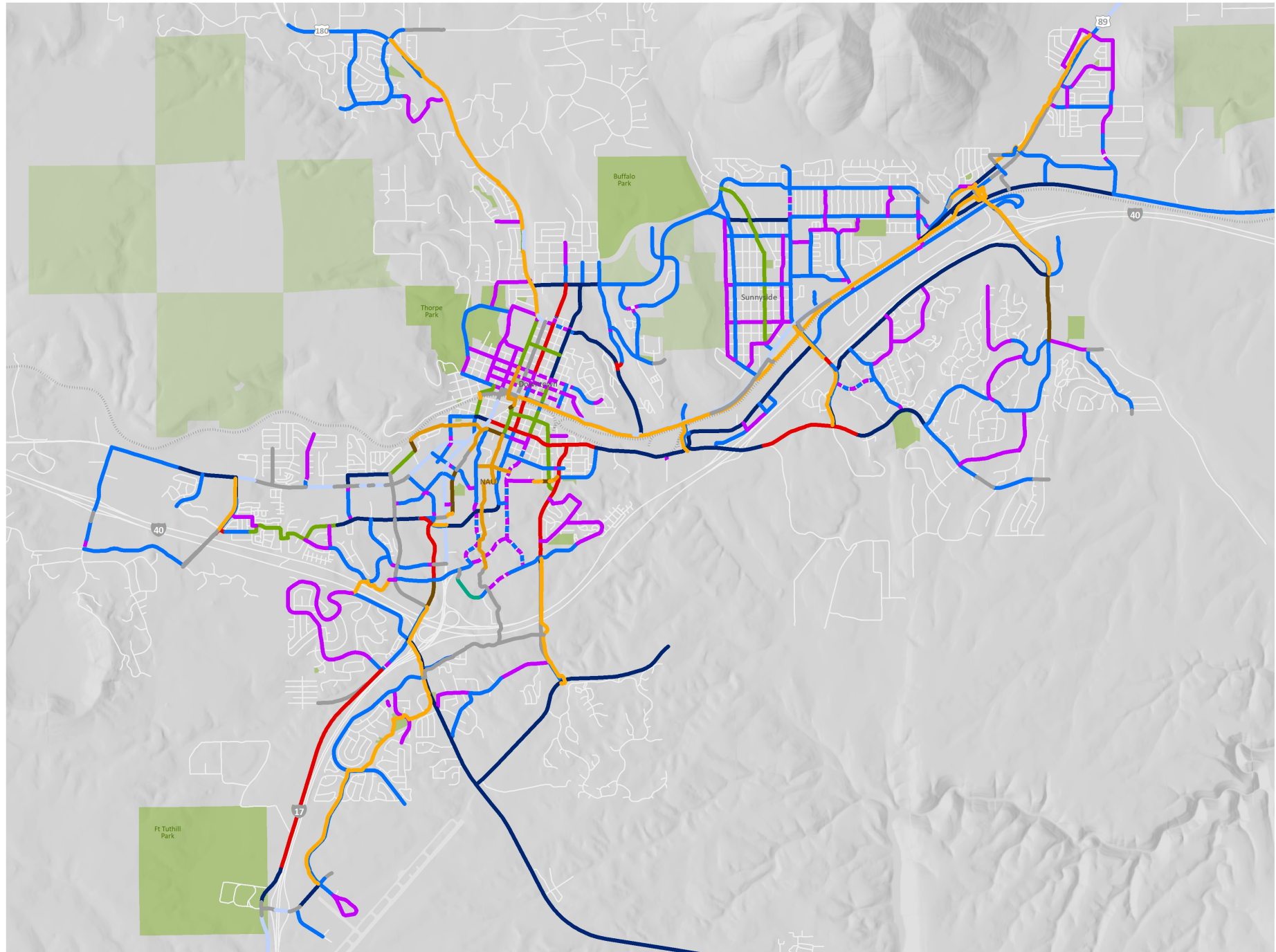
Bikeway facilities

Categorized by level of separation:

- **Shared streets:** low speed/low volume streets where bicyclists share the street with vehicles - route, boulevard, shared lane markings, advisory bike lanes
- **Dedicated facilities:** bikes have their own designated space within the roadway - bike lanes, buffered bike lanes
- **Separated facilities:** space for bicyclists is separated from traffic, either vertically by a physical barrier or horizontally by a buffer - vertical, horizontal, cycletrack, FUTS

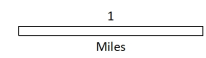
Active Transportation
Master Plan

**Bikeways
by facility**



Facilities

-
- Bike lanes
- Boulevard
- Buffered
- Bus/bike lane
- Cycletrack
- Divided FULTS
- FULTS
- Route
- Separated
- SLM/bike lane
- Shared lane markings
- Shoulders



City of Flagstaff
September 2021



Bikeways prioritization



- Bikeways hierarchy – primary and secondary
- Reliance on other projects to complete segments
- Anticipated function and level of use
- Character of street and need for bikeway facilities



Intent within 5 years

- Complete primary and secondary bikeways as much as possible
- Include high-visibility, high-impact facilities, including separated
- Introduce other types of advanced facilities
- Implement bike lanes, bike routes, and other enhancements on third and fourth level bikeways
- Pull the network together with signing, identification, and wayfinding



Near-term separated bikeways

Pilot projects

- Butler Ave
- Beaver St

Bikeway projects

- Country Club Dr
- Mikes Pike
- Beulah Blvd

Roadway projects

- Lone Tree overpass
- East Butler Ave
- Beulah/University
- J.W. Powell Blvd

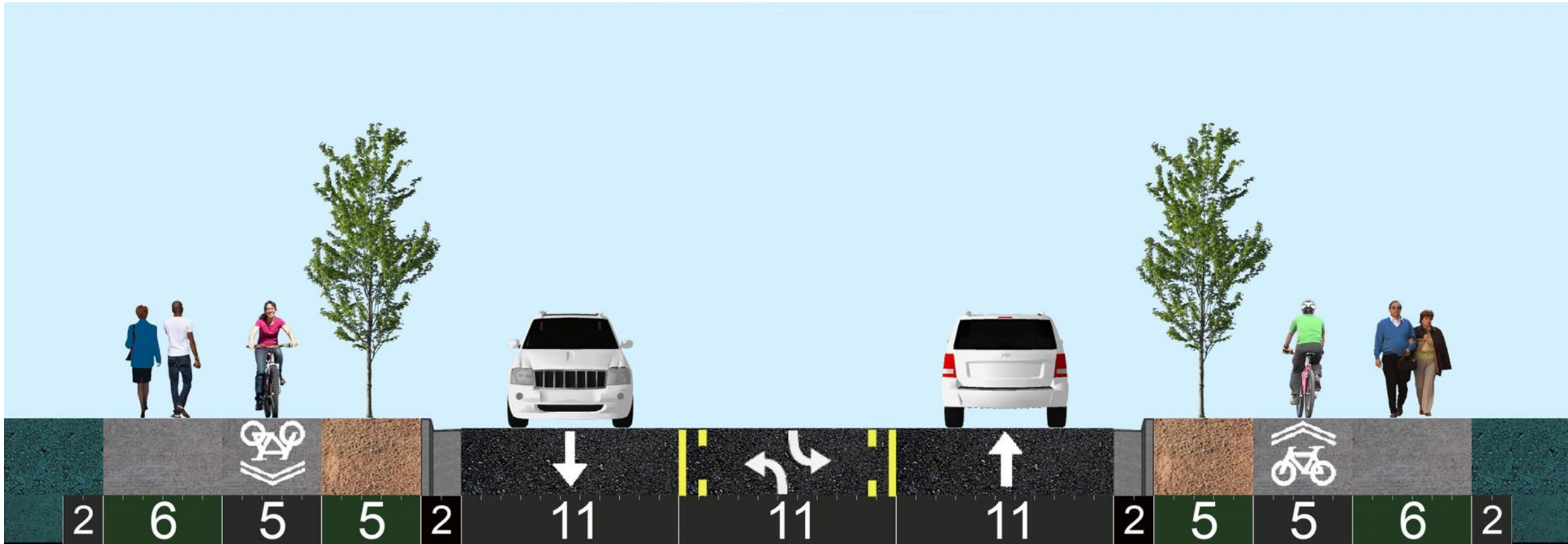
Capital projects

- Rio de Flag flood control
- Downtown Conn Center



Separated - horizontal

- Bike lane is separated from adjoining traffic lanes horizontally by parkway, buffer strip, or curb-and-gutter





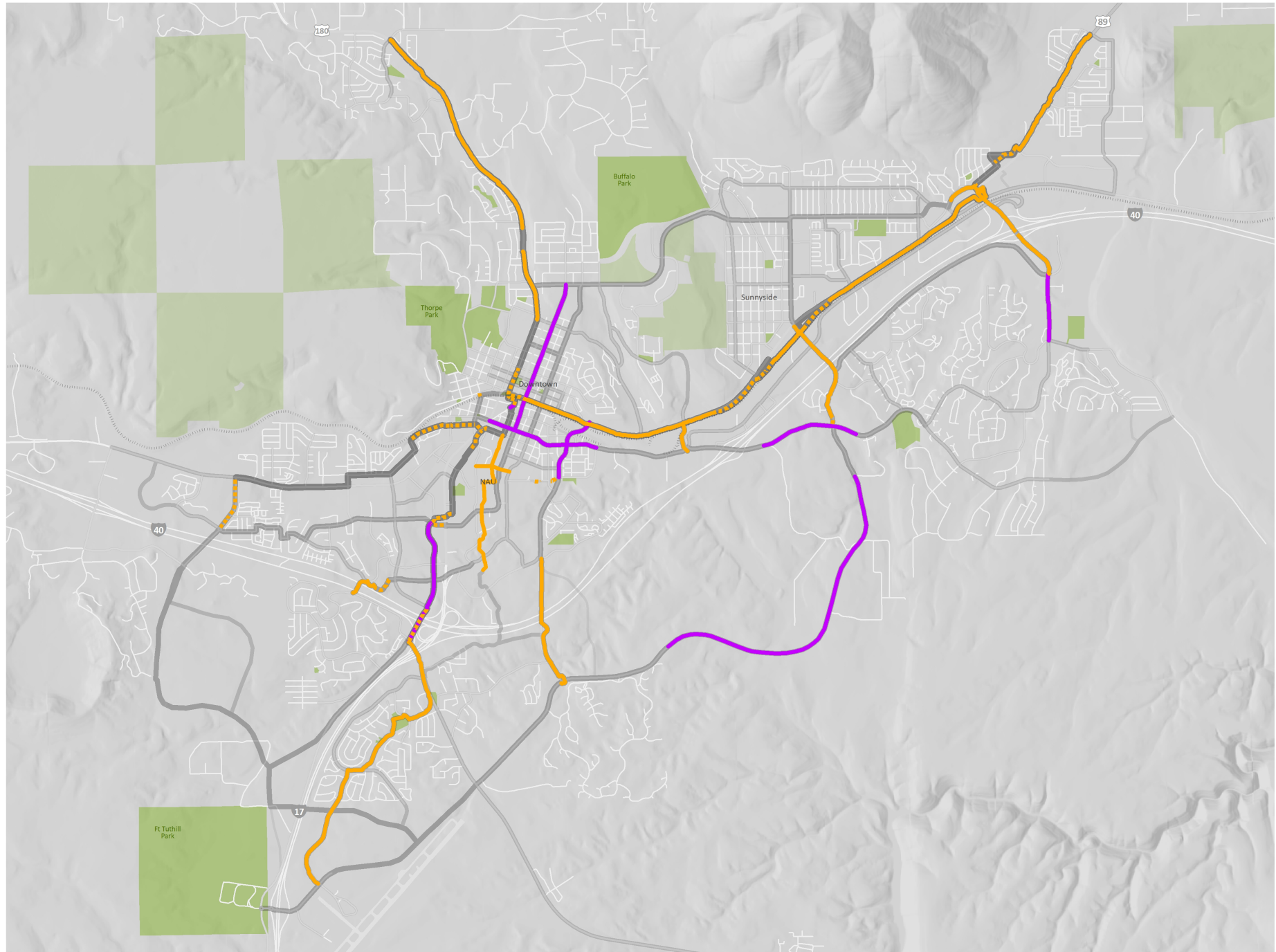
Separated - horizontal





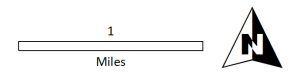
Separated - horizontal

- Preferred configuration for separated bike lanes for new streets or construction
- Expensive to construct on existing streets
- Snow clearing and sweeping are same as FUTS trails
- Need clear differentiation between ped side and bike side
- May preclude cyclists from making left turns as a vehicle – need separated intersections, two-stage left boxes



Active Transportation
Master Plan
**Planned separated
bike lanes and FUTA**

- Existing FUTA
 - Planned FUTA
 - Separated
- Bikeway class**
- 1 Primary
 - 2 Secondary
 - 3 Third
 - 4 Fourth





Separated Bicycle Lane Infrastructure

Discussion