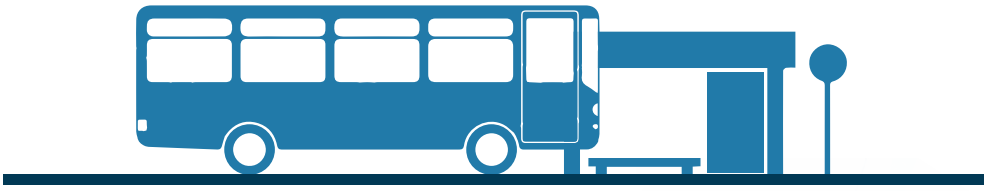
NORTH AVENUE



ENHANCED TRANSIT CORRIDOR STUDY

Final Report
June 2022

Vision for North Avenue

The vision for the North Avenue Enhanced Transit Corridor is to be a safe, multimodal corridor that is comfortable and easily accessible for people walking, biking, taking transit, and driving. The corridor will provide mobility and access to users of all ages and abilities to destinations along the corridor, efficient service for those traveling through the corridor, support efficient movement of goods, and connectivity to the City's surrounding transportation network. The corridor will foster existing business and future infill and redevelopment to accommodate a clean, vibrant, attractive, and well-maintained user experience.

Common Acronyms

ADA	Americans with Disabilities Act
AVL	Automatic Vehicle Locator
CAD	Computer-Aided Dispatch
CDOT	Colorado Department of Transportation
CMU	Colorado Mesa University
GJHS	Grand Junction High School
GVT	Grand Valley Transit
LPI	Leading Pedestrian Interval
LOS	Level of Service
NACTO	National Association of City Transportation Officials
ROW	Right-of-Way
RSA	Road Safety Audit
RTPO	Regional Transportation Planning Office
TEDS	Transportation and Engineering Design Standards
TSMO	Transportation Systems Management and Operations
TSP	Transit Signal Priority
VA	Veterans Administration

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1. Introduction

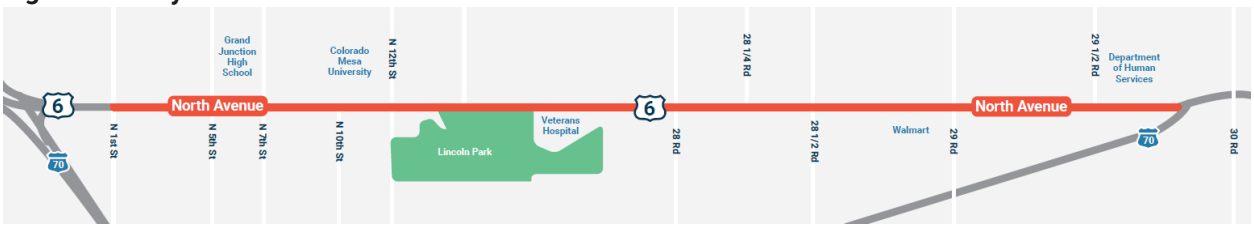
The Regional Transportation Planning Office (RTPO), City of Grand Junction, and Colorado Department of Transportation (CDOT) led an Enhanced Transit Corridor Study on North Avenue from 1st Street to the I-70 Business Loop. This document provides a summary of the Study, including several key components:

- Existing Conditions (Chapter 2)
- Outreach (Chapter 3)
- Corridor Vision (Chapter 4)
- Recommendations (Chapter 5)
- Action Plan (Chapter 6)

Study Area

The Study Area is shown in **Figure 1** and includes the 3.75 mile length of North Avenue from 1St Street on the west end to I-70B on the east end. North Avenue falls mostly within the City of Grand Junction, but some short segments east of 29 Road are in unincorporated Mesa County. Because North Avenue is a State Highway (US 6), the Colorado Department of Transportation (CDOT) owns and operates the road in collaboration with the City of Grand Junction and Mesa County. Additionally, Grand Valley Transit (GVT) operates several public transit bus routes along North Avenue.

Figure 1. Study Area: North Avenue from 1st Street to I-70B



Purpose and Goals

The purpose of this Corridor Study was to define a long-term vision for North Avenue and identify a set of prioritized infrastructure projects to make the corridor more comfortable for people biking, walking, and taking transit. While the entire cross section of the roadway was studied, the primary focus of this Study was on the areas outside the travel lanes, including the sidewalk, buffer area (between the sidewalk and curb), and bus stops.

Key Outcomes of The Corridor Study

- A community driven vision for North Avenue;
- Conceptual design and recommendations for improving bus stops along the corridor;
- Recommendations for long-term transit speed and reliability improvements;
- Conceptual design for a multiuse trail for the entire North Avenue corridor;
- Preliminary design for construction of the next high priority segment of multiuse trail;
- A prioritized list of long-term infrastructure projects aimed at making North Avenue safer and more comfortable to walk, bike, and access transit that can be implemented as funding becomes available.

Project Context

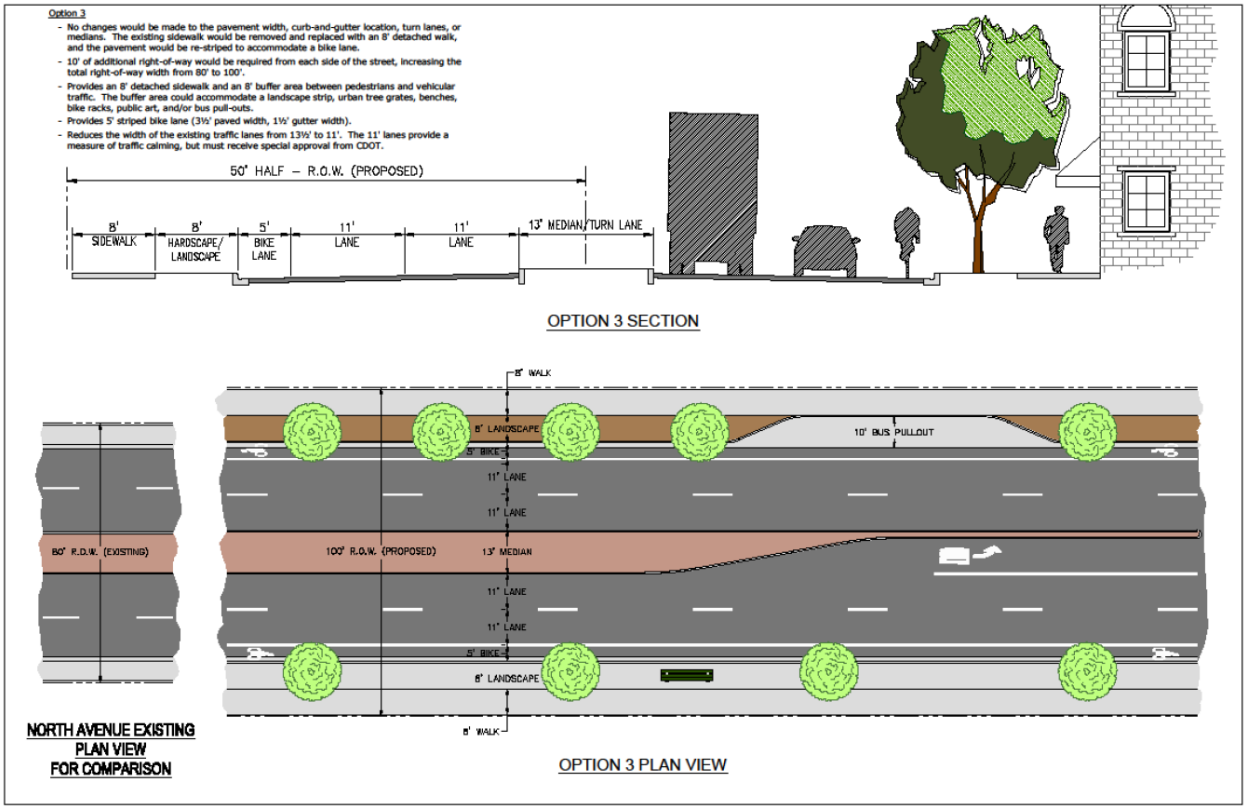
North Avenue is a highly traveled corridor by all modes of transportation. It is a State Highway (US 6) that transects the heart of the Grand Valley with many local and regional destinations. North Avenue has a long history as an important thoroughfare within the Grand Valley. Major destinations on or near North Avenue include: Grand Junction High School (GJHS), Colorado Mesa University (CMU), Lincoln Park (including Ralph Stocker Stadium and Suplizio Field), the Veterans Administration (VA) Medical Center, Walmart, Mesa County Community Services and Workforce Center, Mind Springs Behavioral Health Center, District 51 Career Center, and several human services providers. In addition to these, the bulk of the destinations on the corridor include an eclectic mix of private small, medium, and large businesses serving a variety of community needs. A mix of single-family homes, apartments, and mobile homes also flank the corridor.

The two GVT bus routes that serve North Avenue (Route 5 and Route 9) each have double the transit ridership of any other route in the GVT system. Additionally, between 2015 and 2019 there were 68 crashes in the corridor involving bicyclists and pedestrians, which speaks to both the high level of multimodal activity in the corridor and traffic safety concerns.

Project Background

In 2007 and 2011, The *North Avenue Corridor Plan* established a long-term vision for North Avenue that includes a parallel multiuse trail on both sides of the street with a landscaped buffer and on-street bike lanes, see **Figure 2**. That project also modified zoning standards, resulting in sidewalk and landscaping improvements at various locations across the corridor as properties redeveloped over the last decade.

Figure 2. Standard Design Identified for North Avenue in the 2011 *North Avenue Corridor Plan*



Relevant Plans

North Avenue has been identified as a key multimodal connection in several City and regional plans including:

- **One Grand Junction Comprehensive Plan (2020)** identifies North Avenue as a corridor to improve and enhance transit connections and equally prioritize transit with other modes to encourage use of transit, bicycling, and walking.
- **2045 Regional Transportation Plan (2020)** identifies North Avenue as an Enhanced Transit Corridor due to its high ridership and potential for transit-oriented development.
- **Grand Junction Circulation Plan (2018)** identifies North Avenue as an active transportation corridor.

Concurrent North Avenue Projects

While this Study was being developed CDOT was also finalizing the design phase of a North Avenue Improvement Project that impacts the curb-to-curb design of the roadway. That project included resurfacing the road, narrowing the inside travel lanes from 12.5’ to 11’, and installing new medians to control access, improve safety, and improve traffic flow. CDOT was also in the design process to eventually upgrade the traffic signals on North Avenue with more reliable and modern signal equipment.

2. Existing Conditions

An analysis of existing multimodal transportation conditions along the North Avenue corridor and surrounding area was conducted as part of this Study. The existing conditions analysis focused primarily on the transit, bicycle, and pedestrian networks. The analysis provides a baseline context for the Study and identified network gaps and potential issues to inform recommendations. Maps and graphics produced as part of the existing conditions analysis were presented to the public as part of the project outreach and are provided in **Appendix A**. A written summary of findings is provided in this chapter.

Transit

Appendix A includes a map of the transit network around North Avenue, including bus stop locations, average daily boardings by stop (in 2019), and charts showing the amenities by stop.

North Avenue is primarily served by GVT Routes 5 and 9, which each have double the transit ridership of any other route in the GVT system. Short segments of North Avenue are also served by Route 6, Route 7, and Route 10. With the exception of Route 1 (which operates on Main Street, 12th Street, and Horizon Drive) all GVT routes operate hourly service Monday through Saturday from about 5:15 AM to 8 PM. Due to the hourly frequencies, routes are scheduled to provide timed transfers at the three major transfer facilities in the Grand Valley: Downtown Transfer Station, West Transfer Station, and Clifton Transfer Station. Bustang and Bustang Outrider, which are managed by CDOT and provide daily service to Denver (via I-70), Durango (via US 50/ CO 145, and US 160), and communities in-between, also serve North Avenue, with a stop at the VA Medical Center.

Key Findings of Transit Analysis

- Route 5 and 9 that operate on North Avenue each have double the ridership of any other route in the GVT system.
- The highest boardings on North Avenue occur in the east end of the corridor.
- In 2019 stops between 28 ½ Road and 29 Road averaged over 20 boarding per day and the stop on 29 ½ Road at North Avenue averaged over 50 boardings per day, the highest in the corridor.
- 68% of bus stops on North Avenue are more than 200' from the nearest signalized crossing, increasing the likelihood of riskier pedestrian crossing behavior.
- Of the 24 bus stops on North Avenue, 60% have a bench, 44% have a trash bin, 32% have a shelter, and 0% have lighting or bike racks.
- Pre-COVID, Routes 5 and 9 had lower on-time performance than the other GVT routes, but on-time performance has improved since the pandemic likely due to decreased ridership.
- Based in interviews with bus drivers the two primary sources of delay for routes on North Avenue are from boarding (primarily from people who do not have their fare payment ready,

but also from people who need more time boarding, such as wheelchairs) and when buses must wait for gaps in traffic when reentering the travel lanes from a bus pullout.

Pedestrian Network

Appendix A shows a map of the pedestrian network along North Avenue and within a half mile of North Avenue. The width of the sidewalk and whether there is a buffer between the sidewalk and curb was mapped on both sides of North Avenue. The pedestrian network around North Avenue was also mapped based on available data provided by Mesa County, including where there are buffered sidewalks (which includes a buffer between the sidewalk and street), attached sidewalks (where there is no buffer between the street and sidewalk), and streets with no sidewalk.

Existing Sidewalk Condition Along North Avenue

Prior to the 2011 *North Avenue Corridor Plan*, the standard sidewalk design for North Avenue was the same as any other major arterial in Grand Junction, which was a 6' attached sidewalk. Following the 2011 *North Avenue Corridor Plan*, the standard design changed to an 8' sidewalk with an 8' buffer.

Existing conditions analysis revealed that the width of the sidewalk and presence of a buffer varies depending on the segment of the corridor. In 2016, the City improved most of the segment between 12th Street and 23rd Street to a width of 8' with an 8' landscaped buffer and pedestrian scale lighting. Several other sections have also been improved to this standard as private properties have been redeveloped, but most of these are short and discontinuous with other improved segments. As a result, most of the corridor continues to have a 5' or 6' attached sidewalk (see photo at right). A few sections are narrower than 5' (some as narrow as 2.5'), mostly on the south side between 9th Street and 13th Street. Many parts of the east end of the corridor between 28 ½ Road and I-70B have no sidewalk (see photo at right).

Key Findings of Sidewalk Condition Along North Avenue

- 26% of North Avenue has at least an 8' sidewalk, 52% has a sidewalk less than 8', and 22% of the corridor has no sidewalk (mostly east of 28 ½ Road).
- The majority of the sidewalk on the corridor is attached (with no buffer from the street), the exceptions primarily include the stretch between 12th Street and 23rd Street and few other short segments where private development has occurred since 2011.
- East of 29 Road about 65% of the north side of North Avenue and 80% of the south side is missing a sidewalk.

Key Findings of Surrounding Sidewalk Network

- See **Appendix A** for map of the surrounding sidewalk network.
- West of 28 Road the surrounding street network is generally well connected, and most streets have sidewalks.

- East of 28 Road the surrounding street network is more poorly connected, and many streets are missing sidewalks.
- Most streets missing sidewalks around North Avenue are local streets with lower traffic volumes and speeds, but three arterial or collector streets within a quarter mile of North Avenue were found to be missing sidewalks, which can pose a bigger barrier to pedestrian circulation:
    - 28 Road (between North Avenue and Gunnison Avenue)
    - 28 ½ Road (between Gunnison Avenue and Elm Avenue)
    - Elm Avenue (between 28 Road and 28 ½ Road)

Bicycle Network

The existing and planned bicycle network around North Avenue was mapped in **Appendix A**. Existing bicycle corridors that cross North Avenue include a mix of on-street bike lanes, signed bike routes, and off-street parallel multiuse trails (see **Appendix A** for visual example of each). Additionally, planned Active Transportation Corridors identified in the 2018 *Grand Junction Circulation Plan* are also mapped. The entire length of North Avenue is planned as an Active Transportation Corridor, and the section between 12th Street and 23rd Street has an existing off-street multiuse trail.

There are seven cross streets that intersect North Avenue with existing bikeways. All of the bikeways currently cross North Avenue at a signalized intersection except at 3rd Street. There are five additional streets planned as active transportation corridors or bikeways that intersect North Avenue, all planned at existing signalized intersections. As of publication the City of Grand Junction was initiating a citywide *Pedestrian and Bicycle Master Plan* that may refine the planned bike network across North Avenue.

Streets with Existing Bikeways that Intersect North Avenue

- 1st Street (bike lane)
- 3rd Street (bike lane)
- 10th Street (bike lane – south leg only)
- 12th Street (off-street trail – north leg only)
- 28 Road (bike lane)
- 28 ¾ Road (bike lane – north leg only)
- 29 Road (bike lane)

Streets Planned as Active Transportation Corridors that Intersect North Avenue

- 5th Street
- 7th Street
- 23rd Street
- 28 ¼ Road
- 29 ½ Road

Traffic

North Avenue includes two travel lanes in each direction, each at a width of 12.5', plus a 14' median (center line to center line) that is typically a left turn lane with a narrower median. As part of the US 6 North Avenue Improvements project planned by CDOT (to be implemented in 2022) additional median/access control will be added to more sections of North Avenue and the inside lanes will be narrowed to 11'.

Average traffic volumes on most of North Avenue in 2019 were between 20,000 and 25,000 vehicles per day. The segment with the highest daily volumes was east of 5th Street at 29,000 vehicles per day and the lowest was east of 29 Road at 17,000 vehicles per day. The posted speed on North Avenue is 30 mph between 1st Street and 12th Street, 35 mph from 12th Street to 29 Road, and 40 mph east of 29 Road.

A traffic analysis was not completed as part of this Study. However, CDOT completed a Transportation Systems Management and Operations (TSMO) analysis as part of the US 6 North Avenue Improvements project and found no significant traffic level of service (LOS) concerns under existing conditions or with forecast traffic through the year 2040.

Crash Analysis

Analysis was performed of all bicycle and pedestrian involved crashes that occurred along North Avenue over a five-year period between 2015 and 2019. A summary of the data is mapped and key findings illustrated in **Appendix A**.

Key Findings of Crash Analysis

- Between January, 2015 and December, 2019 there were 68 crashes on North Avenue involving a person walking or biking, an average of over one crash per month for five years.
- Eleven of these crashes resulted in severe bodily injury, including one fatality.
- Bicycle and pedestrian crashes were distributed along most of the North Avenue corridor.
- The highest concentration of pedestrian crashes occurred between 7th Street and 12th Street and between 28 Road and 29 Road.
- The highest concentration of bicycle crashes on North Avenue occurred around the intersections with 7th Street, 12th Street, and 28 Road.
- 52% of bicycle and pedestrian involved crashes on North Avenue were from drivers failing to yield right-of-way while turning (mostly from vehicles turning right onto North Avenue from a side street and striking a bicyclist or pedestrian in the crosswalk along North Avenue)
- However, only 36% of severe crashes involving a pedestrian or bicyclist were from a turning vehicle failing to yield right-of-way.
- 64% of severe bicycle and pedestrian involved crashes were from pedestrians or bicyclists crossing North Avenue who were struck by a vehicle, including crashes that involved:
    - Pedestrians crossing against the signal,
    - Pedestrians or bicyclists crossing not at a signalized crossing, or
    - Drivers that ran a red light.

Signal Spacing

The distance between traffic signals is an important measure of pedestrian safety and comfort along North Avenue. Given that North Avenue is typically five lanes across and heavily traveled (traffic volumes average about 20,000 to 25,000 vehicles a day along most of the corridor), traffic signals provide the safest locations for pedestrian connectivity across North Avenue. Frequent pedestrian crossings are important for pedestrians to access businesses on either side of the street, for students to go to/from school, and for transit users to conveniently get to and from bus stops. Locations with long gaps between signals present a potential barrier to pedestrian access, circulation, and safety along North Avenue. A map and findings of the signal spacing analysis along North Avenue is available in **Appendix A**.

Key Findings of Signal Spacing Analysis

- Most of North Avenue is defined by quarter-mile signal spacing, which is about a five-minute walk for pedestrians between signals.
- Three locations along North Avenue have greater than quarter-mile signal spacing and may present a barrier to pedestrians and bicyclists trying to cross North Avenue at these locations:
    - Between 1st Street and 5th Street (0.34 miles)
    - Between 12th Street and 23rd Street (0.75 miles)
    - Between 29 Road and 29 ½ Road (0.5 miles)

Multiuse Trail Analysis

As part of this Study an existing conditions analysis was performed along the corridor to identify challenges and opportunities specifically when considering the addition of a separated multiuse path along both sides of the roadway. A comprehensive summary of the analysis is provided in a technical memorandum in **Appendix B**. A concept plan for a multiuse trail along the length of both sides of North Avenue is mapped in 40-scale plan sheets in **Appendix C**. The concept plan also illustrates locations where barriers to implementing a multiuse trail occur as well as potential design solutions at those locations. Key findings of the multiuse trail existing conditions analysis are summarized below.

Key Findings of Multiuse Trail Existing Conditions Analysis

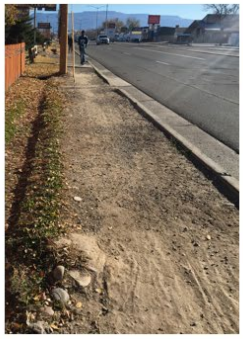
- Due to right-of-way constraints an estimated 130,000 square feet of property would need to be purchased or easements secured, with the highest concentration occurring between 1st Street and 12th Street.
- Approximately 30 businesses may have impacts to their existing privately owned off-street parking, including 20 locations between 1st Street and 12th Street, and 10 locations east of 28 ½ Road.
- There are approximately 184 business access points (driveways) along North Avenue and there appears to be an opportunity to consolidate some accesses along the corridor as part of the multiuse trail project.
- There are over 170 utility conflicts identified along North Avenue, with most being just spot conflicts.
- There are three direct conflicts with buildings, all between 8th Street and 11th Street.
- There are 115 other conflicts identified (signs, fences, benches, etc.), with the majority identified on the north side.

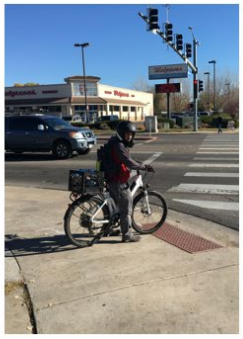
Walk Audit

The technical team for the Study performed a walk audit, which included walking a mile on the east end of the corridor (from 28 ½ Road to 29 ½ Road) and over a mile on the west/central part of the of the corridor (from 5th Street to 23rd Street) as well as riding two GVT buses along North Avenue. The walk audit exposed the team to the experience of a pedestrian and transit user on the corridor and helped

reveal additional barriers and opportunities as part of this Study. Key findings from the walk audit are summarized below.







Walk Audit Key Findings

- A lot of pedestrian and bicycle activity was observed corridor-wide even where there are no sidewalks.
- People were observed not crossing at signals (midblock) corridor-wide.
- An open irrigation ditch is present in the east end of the corridor where a sidewalk/ landscaped buffer might be located.
- Inconsistent pedestrian ramps were observed at crossings that may create challenges for people in wheelchairs and with strollers.
- There are gaps in the sidewalk network on the east end, despite pedestrian/ bicycle demand.
- Parking and building constraints on the west end may create challenges for widening the sidewalk.
- Bus service is infrequent (60-minute headways), which is problematic for riders who miss their bus, and overall does not provide viable bus service for many North Avenue users.
- A lot of students from GJHS and CMU were observed walking along North Avenue between 7th Street and 12th Street during lunch hour.
- There are frequent curb cuts and locations for pedestrian/ vehicle conflicts corridor-wide.
- Many pedestrian signals along North Avenue default to Don't Walk even when the parallel traffic signal is green.

Transit Signal Priority Assessment

An existing conditions analysis of the technology of the traffic signal system and buses that operate along North Avenue was performed to assess feasibility of implementing Transit Signal Priority (TSP) in the corridor. TSP is a technology that can extend the green time at traffic signals by several seconds when a bus is approaching and the signal is about to turn red in order to allow the bus to clear the signal without waiting for the next cycle. The analysis found that the signal system is compatible with TSP, and GVT could leverage its onboard Computer-Aided Dispatch (CAD)/ Automatic Vehicle Location (AVL) service. A complete summary of the TSP analysis, including recommendations, cost estimates, and considerations for implementing TSP in the North Avenue corridor is provided in **Appendix F**.

3. Outreach Summary

Guidance for developing a corridor vision and recommendations came from input provided by the public and key stakeholders as part of outreach events conducted during the Study. There were seven general ways the public and stakeholders provided input and guidance for this Study, including through:

1. A Project Technical Team
2. Online Public Survey
3. Open House
4. Pop Up Event
5. Canvasing Businesses
6. Focus Groups
7. Bus Driver Interviews

Project Technical Team

A project technical team made up of representatives of key agencies provided guidance and technical oversight to the project. The technical team was made up of four agencies: the Grand Valley Regional Transportation Planning Office (RTPO – which included Grand Valley Transit), the City of Grand Junction, Mesa County, and the Colorado Department of Transportation (CDOT). The technical team met formally nine times over the course of the project, conducted a walk audit, and was instrumental in guiding analysis and recommendations. The agendas, meeting notes, and presentations from the technical team meetings are provided separately.

Online Public Survey

An online public survey was conducted early in the project to understand how people are using North Avenue, barriers to walking, biking, and using transit on North Avenue, and to solicit input on the vision for the corridor. Over 290 people responded to the survey. A complete summary of survey findings is provided in **Appendix D**. Key findings are summarized below.

Key Findings of Online Survey

- When asked what segment people would most like to walk or bike on North Avenue, but don't feel comfortable doing so, over 50% of respondents said the segments between 7th Street and 28 Road, see **Figure 3**.
- When asked to select three words that describe their vision for North Avenue, the top choices included bicycle, safe, and clean, followed by sidewalks, walkable, and accessible, see **Figure 4**.
- When asked what transit stop amenities are most important at bus stops, lighting, and shelter were ranked highest.
- When asked what barriers prevent people from walking and biking on North Avenue, the top responses were not feeling comfortable walking and biking, followed by lack of lighting, lack of signalized crossings, and not feeling comfortable crossing at existing crosswalks.

Figure 3. Survey results: Which section of North Avenue do you most want to walk or bike along, but do not feel comfortable doing so?

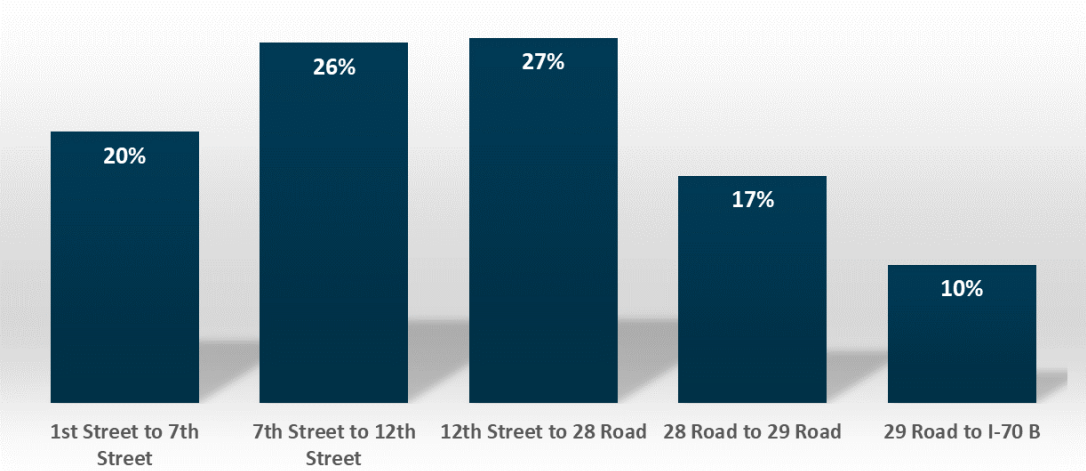


Figure 4. Survey results: What are 3 words that would describe your vision for the future of North Avenue?

Public Open House

The project team hosted a public open house at the Lincoln Park Barn on November 16th, 2021 to present the goals of the project and existing conditions findings, as well as to solicit input from the public on their vision and priorities for the corridor. Over 40 people attended the open house and highlights of input received is provided below.

Highlights of Input Received at the Open House

- Safety is a priority
- Prefer pedestrian-oriented design
- Desire for protected bikeway
- Better bicycle and pedestrian crossings of North Avenue
- More multimodal accommodations
- Want North Avenue to be transit friendly
- Recommendations should support businesses on North Avenue
- Slow traffic

Pop Up Event

One pop-up event was held early in the project to intercept people going to a CMU football game at Ralph Stocker Stadium adjacent to North Avenue. The event was used to spread awareness about the project and distribute the project survey.

Canvasing Businesses

RTPO and City of Grand Junction staff canvased businesses on North Avenue to inform them of the project, the online survey, and the public open house, and to drop off flyers in both English and Spanish for customers.

Focus Groups

Four focus groups were also held as part of the Study to get input from key agencies identified by the technical team as influential to North Avenue. The focus groups provided additional insight on existing barriers and the vision for the future of North Avenue. A brief summary of key outcomes of each focus group is provided below and a complete summary can be found in **Appendix E**.

The four focus groups included:

1. **Education Providers** (GJHS, D51 Career Center, CMU was invited but did not participate)
2. **North Avenue Businesses** (Habitat for Humanity, Latino Chamber of Commerce, Latino business owner, CMU student, North Avenue landowner)
3. **Human Services Providers** (Mind Springs, Ariel Clinical Services, Mesa County Workforce Center & Health Dept., Mesa County Public Health Trails, VA Medical Center)
4. **Urban Trails Committee**

Education Providers Focus Group Key Findings

- A lot of students use the bus, walk, and bike to the D51 Career Center.
- The D51 Career Center staff would like students to use transit and travel more on North Avenue but generally do not encourage it due to the gaps in the sidewalk system.
- A small group of GJHS students use the bus.
- GJHS students walk to restaurants on North Avenue at lunch, lots of kids walk/bike/skateboard to school, and many work at restaurants on North Avenue.
- Observe lots of families and people trying to cross North Avenue by foot near 29 ¼ Road (access to Bookcliff Middle School, bus stops, stores, trailer park).
- Need another crossing between 29 Road and 29 ½ Road.
- Some students will walk to a farther bus stop that has more amenities and a more comfortable waiting area.
- Having a comfortable/inviting space to wait for the bus is most important.
- Prioritize improving the sidewalk from 29 to 29 ½ Road, and 7th Street to 12th Street.

North Avenue Businesses Focus Group Key Findings

- Homeless presence detracts from people walking/ taking transit.
- Many residents live along North Avenue because they don't have a vehicle and are able to use transit.
- Observe a lot of people crossing the street midblock to get to a side where a sidewalk exists.
- Latino population not using the bus as much (bus stops feel unsafe, often have kids, bus does not operate in the evening, need material in Spanish).
- Campaigning in a fun way could introduce more people to the bus (ride the bus for a day, involve businesses, etc.).
- Vision for North Avenue
    - Safer/ connected bike facility.
    - Crossings needed (at Habitat Restore, near CMU, the VA Medical Center, near Walmart).
    - Improve traffic flow (signal progression) and bus pullouts help.
    - Improve attractiveness (greenery, banners, murals, branding, maintenance, lighting, etc.).
    - Supportive of multiuse path, some concern about impact to business parking.
    - Prioritize sidewalk improvements on the east end and filling sidewalk gaps.

Human Service Providers Focus Group Key Findings

- Biggest Barriers to more people walking/ biking/ riding transit:
    - Transit service is too infrequent.
    - Transit service is not direct enough to destinations (roundabout routes).
    - There are sidewalk gaps and lack of a bike facility.
    - People cross mid-block because distance is often too far to walk to a crosswalk.
- Vision for North Avenue
    - Wider sidewalks.
    - Traffic calming.
    - Improved bus stops: lighting, bus shelters, benches.
    - Landscaping and greenery.

- Prioritize improvements where there are sidewalk gaps, where people are walking, and at high bus ridership locations.
- There is a lot of pedestrian demand to cross near 29 ¼ Road.

Urban Trails Committee Focus Group Key Findings

- Support a multiuse trail for bikes to access businesses and services on North Avenue (main purpose would be to provide access and less so as a long through connection).
- Most people would not likely use an on-street bike lane on North Avenue that has no buffer/ barrier from traffic.
- A buffer is important for the multiuse trail.
- Recommend signage or better indication to drivers and other people that bikes may be on the side path, particularly at crossings.
- Potential areas to prioritize for improvement: around CMU, Walmart, and 28 ½ Road to 28 ¾ Road.
- Consider signage and green paint where bikes are to cross North Ave.
- Recommend additional lighting along the corridor.

Bus Driver Interviews

One-on-one interviews were held with two bus drivers that operate GVT buses along North Avenue to get an understanding of existing operations, preference on bus design features, and potential areas of delay. Questions were specifically asked about driver's preference regarding bus pullouts and the frequency of delay and main causes.

Bus Driver Interview Key Findings

- Bus Pullouts
  - Prefer pullouts (when well designed) to mitigate conflict with vehicles.
  - Desire longer tapers and deeper pullouts than how most of the pullouts on North Avenue are currently designed (would like pullouts designed like the new stop in front of U-Haul).
  - Loading area for wheelchairs needs to be deeper at some locations.
- Delay to Buses
  - Largest source of delay is loading/ unloading (often from passengers fumbling for change/ bus pass or wheelchairs).
  - Waiting to pull back into traffic from a pullout can occasionally delay the bus (typically adds about a minute of delay per run).
  - Traffic congestion/ signals do not cause delay (except at lunch hour westbound at 7th Street due to right-turning vehicles waiting for high volume of high school students to cross 7th Street).

4. Corridor Vision

The vision for the corridor was established by the technical team based on input received during the outreach process from the public and stakeholders, as well as the larger goals of the City of Grand Junction, the Mesa County RTPO, and CDOT.

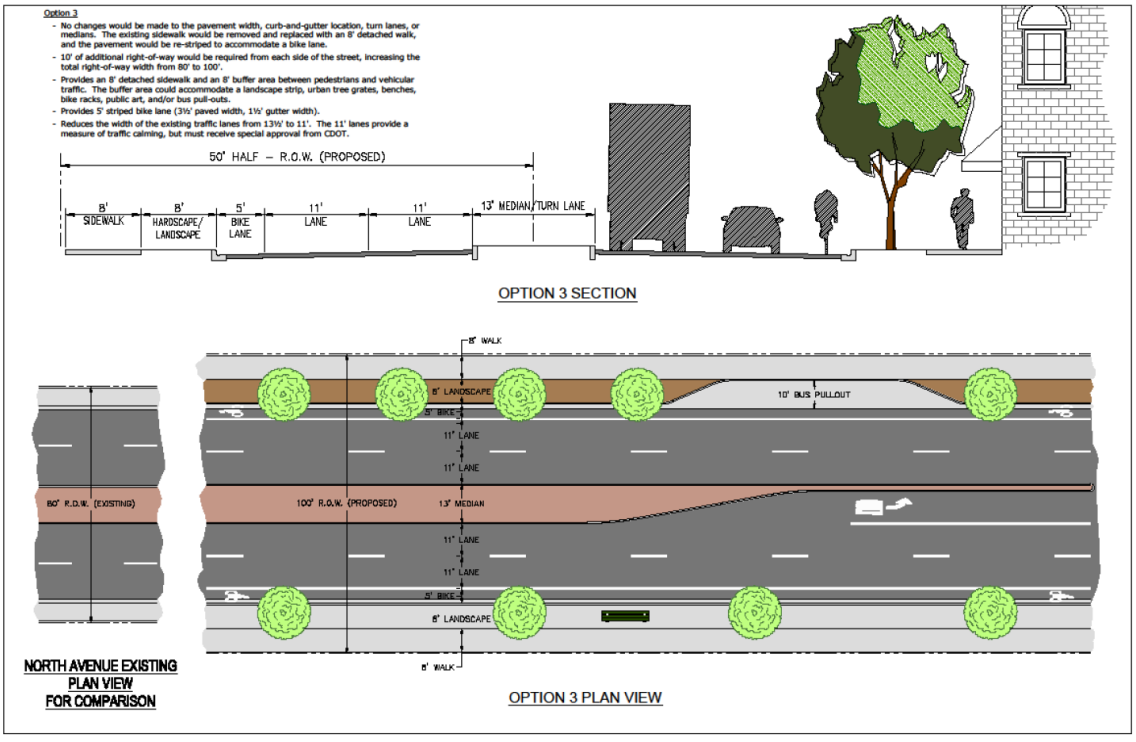
Vision Statement

The vision for the North Avenue Enhanced Transit Corridor is to be a safe, multimodal corridor that is comfortable and easily accessible for people walking, biking, taking transit, and driving. The corridor will provide mobility and access to users of all ages and abilities to destinations along the corridor, efficient service for those traveling through the corridor, support efficient movement of goods, and connectivity to the City's surrounding transportation network. The corridor will foster existing business and future infill and redevelopment to accommodate a clean, vibrant, attractive, and well-maintained user experience.

Cross Section

The cross section for the corridor, which was established by the 2011 *North Avenue Corridor Plan*, will remain largely the same as shown in **Figure 5**, with a few modifications as described below.

Figure 5. Standard design identified in the 2011 *North Avenue Corridor Plan*.



Key Attributes Unchanged from 2011 Vision:

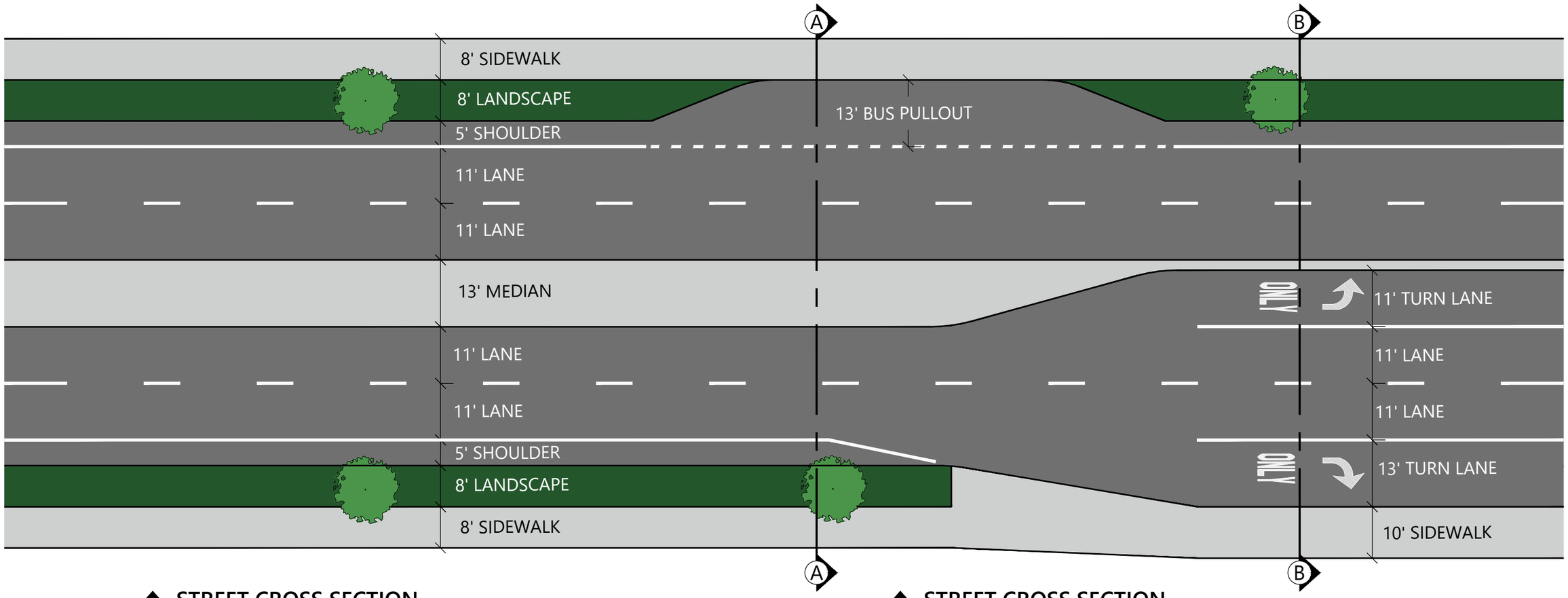
- 11' travel lanes with a 13' median/ left turn lane (note: the width from inside edge like to inside edge line is 14' given there is a 6" buffer from the median to inside edge line on each side).

- 8’ multiuse trail with an 8’ landscaped buffer with pedestrian-scale lighting.
- Pullouts for bus stops where feasible.

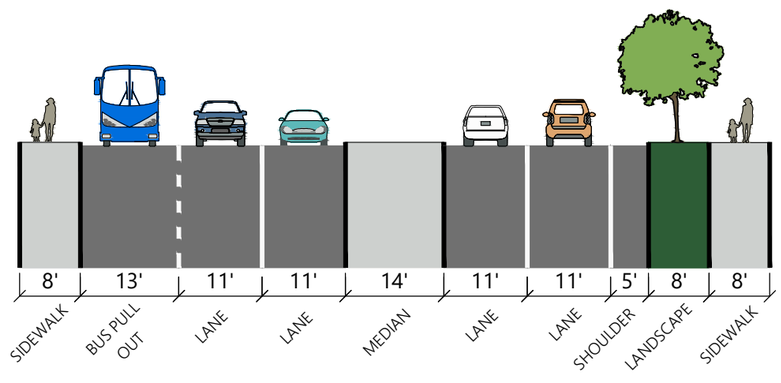
Modifications from 2011 Vision:

- On segments of the corridor with right-turn only lanes (or where constraints necessitate an attached sidewalk) the multiuse path will be 10’ wide and adjacent to the curb (instead of an 8’ path with and 8’ buffer) in order to minimize right-of-way (ROW) impacts.
- An outside edge line will be striped to indicate the edge of the outside travel lane (in most sections of North Avenue this will place the edge line 5’ from the curb) and there would be no formal bike lane.
- The bus pullouts will be 13’ wide from the outside travel lane to the curb to match standards in the Grand Junction Transportation and Engineering Design Manual (TEDS), which require at least 12’ of width, instead of 10’ wide from the edge of the gutter pan to the curb as shown in the previous plan.

The updated cross-section vision for the North Avenue corridor reflecting these modifications from the original vision is shown in **Figure 6**.



A STREET CROSS SECTION



B STREET CROSS SECTION

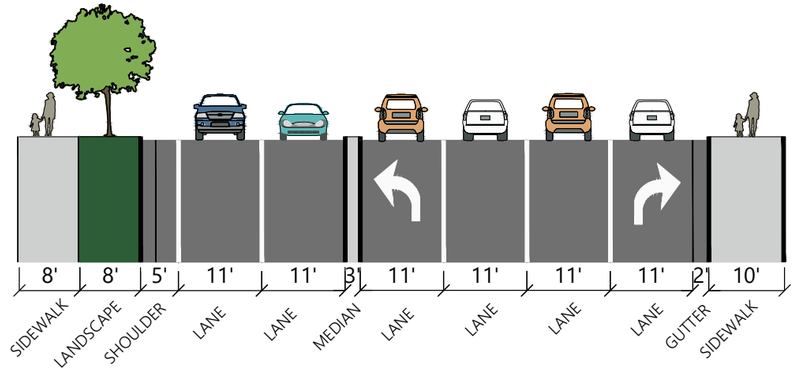


Figure 6
North Avenue Enhanced Transit Corridor Study
Corridor Vision Cross Section

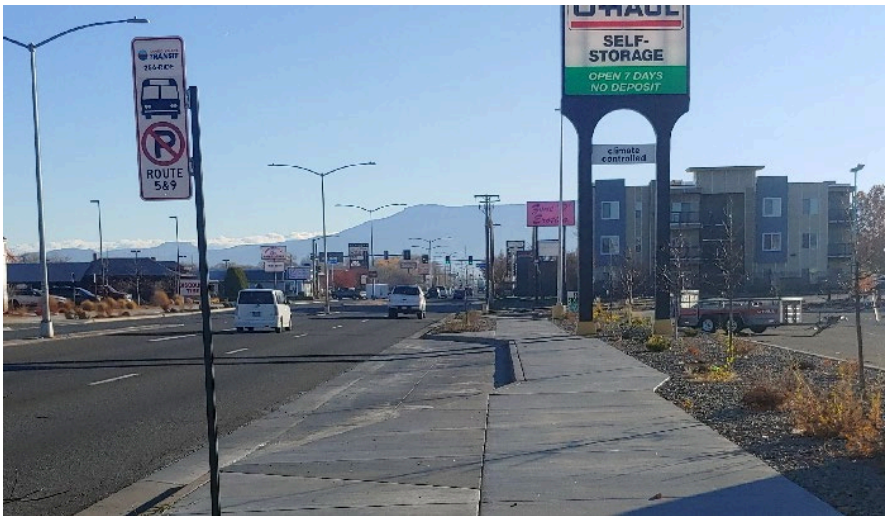
CONCEPTUAL - NOT FOR CONSTRUCTION. ADDITIONAL
DETAILED ANALYSIS AND ENGINEERING DESIGN REQUIRED.

Feedback provided by the public and stakeholders indicated that a 5' standard bike lane (as envisioned in the 2011 Plan) was not appropriate to provide the level of bicycle comfort and safety desired given the volume and speed of traffic on North Avenue, especially the volume of trucks and buses. A buffered lane or protected bike lane would be a more appropriate design along North Avenue, which cannot be added without moving the curb or repurposing travel lanes, both of which would have significant impacts (to cost, right-of way, left turn movements, and/or traffic flow). Instead, this Study recommends that the cross section include an outside edge line generally 5' from the curb to define the outside travel lane width at 11'. As part of the 2022 resurfacing project, CDOT will be restriping the travel lanes so the inside travel lanes will be 11', instead of 12.5' today, in accordance with the 2011 *North Avenue Corridor Plan* vision. Under this striping plan, an edge line could also be added that will define the outside travel lanes to a width of 11'.

An edge line would provide the following benefits that will help achieve the corridor vision:

- Narrow the outside travel lane from 14' (under CDOT's 2022 restriping plan) to 11'. Narrowing travel lanes has been proven to reduce speeds and mitigate the likelihood of speeding.[1]
- Provide an additional buffer between traffic and the sidewalk, particularly in segments of the corridor where the sidewalk will remain attached due to right-of-way or other constraints.
- Allow bus pullouts to achieve the recommended 12' width from the outside travel lane without necessitating shifting the sidewalk at pullouts. As an example, the recently improved bus stop in front of the U-Haul at 2809 North Avenue is shown in **Figure 7**. This stop required shifting the alignment of the sidewalk by 2' around the stop to achieve a 12' wide pullout. Shifting the outside edge of the travel lane to be at least 2' further from the curb would negate the need to shift the alignment of the sidewalk around bus pullouts. It should also be noted that the sidewalk cannot be narrowed by 2' at bus pullouts because of the need to provide an 8' landing area for wheelchairs.

Figure 7. Example of sidewalk alignment shift at new bus stop near 2809 North Avenue.



[1] http://www.cmfclearinghouse.org/collateral/HSM_knowledge_document.pdf

5. Recommendations

The recommendations for the North Avenue Enhanced Transit Corridor Study are organized into eight general categories, with core recommendations for each category summarized below:

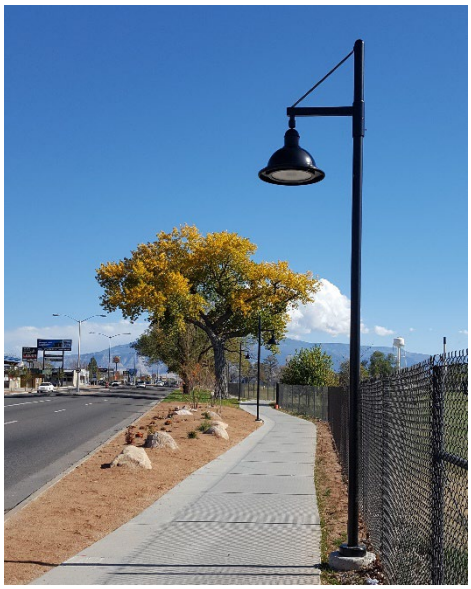
1. **Buildout of the Multiuse Trail**
    - Complete buildout of an 8' multiuse trail with an 8' buffer on both sides of the street.
    - Prioritize completing the trail on at least one side of North Avenue for the length of the corridor to provide continuity for people walking and biking.
2. **Pedestrian & Bicycle Safety Improvements**
    - Investigate operational improvements to improve bicycle and pedestrian safety; suggestions to investigate include:
        - Prohibit right-on-red at cross streets
        - Longer "Walk" phase at cross streets
        - Leading pedestrian interval (LPI) signal phase
        - Protected left turn signal phase
        - Bicycle detection at traffic signals
        - Bicycle crossing signage and striping
    - Conduct a bicycle and pedestrian safety study.
3. **Complete Adjacent Sidewalk Network**
    - To improve access to transit along the corridor it is recommended to gradually complete the missing gaps in the sidewalk network within a quarter mile of North Avenue.
    - Prioritize completing the sidewalk network on arterial and collector streets where traffic volumes and speeds are higher and the environment is less hospitable to pedestrians sharing the road with cars (recommend prioritizing segments of 28 Road, 28 ½ Road, and Elm Avenue that are missing sidewalks).
4. **New Pedestrian Crossings**
    - To reduce segments of the corridor with long gaps between pedestrian crossings, evaluate the following three locations for a new signalized intersection along North Avenue: 15th Street, 21st Street, 29 ¼ Road.
5. **New Bicycle Crossing**
    - Given the volume, speed, and number of traffic lanes on North Avenue, and the difficulty for bicyclists to safely cross at an unsignalized intersection it is recommended to improve the only unsignalized bicycle crossing in the corridor at 3rd Street to allow for safer and more comfortable crossing by bicyclists.
6. **Transit – Bus Stop Improvements**
    - Bus stop improvements are recommended to improve transit access, safety, and the transit experience.
    - Bus Stop Location - All transit stops in the corridor are recommended to be located on the far side of every signalized intersection and, to the extent feasible, be within 200' of

a crosswalk to improve pedestrian access and safety (this will require gradually relocating many of the existing bus stops on the corridor).

- Bus Stop Layout - All bus stops on North Avenue are recommended to be constructed with a bus pullout near-term as long as sufficient space is available.
- Bus Stop Amenities -
  - All bus stops will at a minimum have a landing pad that meets ADA requirements, signage with information on routes and schedule, and connections to the sidewalk.
  - Most bus stops are also recommended to include a shelter with lighting, dynamic signage with real-time bus information, a trash receptacle, and a bike rack.
- Bus Stop Branding – Bus stops are recommended to include branding that is cohesive with the overall corridor branding to clearly convey that transit and its associated amenities are a key part of the transportation landscape of North Avenue.

7. **Transit – Speed & Reliability Improvements**
   - Increase frequency of service (highest priority) to reduce waiting time and make transit a viable option for more people.
   - Convert to off-board fare payment or fare free service to mitigate delay caused by passengers finding fare payment.
   - Implement transit signal priority (TSP) to decrease delay caused by red lights.
   - Consider converting to in-line bus stops long term (instead of pullouts) to reduce delay from buses waiting for a gap to pull back into traffic.
8. **Policy Recommendations**
   - Consolidate driveways and manage vehicle access through zoning.
   - Amend Municipal Code so bicyclists do not have to dismount at street crossings.

1. Buildout of the Multiuse Trail



It is recommended to complete the buildout of the 8’ multiuse trail with an 8’ landscaped buffer along both sides of the length of the corridor as described in the vision. This will provide a more comfortable and inviting space for pedestrians, bicyclists, and transit users traveling along the corridor and increase multimodal access to businesses, services, schools, and homes on or near North Avenue. The multiuse trail, landscaped buffer, and pedestrian scale lighting will also help to beautify the corridor. Bus stop improvements should also be made (such as pullouts and shelter pads) as part of building out the multiuse trail. Bus stop location recommendations are provided later in this report. Efforts to consolidate driveways should also be explored as part of the final design process for implementing each multiuse trail segment. A corridor-wide concept plan was developed as part of this Study which identifies, at a

high-level, the path alignment and potential constraints to consider as part of final design and construction (see **Appendix C**). In general, the concept includes an 8' multiuse trail and 8' landscaped buffer, with potential deviations from this typical section in constrained locations or due to other factors as noted. Final alignment will be determined during 30% design or final design. Notable areas where the typical section may deviate include:

- Locations where there is not 16' of space between the curb and back of the sidewalk due to existing buildings, significant impacts to parking, or other constraints. These locations mostly occur between 1st Street and 12th Street and potential solutions are suggested in the concept design on a location-by-location basis, but would need to be fully explored as part of a more detailed engineering design process.
- Where there are right-turn only lanes, or other constraints that necessitate a short segment of attached sidewalk, the segment would include a 10' attached multiuse trail (with no buffer).
- The north side of North Avenue between 10th Street and 12th Street was identified as a critical bicycle link between the bike facilities on 10th Street and the existing 8' multiuse trail along the west side of 12th Street north of North Ave that is part of the CMU campus. This two-block segment is preliminarily envisioned to have both an 8' wide bike trail (with no buffer) and a 6' attached sidewalk to match the existing section along 12th Street. Final concept will be developed when this segment advances to 30% design.

Prioritizing Remaining Multiuse Trail Segments

In several sections of North Avenue the multiuse trail is considered complete. This includes the segment between 12th Street and 23rd Street on both the north and south sides that was completed by the City of Grand Junction in 2016. Because this segment is considered complete it was excluded from the prioritization analysis. Several other smaller segments scattered throughout the corridor have also been completed as part of private sector redevelopment projects. These completed segments were factored into the cost estimates.

Completion of the multiuse trail along both sides of North Avenue is likely to occur gradually over time as funding becomes available. Therefore, this project identified recommendations for how to prioritize the remaining segments that still need to be completed by dividing the corridor into roughly half-mile sections and separating out the north and south side. The corridor segments were divided into seven segments on the north side and seven segments on the south side for consideration:

1. 1st Street to 7th Street
2. 7th Street to 12th Street
3. 23rd Street to 28 Road
4. 28 Road to 28 ½ Road
5. 28 ½ Road to 29 Road
6. 29 Road to 29 ½ Road
7. 29 ½ Road to I-70B

Each segment will be considered a different project for estimating costs, but could be grouped into larger projects depending on future funding.

A set of evaluation criteria was established based on available data to help guide prioritization of each segment. A summary of evaluation criteria used for this analysis is provided in **Table 1**. While these criteria provided guidance to prioritization, other factors that are harder to measure were also considered, including key destinations, anecdotal observations of pedestrian and bicycle use, future private development plans, and connectivity of the network.

Table 1 Multiuse Trail Prioritization Evaluation Criteria

Criteria	Measure
Pedestrian and Bicycle Demand	• Average daily bus boardings in 2019 • Percent of survey respondents that indicated the segment as highest priority
Traffic Safety	• Number of bicycle or pedestrian involved crashes between 2015 and 2019
Missing Sidewalks	• Percent of segment without any sidewalk
Anticipated Right-of-Way Impacts	• Percent of segment where 16' right-of-way (ROW) in the back of the curb is not available
Anticipated Parking & Building Impacts	• Percent of segment where buildings or private parking is within 16' of curb and may be impacted

A summary of the evaluation criteria measures for each segment are provided in **Table 2**.

Table 2 Multiuse Trail Segment Analysis

Criteria	1st St - 7th St	7th St - 12th St	23rd St - 28 Rd	28 Rd – 28 1/2 Rd	28 1/2 Rd - 29 Rd	29 Rd - 29 1/2 Rd	29 1/2 Rd to I-70B
Average Daily Bus Boardings	16	12	30	26	127	23	18
% Survey Respondents Highest Priority	20%	26%	27%	17%	17%	10%	10%
Bicycle and Pedestrian Crashes (2015 -2019)	10	22	9	20	10	3	0
North Side							
% Missing Sidewalk	9%	0%	0%	7%	21%	53%	89%
% Possible ROW Impacts	42%	45%	1%	18%	22%	40%	40%
% Parking & Building Impacts	6%	11%	0%	0%	0%	5%	0%
South Side							
% Missing Sidewalk	0%	0%	0%	6%	32%	85%	72%
% Possible ROW Impacts	33%	27%	54%	19%	21%	39%	45%
% Parking & Building Impacts	12%	17%	0%	0%	3%	2%	10%

A high-level summary of criteria evaluation is provided in **Table 3**. This data shows that no one segment was the highest for all criteria. Instead, each segment had a mix of results. In general, the central part of the corridor has the highest demand (with the area around 28 ½ Road with the highest bus ridership),

the west and central areas have the highest concentration of bicycle and pedestrian crashes, the east end has the highest percentage of missing sidewalk, and the west end has the highest concentration of parking and building constraints. Some areas of the east end also have right-of-way constraints.

Table 3 Multiuse Trail Prioritization Analysis Summary

Criteria	1st St - 7th St	7th St - 12th St	23rd St – 28 Rd	28 Rd – 28 1/2 Rd	28 1/2 Rd - 29 Rd	29 Rd – 29 1/2 Rd	29 1/2 Rd to I-70B
Demand	Med	High	High	High	Very High	Med	Med
Traffic Safety	High	Very High	Very High	High	High	Med	Med
North Side							
Missing Sidewalk	Med	Med	Med	Med	High	Very High	Very High
Minimal Impacts?	Med	Med	Very High	High	High	Med	Med
South Side							
Missing Sidewalk	Med	Med	Med	Med	High	Very High	Very High
Minimal Impacts?	Med	Med	Very High	High	High	High	Med

Funding is available as part of this project to complete construction of about three quarters of a mile of multiuse trail on one side of the street. A core goal of this project was to identify the highest priority segment to advance to 30% engineering design. Based on available funding and the evaluation criteria, prioritization of each segment was divided into three tiers:

- Currently Advancing
- Tier 1 Priority
- Tier 2 Priority

Figure 8 shows which segments would be included in each tier, and also includes the segment between 12th Street and 23rd Street that was already complete.

Figure 8 Prioritization of Future Sections of Multiuse Trail

Already Complete

- 12th Street to 23rd Street – both sides

Currently Advancing

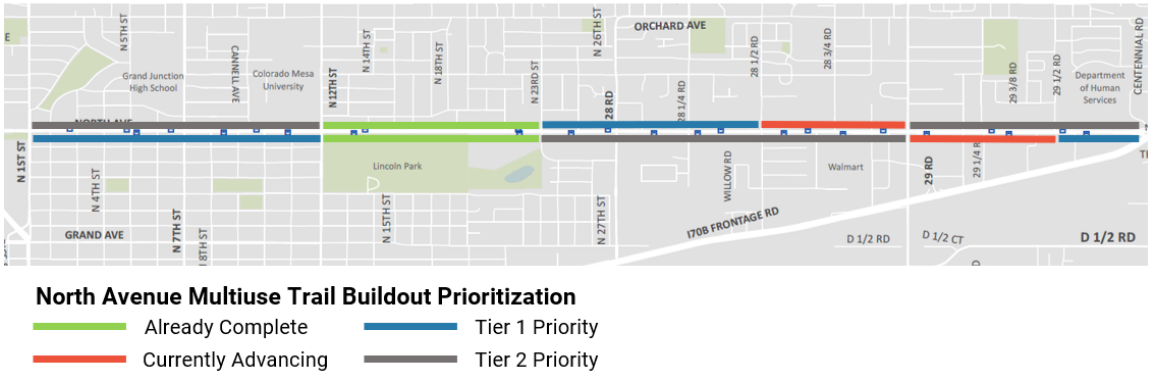
- 28 ½ Road to 29 Road – north side
- 29 Road to 29 ½ Road – south side

Tier 1 – Complete End-to-End Trail on One Side

- 1st to 12th Street – south side
- 23rd Street to 28 ½ Road – north side
- 29 ½ Road to I-70B – south side

Tier 2 – Complete Remaining Missing Segments

- 1st to 12th Street – north side
- 23rd Street to 29 Road – south side
- 29 Road to I-70B – north side



North Avenue Multiuse Trail Buildout Prioritization

Already Complete
Currently Advancing
Tier 1 Priority
Tier 2 Priority

The highest priority segment, labeled "Currently Advancing" in **Figure 8**, that will enter 30% design concept as part of this project will include the segment between 28 ½ Road and 29 Road on the north side and 29 Road to 29 ½ Road on the south side. These sections were identified has high priority based on the existing high bus ridership, percent of the segment missing sidewalks, important nearby destinations (such as the D51 Career Center near 29 ¼ Road), and the opportunity for providing more linear connections from east to west along North Avenue. This was found to be a particularly significant missing gap for people walking and biking in the east end of the corridor as the parallel street network is not as well connected and has fewer sidewalks than in west end of the corridor. Concept design for the high priority segment is provided in **Appendix H**.

The next highest priority segments were included in Tier 1. These segments were included because together they would provide a continuous multiuse trail on at least one side for the end-to-end length of North Avenue. **The priority for building out the multiuse trail on North Avenue (Tier 1) will be to complete the trail on at least one side of the corridor for the length of the corridor to provide continuity for people walking and biking.** Segments in Tier 2 include the remaining segments not completed in Tier 1. Given that implementation and funding have not yet been secured for the Tier 1 and Tier 2 segments, its possible that they will be completed in smaller phases. If this happens the half mile segments can be ranked based on the criteria listed above or other opportunities that emerge including funding source, private development, and right-of-way opportunities and constraints.

2. Pedestrian & Bicycle Safety Improvements

There were 68 pedestrian or bicycle involved crashes along the 3.75-mile stretch of North Avenue during the five-year study period (2015-2019). Additionally, safety emerged as one of the top priorities expressed by the public during the visioning process for the corridor.

In addition to completing the multiuse trail along North Avenue, additional recommendations are included to improve bicycle and pedestrian safety and comfort along North Avenue, which will improve access to transit and key destinations along North Avenue. Improving safety will be important to making the corridor more inviting for pedestrians and bicyclists.

There are two general recommendations to improve pedestrian and bicycle safety, which are summarized in more detail below:

1. Operational Safety Improvements
2. Conducting a Bicycle & Pedestrian Safety Study.

Operational Safety Improvements

The following operational improvements are recommended for consideration to improve pedestrian and bicycle safety along North Avenue. These recommendations are based on the crash analysis findings and limited field observations and are in alignment with proven safety countermeasures and industry best practices. These recommendations are general in nature, and, while in some instances potential locations are identified based on a corridor-wide analysis, a more detailed site-specific engineering study should be completed prior to implementation.

Prohibit Right on Red at Cross Streets

50% of all bicycle crashes in the corridor and 55% of all pedestrian crashes in the corridor involved a driver failing to yield to right-of-way while turning. Approximately 19% of bicycle and pedestrian crashes in the corridor involved a northbound or southbound driver making a right on red at a signalized intersection and striking a pedestrian or bicyclist in the crosswalk along North Avenue. The most common occurrence involved a right turning driver looking left for a gap in traffic along North Avenue and failing to look for a pedestrian or bicyclist to the right before proceeding.

Given the enhancements envisioned on the corridor that would increase the presence of bicyclists and pedestrians as well as the crash history, **it is recommended to consider prohibiting right turns on red at cross** streets on North Avenue.

Intersections with a crash history of right-turn-on-red pedestrian and bicycle crashes to consider for improvement include (this list is not exclusive of intersections to consider):

- 5th Street
- 12th Street
- 28 Road
- 28 ¼ Road
- 28 ½ Road

Section 2B.54 of the Manual for Uniform Traffic Control Devices (MUTCD) states several reasons when a No Turn on Red sign should be considered, including several that may apply to North Avenue intersections:

- "Geometrics or operational characteristics of the intersection that might result in unexpected conflicts." (e.g., the multiuse trail could introduce unexpected conflicts).
- "An unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers, especially involving children, older pedestrians, or persons with disabilities." (the intersections with the most right-on-red pedestrian/bicycle crashes were 12th Street and 28 Road).
- "More than three right-turn-on-red accidents reported in a 12-month period for the particular approach." (all crash data, including vehicle-vehicle crashes, and not just pedestrian and bicycle involved crashes, would need to be analyzed to determine if any locations meet this criteria)

Longer "Walk" Phase at Cross Streets

The default pedestrian signal at most cross streets on North Avenue is "Don't Walk." Even if a pedestrian crossing is called, the light will typically cycle out well before the green signal on North Avenue. **Figure 9** shows an example of this situation. To support increased bicycle and pedestrian use, reduce delay, and mitigate people crossing against the signal in the corridor it is recommended that these crossings default to the "Walk" phase and last until the parallel green phase along North Avenue cycles out. This change is particularly important to effectively supporting use by bicyclists on the parallel multiuse trail.

Figure 9. Example of *Don't Walk* phase with green signal on North Avenue.

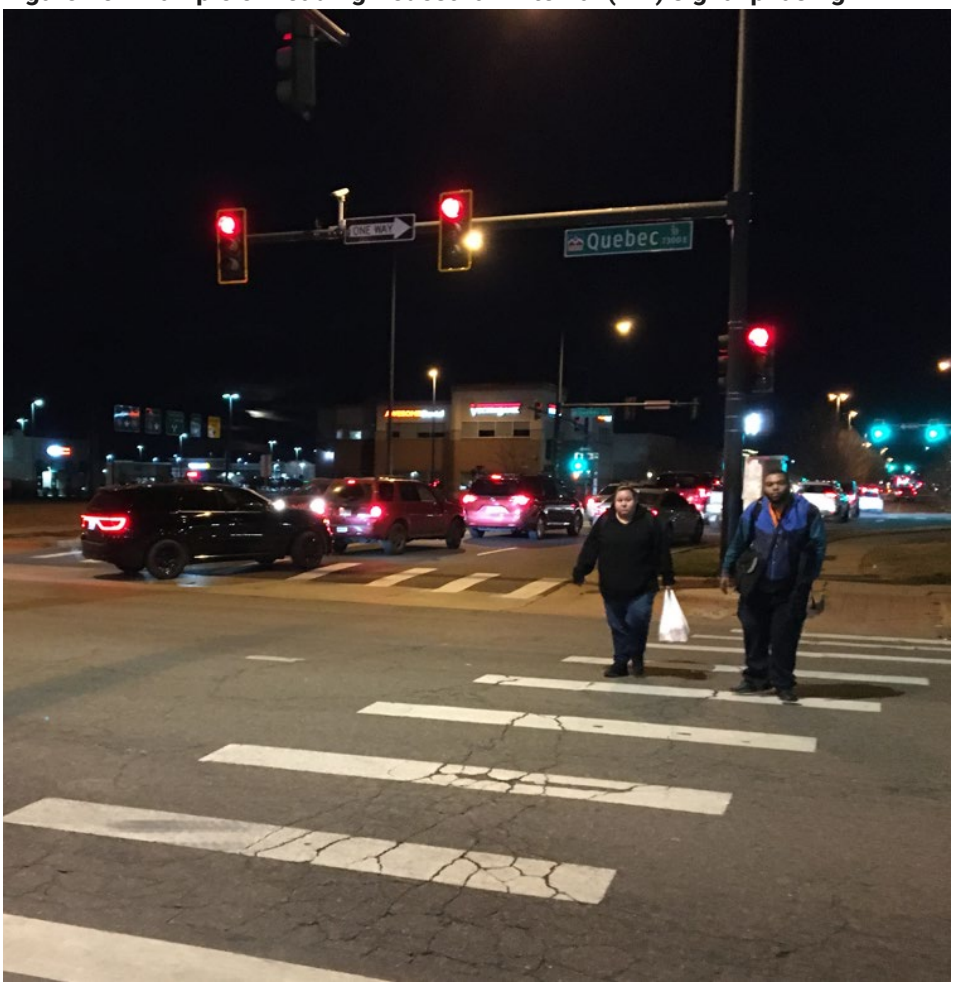
Intersections to consider for improvement:

- All signalized intersections

Leading Pedestrian Interval

Leading pedestrian interval (LPI) activates the pedestrian walk phase (at least 3-7 seconds) prior to activating the corresponding green phase for traffic. See **Figure 10** for an example of walk phase activated prior to a green signal for parallel traffic. LPI is applied at intersections to mitigate conflicts between pedestrians and right or left turning vehicles, by allowing time for the pedestrian to get far enough in the crosswalk to be more visible to turning vehicles. LPI could be considered for pedestrians crossing North Avenue at signalized intersections. Other agencies have prioritized LPI at intersections with a crash history of turning vehicles colliding with pedestrians, intersections with high pedestrian volumes, and intersections where vulnerable populations are likely to cross such as school-aged children or older adults. Implementation of LPI should consider the signal timing impacts on traffic movements.

Figure 10. Example of Leading Pedestrian Interval (LPI) signal phasing.



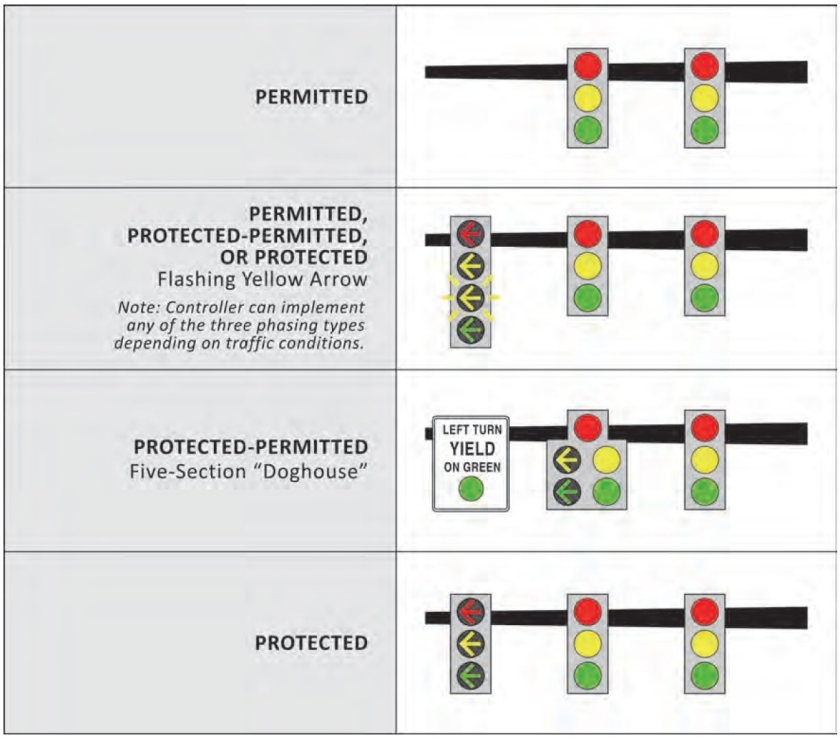
Locations with a crash history of vehicles turning onto North Avenue and striking a pedestrian in the crosswalk that may be mitigated by LPI across North Avenue include (this list is not exclusive of signalized intersections to consider LPI):

- 7th Street
- 10th Street
- 28 Road
- 28 ¼ Road

Protected Left Turn Phasing

Left turn only signal phase provides the left turn movement with an exclusive phase (green arrow) and is often used to mitigate left turn conflicts with the corresponding pedestrian phase. Many intersections along North Avenue have protected/permitted left turn phasing, whereby both a protected and permitted phase is provided. Other intersections are permitted-only. A more detailed engineering analysis that considers traffic operations impacts should be conducted prior to converting a left turn movement to a protected-only phase. Examples of the different types of left turn signal phasing are shown in **Figure 11**.

Figure 11. Example of left turn signal phasing options.



Source: NCHRP Report 812, Signal Timing Manual, 2nd Edition

Locations with a crash history of left turning vehicles failing to yield and striking a pedestrian or bicyclist in the crosswalk to consider adding or modifying the protected left turn phase include (but is not exclusive to):

- 7th Street (NB) – currently protected/permitted
- 10th Street (NB) – currently permitted-only (LPI may be an effective alternative here)
- 28 Road (WB) – currently protected/permitted
- 28 ½ Road (WB) – currently permitted-only

The frequency and direction of vehicle-to-vehicle broadside or angle crashes from a driver failing to yield right-of-way to oncoming traffic and making a left turn during a permitted phase should also be considered when evaluating whether to convert a left turn signal phase to protected-only.

Bicycle Detection at Traffic Signals

The traffic signals on North Avenue are coordinated to minimize delay to vehicles traveling along North Avenue. Most signals are semi-actuated, whereby the default setting is a green phase for traffic on North Avenue and cross streets are only activated when a vehicle is detected or a pedestrian call is made. Thus, a bicyclist attempting to cross North Avenue at one of these signalized intersections would not likely get a green signal unless a car or pedestrian were present. This situation could result in both a safety risk and inconvenience to the bicyclist.

Several existing or planned bike routes cross North Avenue, most at signalized intersections (the exception being 3rd Avenue, which is unsignalized). To improve the safety of bicyclists crossing North Avenue it is recommended where an existing or planned bike route crosses North Avenue at a signalized intersection, at a minimum, one of two modifications be made to accommodate bicycle flow across the intersection:

1. Bicycle detection should be installed so bicyclist can reliably call for the signal; or
2. The signal timing should be changed so the cross street is automatically called every cycle.

Locations where an existing bike route crosses North Avenue at a signalized intersection include:

- 1st Street
- 10th Street
- 12th Street
- 28 Road
- 28 ¾ Road
- 29 Road

Locations where a planned bike route crosses North Avenue at a signalized intersection include:

- 5th Street
- 7th Street
- 28 ¼ Road
- 29 ½ Road

Existing bicycle corridors should be prioritized over planned corridors and CDOT and the City may also consider applying this change to all signalized intersections along North Avenue as bicyclists can (and may) use any City street, not just those that are designated bike corridors.

It should also be noted that the need for this change may be less important at busy cross streets where the signal is typically called every cycle (such as 12th Street or 29 Road), and more important at less busy crossings (such as 10th Street). Public comments showed that bicyclists not being detected was a particular issue at 10th Street. Given 10th Street is a low volume street, but important bicycle connection, this location should be the highest priority for making this change. Additionally, 5th Street is also being considered as an enhanced bicycle corridor and given it provides direct access to Grand Junction High School, may emerge as a another high-priority location to make this improvement. As of publication the City was about to start on a citywide *Pedestrian and Bicycle Master Plan*, which could further identify high priority corridors and recommendations for bicycle and pedestrian crossings.

The most common example of bicycle detection at signals is through video and is often associated with a bicycle symbol in the pavement indicating where bicyclists should wait to call a signal, see **Figure 12**. Other bicycle detection technologies include a loop detector embedded in the pavement (similar to vehicle detection), user activated push buttons (similar to pedestrian push button, but reachable from a bike on-street), and microwave radar. The National Association of City Transportation Officials (NACTO) *Urban Bikeway Design Guide* provides guidance on installing bike detection at traffic signals

(https://nacto.org/publication/urban-bikeway-design-guide/bicycle-signals/signal-detection-and-actuation/).

Figure 12. Bike detection at a traffic signal.

Source: NACTO Urban Bikeway Design Guide

Bicycle Crossing Signing and Striping

50% of all bicycle crashes in the corridor and 55% of all pedestrian crashes in the corridor involved a driver failing to yield to right-of-way while turning. Many of these crashes are from drivers turning onto North Avenue from a driveway or side street. As additional segments of multiuse trail are added to North Avenue the volume of pedestrians and bicyclists are likely to increase. To help mitigate this crash type it is recommended to install pedestrian and bicycle crossing signs at busy cross streets and busy driveways to alert drivers to look for bicyclists and pedestrians before turning onto or off of North Avenue. One example of sign treatment is shown in **Figure 13.**

Figure 13. Custom sign at multiuse trail crossing on 28th Street in Boulder, CO.

It is also recommended to consider the use of stop bars and crosswalk markings at all side street intersections and major driveways with North Avenue to aide in driver yield compliance. The use of green paint at major driveways and crossings could also be considered as an additional treatment to indicate a bikeway crossing consistent with NACTO recommendations for crossing treatments (https://nacto.org/publication/urban-bikeway-design-guide/bikeway-signing-marking/).

Conduct a Bicycle & Pedestrian Safety Study

The crash analysis showed that in the five-year study period (2015-2019) there were 68 bicycle and pedestrian crashes on North Avenue (over the 3.75 miles). That equates to an average of just over one bicycle or pedestrian involved crash per month in the corridor during that time. Furthermore, safety was the most frequently cited theme to emerge from the public open house and community survey as part of the visioning exercise for the corridor.

While this Study provides high-level operational safety recommendations for the City, County, and CDOT to consider, it does not provide a comprehensive list of site-specific traffic safety countermeasures that a more thorough study would reveal. To improve traffic safety in the corridor for all modes it is recommended to conduct a bicycle and pedestrian safety study of the corridor using a Road Safety Audit (RSA) approach, which will identify a full suite of safety countermeasures.

The RSA would include the following:

- A comprehensive crash analysis (potentially using analysis outcomes already started by CDOT and as part of this Study).
- Interviews with traffic safety partners, such as the police department, fire department, council district representatives, local roadway engineers, and other relevant community groups or members to identify traffic safety concerns.
- A comprehensive site visit of the length of the corridor by foot and vehicle at different times of day by a diverse team of traffic engineers and traffic safety professionals to observe potential issues and identify potential solutions.
- A summary report of site specific and corridor-wide traffic safety countermeasures with a particular focus on bicycle and pedestrian safety.

Completion of an RSA would provide the City, County, and CDOT with both more specific and a comprehensive set of improvements to effectively address existing and potential safety issues in the corridor.

3. Complete Adjacent Sidewalk Network

The adjacent street network provides critical access between surrounding land uses and the transit system on North Avenue, which is important to supporting transit ridership on the corridor.

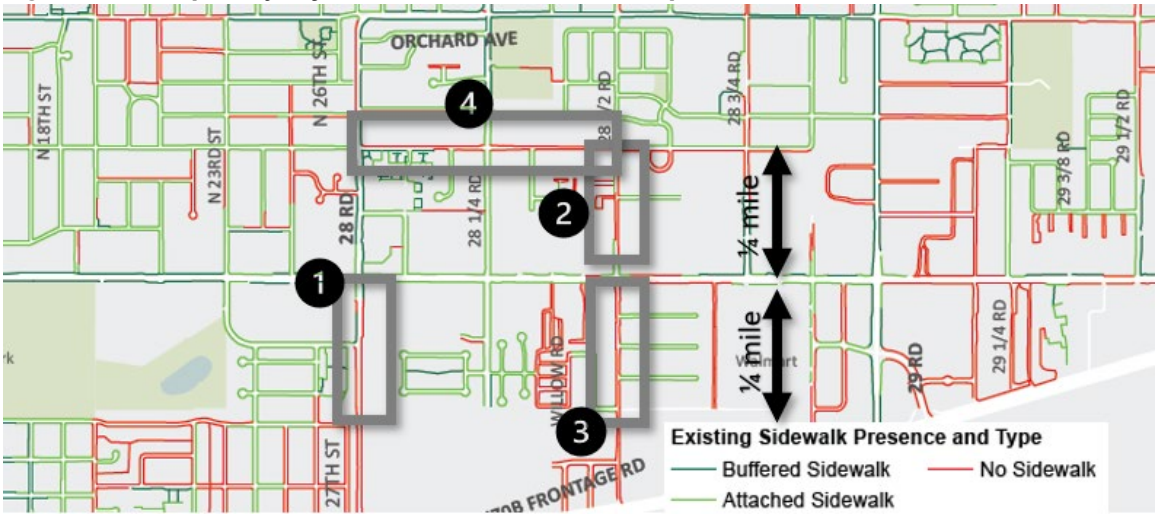
Existing conditions analysis showed that most of the street network around North Avenue has sidewalks. However, there are gaps in the network that were identified during the existing conditions analysis, most notably on the east half of the corridor. **To improve access to transit along the corridor it is recommended that the City gradually complete the missing gaps in the sidewalk network within a quarter mile of North Avenue**. A quarter mile is the distance that the majority of people will walk to access local transit.

Additionally, the City should prioritize completing the sidewalk network on arterial and collector streets over local streets, where traffic volumes and speeds are higher and the environment is less hospitable to pedestrians sharing the road with cars. Most of the arterial and collector streets within a quarter mile of North Avenue currently have sidewalks, with the exception of the following four locations. It is recommended to prioritize completing the sidewalk network along these four roadway segments adjacent to North Avenue, listed in order of priority and mapped in **Figure 14**, in order to improve access to transit:

1. 28 Road (between North Avenue and Gunnison Avenue)
2. 28 ½ Road (between North Avenue and Elm Avenue)
3. 28 ½ Road (between North Avenue and Gunnison Avenue)
4. Elm Avenue (between 28 Road and 28 ½ Road)

Sidewalks should be provided on both sides of these streets. 28 Road south of North Avenue does not currently have a sidewalk and would provide access to the Western Region One Source - resource center for veterans, which was identified by the technical team as an important transit destination near North Avenue. Additionally, 28 ½ Road does not have sidewalks north or south of North Avenue and is a critical connection between many affordable residential units near North Avenue. Note: the south side of Elm Avenue west of 28 ¼ Road is slated to be constructed in 2022.

Figure 14. Four priority adjacent street corridors to complete sidewalks.



4. New Pedestrian Crossings

Pedestrian crossings across North Avenue are important to facilitating pedestrian circulation and access to transit and businesses. All existing pedestrian crosswalks on North Avenue are at signalized intersections. This Study recommends that pedestrian crossings should be provided at all transit stops on North Avenue where feasible to provide a safe means to cross the street and mitigate pedestrians crossing midblock. In most cases, it is recommended to relocate transit stops that are far from a signalized crossing to a nearby existing signal (see Transit Improvements recommendation). However, in

some areas of the corridor where there are long gaps between signals, new signalized pedestrian crossing are recommended.

Due to high traffic volumes (20,000+ vehicles per day) and moderate speeds (posted at 30 - 40 mph) on North Avenue coupled with the desire to maintain traffic flow (for automobile traffic and transit buses) through a coordinated traffic signal system, both CDOT and the City of Grand Junction request that any new pedestrian crossing on North Avenue should be at a fully signalized intersection.

Analysis of the traffic signal spacing along North Avenue showed that most areas of the corridor have quarter-mile signal spacing. Quarter-mile transit stop spacing provides a balance between speed and access along the corridor. Using the average walking speed of 3 mph a pedestrian would need to walk no more than two and a half minutes out of the way to cross the street at a signal with quarter-mile signal spacing.

There are three locations along the corridor where signal spacing is longer than a quarter-mile:

- Between 1st Street and 5th Street (0.34 miles)
- Between 12th Street and 23rd Road (0.75 miles)
- Between 29 Road and 29 ½ Road (0.5 miles)

Given these gaps, input received from the public, stakeholders and technical team, and that any new crossing be fully signalized, **it is recommended that the City evaluate the following three locations for a new signalized intersection along North Avenue**:

- 15th Street
- 21st Street
- 29 ¼ Road

An evaluation would need to follow CDOT's *Pedestrian Crossing Installation Guide*, which includes collecting pedestrian and vehicle volume data. Since all of these would be new signals, the City could also consider conducting a full signal warrant analysis to evaluate the multimodal need. The City may also want to evaluate other locations near these crossings if these crossing are found not to meet the necessary signal warrant requirements, but other locations may. To ensure that pedestrian crossings are provided at most bus stops along the corridor, it is also recommended to relocate bus stops that are far from a signal to a signalized intersection (see Transit Improvements). An explanation of the reason each of the three recommended intersections would benefit from a new signalized crossing is provided below.

15th Street

15th Street is designated as a major collector street where it intersects North Avenue and is also a bike corridor north of Elm Avenue. A new traffic signal at this intersection would reduce the long gap between signals in this part of the corridor. It would also provide a connection for bicyclists and pedestrians traveling north-south along 15th Street to the multiuse trail on the south side of North Avenue along Lincoln Park. It would also allow for a new bus stop at this location improving transit access to the land uses to the north. Lastly, it would improve access for vehicle circulation between North Avenue and 15th Street, particularly for drivers making a southbound left.

21st Street

21st Street is near the bus stops on North Avenue that serves the VA Medical Center main entrance. A crossing here would reduce the long gap between signals in this part of the corridor. It would also provide a convenient crossing for people going between the VA Medical Center and the westbound bus stop as well as for staff and visitors at the hospital to access the restaurants across North Avenue from the Medical center. Several pedestrians were observed crossing in the vicinity of this location during a walk audit conducted as part of this project.

29 ¼ Road

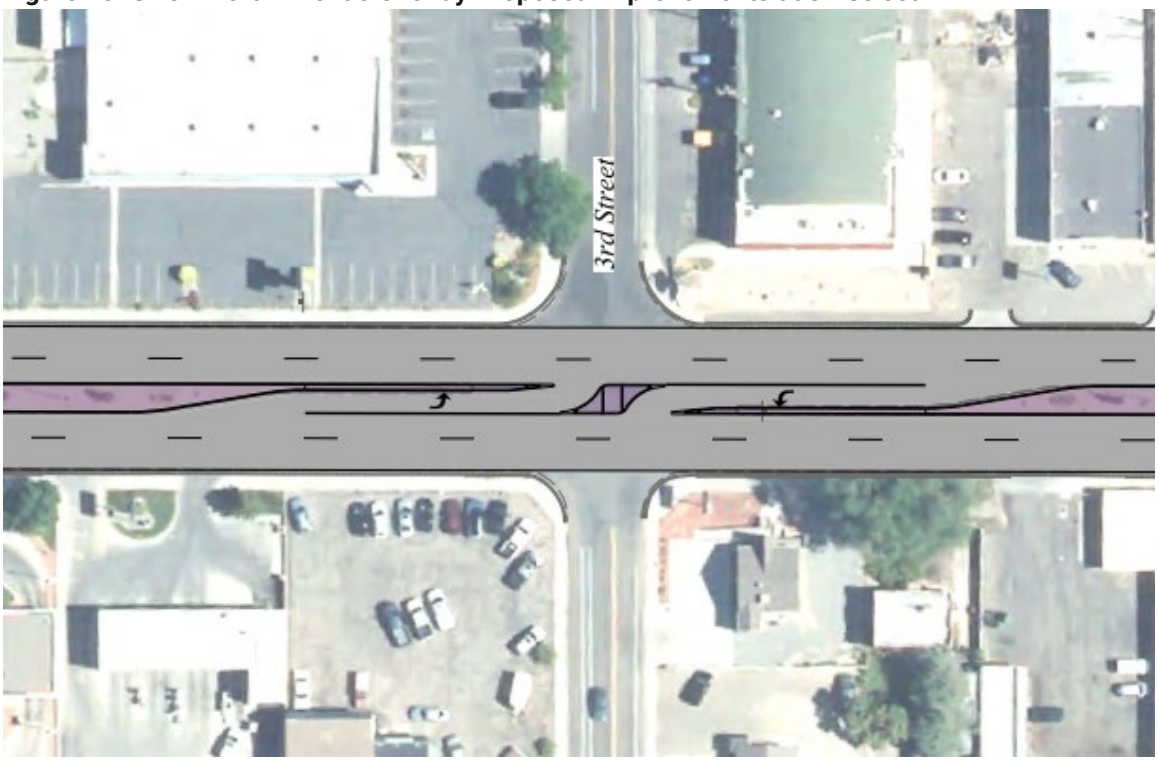
29 ¼ Road is a quarter-mile from the nearest signalized crossing and a new signal would reduce the signal spacing along this stretch to a quarter mile, consistent with most of the rest of the corridor. This location is also near an existing bus stop that provides access to the D51 career center, used by hundreds of high school students per year, many of which use the bus. Lastly, Bookcliff Middle School is located along 29 ¼ Road just north of North Avenue and the school's district includes locations south of North Avenue, including a residential mobile home park south of North Avenue at 29 ¼ Road. A new signalized crossing on North Avenue at 29 ¼ Road would allow students living in the mobile home park a safer connection across North Avenue to get to Bookcliff Middle School, as well as a safer crossing for bus riders, and people accessing the D51 Career Center.

5. New Bicycle Crossing

In addition to the recommendations for three new pedestrian crossings on North Avenue, 3rd Street is the only location along North Avenue where an existing bicycle facility crosses North Avenue at an unsignalized intersection. **Given the volume, speed, and number of traffic lanes on North Avenue, and the difficulty for bicyclists to safely cross at an unsignalized intersection it is recommended to improve the crossing at 3rd Street to allow for safer and more comfortable crossing by bicyclists**.

CDOT is currently planning to convert this intersection to three quarter movement with a center cut-through/ refuge median for bicycles as part of their planned overlay in 2022, see **Figure 15**. This will provide a more comfortable crossing for bicyclists as it would allow for a two-stage crossing (thus, bicyclists would only need to cross one direction of North Avenue at a time).

Figure 15. CDOT North Avenue Overlay Proposed Improvements at 3rd Street



It is recommended that this crossing be further enhanced by providing signs and pavement markings to direct bicycles to the planned median cut-through along North Avenue, including transitioning the bike lanes on 3rd Street to the center of the street at each approach to North Avenue, similar to the example from Tucson, AZ shown in **Figure 16**.

Figure 16. Example of a bike refuge median crossing approach treatment.

Source: NACTO Urban Bikeway Design Guide

6. Transit – Bus Stop Improvements

Several transit bus stop improvements are recommended to improve transit access, safety, and the transit experience. These recommendations are divided into the following categories:

1. Bus Stop Location
2. Bus Stop Standard Layout
3. Shelter Design and Specifications
4. Bus Stop Amenities
5. Branding

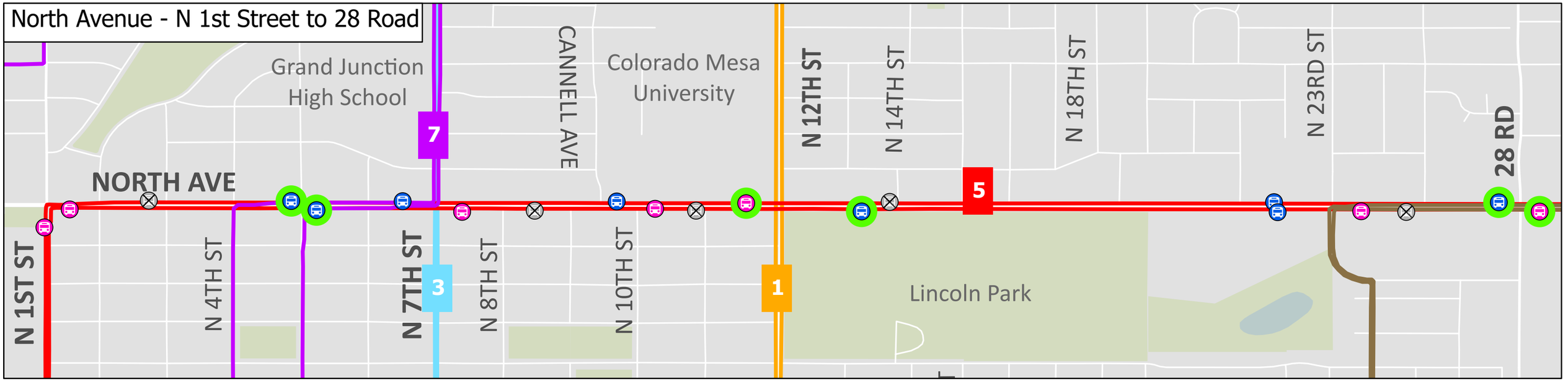
Bus Stop Location

It is recommended that all transit stops in the corridor be located on the far side of every signalized intersection and, to the extent feasible, be within 200' of a crosswalk.

People who use transit on North Avenue will need to cross North Avenue as part of at least one direction of their trip. Thus, locating bus stops close to signalized crossings will improve the safety and convenience of transit users in the corridor and reduce the likelihood of pedestrians attempting to cross North Avenue at unsignalized locations. The signal spacing in the corridor is generally a quarter mile, and quarter mile stop spacing will provide a good balance between maintaining transit speed (not stopping too frequently) and transit access (limiting walking distance to a stop). Lastly, far side stops are the preferred location for transit stops as they encourage pedestrians to cross behind, instead of in-front of, buses, result in fewer conflicts with turning vehicles, allow buses to clear the signal before stopping, and are more easily compatible with transit signal priority (TSP).

Per the corridor vision, bus pullouts are recommended where feasible at all stops in the corridor to mitigate traffic congestion and conflicts. However, it is recommended that in constrained environments where there may not be space to construct a pullout close to a signalized intersection that the City prioritize locating bus stops within 200' of a signal over providing a bus pullout farther away. In these situations, in-line bus stops may be appropriate.

A map of the approximate future locations consistent with the bus stop relocation recommendations is shown in **Figure 17**. This includes existing bus stops that do not need to move as well as existing bus stops that are recommended to be moved at some point in the future. In addition, the map provides recommended locations for future enhanced bus stops. These stops would have a larger shelter/ waiting area to accommodate higher ridership, and more amenities (i.e., bike racks, real time arrival information, etc.) and could be used for express service if implemented in the future. Bus stop locations may also be added or relocated from what is mapped if additional pedestrian crossings are added to the corridor.



LEGEND

Bus Stop Location

- Future Stop Location (Exists Today)
- Future Stop Location (New - Approximate Location)
- Existing Stop Location to be Removed
- Enhanced Stops

0 0.5 1 Miles

Figure 17

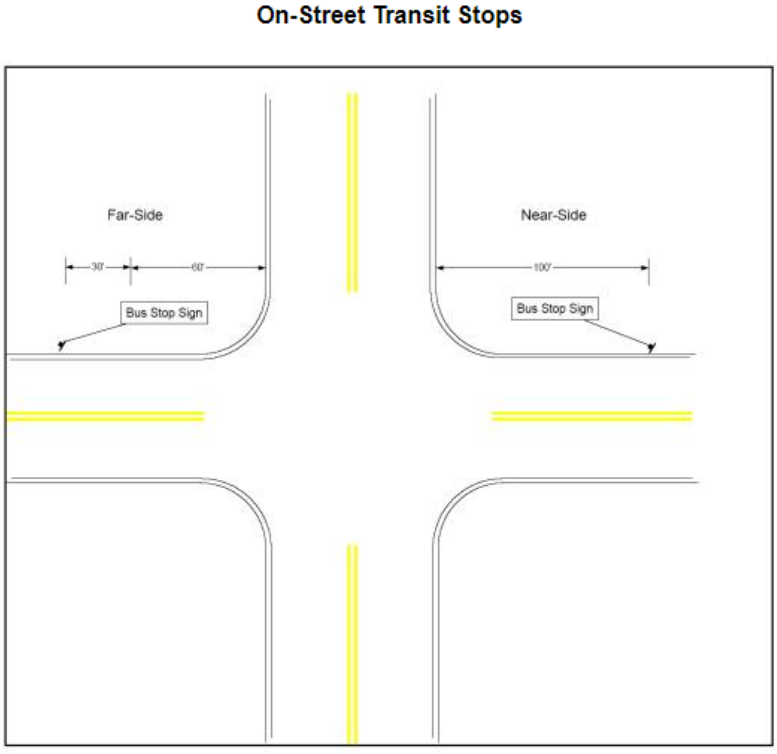
Recommended Bus Stop Locations on North Avenue

It should be noted that a few existing bus stops will remain in their current location despite being farther than 200' from a signal due to other factors. These include the following bus stop locations:

- Stocker Stadium (eastbound) – The proximity of the track at Stocker Stadium to the sidewalk prevents the sidewalk from being wide enough to support a bus stop closer to the signal at 12th Street.
- VA Medical Center (eastbound and westbound) – these stops were recently improved, are adjacent to the main hospital entrance and are within 350' of the signal at 23rd Street.
- D51 Career Center (eastbound) – this stop serves the D51 Career Center, is located where there is a long gap between signals, and is near 29 ¼ Road, which is recommended for a new signalized pedestrian crossing.

Stops should also be far enough from the intersection so buses are not blocking the intersection. The preferred placement of on-street stops in relation to intersections is shown in **Figure 18** and comes from Chapter 29.52 of the Grand Junction TEDS.

Figure 18: On-Street Stop Placement from Intersection for Grand Valley Transit (source: Chapter 29.52 of Grand Junction TEDS)



The guidelines show that far-side stop locations should be 90' from the intersection (to the bus stop signpost) and 100' from the intersection for near-side stops.

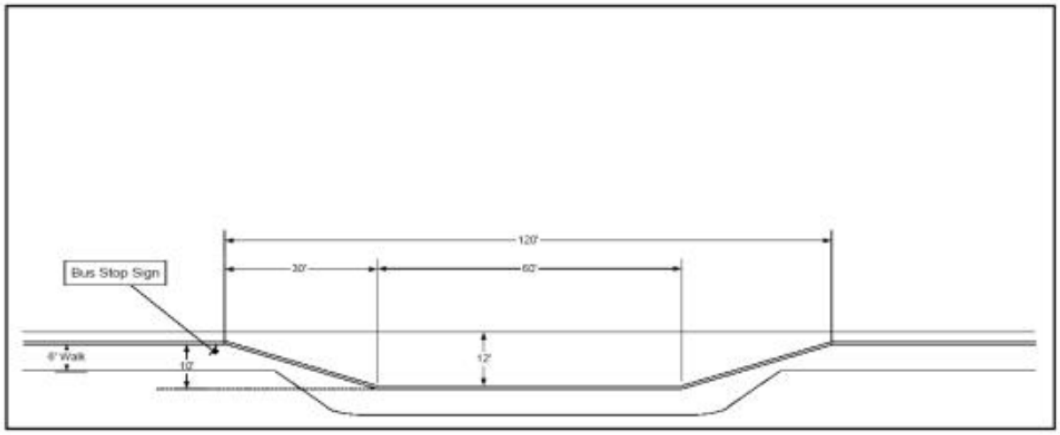
Bus Stop Standard Layout

This section defines the layout recommendations for bus stops on North Avenue.

Recommended Bus Pullout

Based on guidance from the project technical team, it is recommended that all bus stops on North Avenue be constructed with a bus pullout near-term as long as sufficient space is available. The recommended bus pullout, also known as an off-street transit turnout, for Grand Junction has been established in Grand Junction Transportation Engineering Design Standards (TEDS) Manual in Chapter 29.52 Transit Design Standards and Guidelines, as shown in **Figure 19**. Since this is an established standard, it is recommended as the project standard for North Avenue at stops where space is available for a bus pull-out.

Figure 19: Transit Turnout for Grand Valley Transit (source: Chapter 29.52 of Grand Junction TEDS Manual)



The recommended bus pullout is 120’ in total length, consisting of 60’ of linear curb space for bus loading and unloading and 30’ each of entrance and exit taper. The pull-out is 12’ wide from the curb to the edge of the outside travel lane. This design can accommodate one bus up to 40’ in length. If there are future stops requiring multiple buses to occupy a stop at the same time, the length of the loading and unloading may need to be lengthened.

Bus Stop Elements – Layouts

Each bus stop has several programming elements that should be accommodated for within the layout including:

- Landing pad, required as part of the Americans with Disabilities Act (ADA), at a minimum of 5’ wide by 8’ deep (can include existing sidewalk area). The preferred location of the landing pad is recommended to be on the far side of the shelter, but it can be on the near side so long as it is aligned with the front door of the transit bus (where the wheelchair lift is located).
- Shelter or bench pad, which would need to be placed in such way as to retain pedestrian and wheelchair passage.
- Amenity pad for items such as trash can, information kiosk, bike racks, or other amenities.

It is recommended that all bus stops on North Avenue have a shelter. In some locations there may not be sufficient space for a shelter, in which case the stop should still include a sign and, if feasible, a bench.

The recommended and minimum widths for each element of the bus stop is provided below. Note that these are general and may vary depending on the final shelter design selected, and are based on GVT's desire to include advertisements as a revenue source on bus shelters:

- Landing Pad: 8' (deep) x 5' (wide)
- Shelter Pad: 8' x 16' (min. 6' x 10')
- Bench-Only Pad: 3' x 8' (min. 3' x 6')
- Amenity Pad: 6' x 8' (min. 3' x 5')

Standard design layouts are provided in **Figure 20** as general guidance for bus stop design on North Avenue. These include four scenarios depending on the space available:

1. Bus Pullout Unconstrained
2. Bus Pullout Constrained
3. In-Line Stop Unconstrained
4. In-Line Stop Constrained

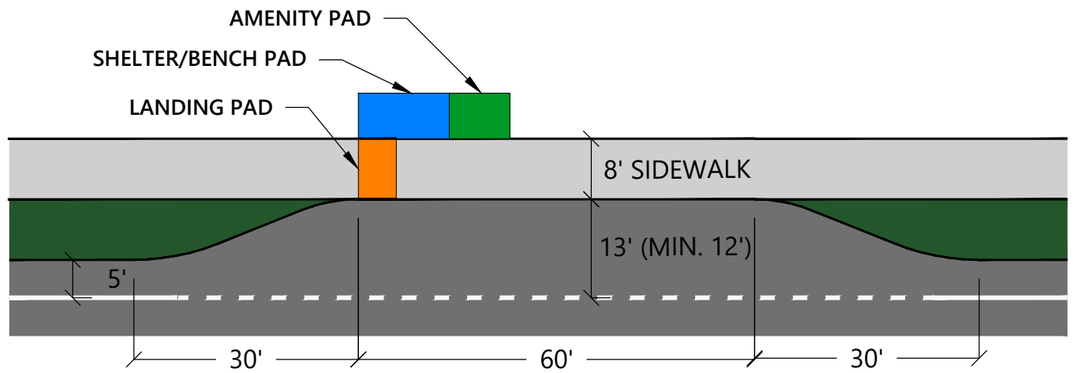
In practice, the exact layout and dimensions of each amenity may vary depending on the individual stop.

Stops with Bus Pullout: Unconstrained Location

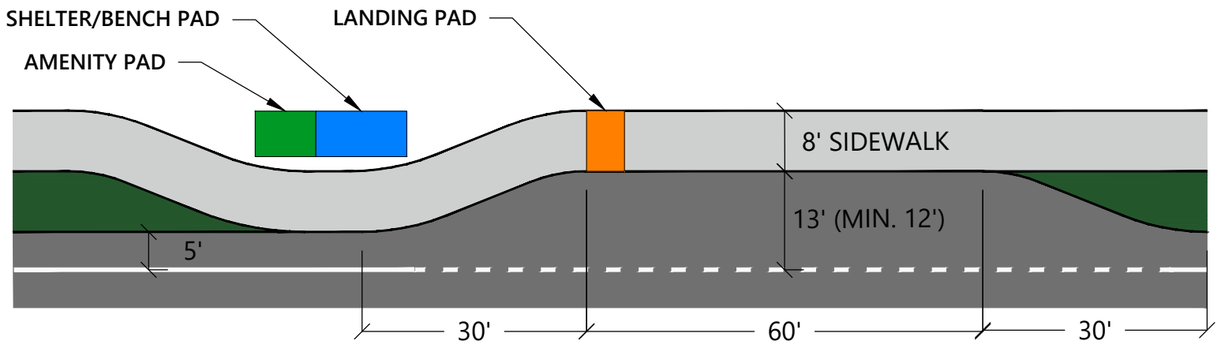
This would occur where there is sufficient space for a bus pull-out and that also has enough right-of-way or an easement behind the sidewalk (unconstrained). This represents the ideal layout for a bus stop on North Avenue. When space is available, the stop would include a pullout and shelter behind the sidewalk.

Stops with Pullouts: Constrained Location

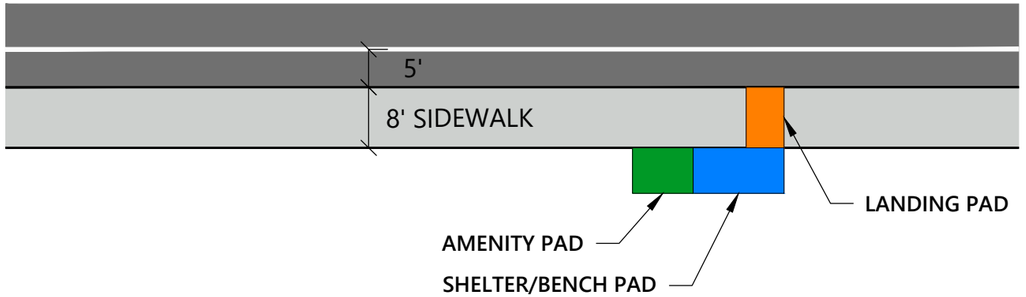
For a bus stop where there is sufficient space for bus pullout but not enough right-of-way or an easement behind the sidewalk, the recommended layout is shown in **Figure 20.** This layout uses the far-side space beyond the bus pullout for a small shelter or a bench. The sidewalk would be designed to curve around the shelter to maintain a buffer for the shelter from the roadway. In this situation, the shelter/ bench could be oriented perpendicular to the sidewalk as shown in **Figure 20** or with an angled orientation behind the sidewalk facing the direction that traffic is coming from.



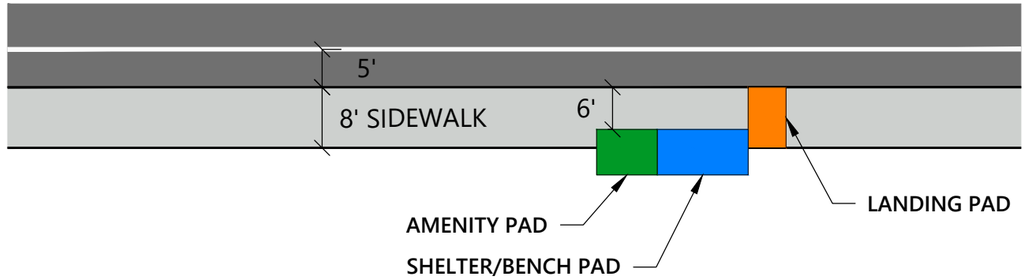
BUS PULLOUT - UNCONSTRAINED



BUS PULLOUT - CONSTRAINED



IN LINE STOP - UNCONSTRAINED



IN LINE STOP - CONSTRAINED

DIMENSIONS:

LANDING PAD: 8' DEEP X 5' SIDE
SHELTER PAD: 8' X 16' (MIN. 6' X 10')
BENCH-ONLY PAD: 3' X 8' (MIN. 3' X 6')
AMENITY PAD: 6' X 8' (MIN. 3' X 5')

Figure 20
North Avenue Enhanced Transit Corridor Study
Bus Stop Configurations

In-Line Stops: Unconstrained Location

Where there is not sufficient space for a bus pullout, the bus stop would be an in-line stop. This will likely occur in locations where the sidewalk is adjacent to the curb (no buffer) due to right-of-way constraints. For in-line stops with some available right-of-way or an easement behind the sidewalk, the concept layout as shown in **Figure 20**, would include a shelter or bench behind the sidewalk.

In-Line Stops: Constrained Location

For in-line stops without sufficient right-of-way or an easement (constrained) behind the sidewalk for a shelter, a bench would only work if 6' of sidewalk clearance could be maintained for people walking and biking along the sidewalk as shown in **Figure 20**.

Shelter Design and Specifications

The recommended bus shelter design for North Avenue is a modern, configurable premanufactured kit from one of numerous manufacturers that offer standard bus shelter kits. This bus shelter kit approach (vs. designing, engineering, and bidding construction of a full custom solution) offers ease of procurement, simplified construction and installation, engineered solution designed for long-term serviceability and maintenance, and potential for customization and beautification through incorporation or addition of branding, unique design elements, or addition of public art through simple application of vinyl or additional of metal sculpture elements.

Specifications

The following bus shelter kit specifications are provided as an example that GVT could use when soliciting proposals from manufacturers. These are based on input received from the community survey, the project technical team, and GVT staff within the context of the North Avenue Corridor Vision:

- The main shelter structure shall be constructed using structural tubing, aluminum or approved equal and powder coated.
- The roof shall be cantilevered with a modern aesthetic.
- The requested color scheme will be determined as part of corridor branding process and shall be powder coated.
- The walls shall be a tempered safety glass, framed acrylic, or polycarbonate material that will be vandal and tamper resistant, retain translucence over time, and allow for possible application of vinyl graphics/ branding.
- The rear wall may also integrate a fixed position map case to accommodate a graphic/map.
- Sides of walls shall be no less than 6" from the ground as not to impede maintenance of snow, debris or general cleaning and to prevent potential water damage.
- The bus shelter roof components shall be modular in design and shall allow for roof components to be securely fastened to the shelter in a concealed and tamper-proof manner.
- All bus shelter structural components shall be clearly labeled and modular in design.
- Given the conceptual design, shelters shall be designed to minimize the collection of debris and trash, facilitate ease of cleaning and provide ample protection from inclement weather. Additionally, the bus shelter design and material selection should minimize graffiti and vandalism. Only materials that meet these guidelines will be considered.

- The structure should maximize shelter from rain, snow, wind and sun.
- Shelters should allow for the installation of the bench seat in addition to a minimum clear floor space of 30” wide and 48” deep inside the shelter for wheelchair access.
- The front of the shelter should be open for people using the shelter to clearly see buses approaching.
- Shelters should come in two configurations to accommodate stops with varying ridership demand and physical space constraint:
  - Medium shelter with an advertising panel (approximate footprint: 5-6’ by 9’-12’)
  - Large shelter with an advertising panel (approximate footprint: 6-8’ by 12’-16’)
- Shelters are required to incorporate lighting options for either solar panels or hard-wired connections. If powered by solar:
  - Advertising kiosk shall include 8 hours of solar powered illumination.
  - Shelter shall contain solar powered dusk to dawn roof illumination.
  - Batteries shall be securely attached and allow for a minimum of six (6) days of lighting autonomy in the event of a lack of solar exposure.
- Benches within the shelter will range in size from approximately 5’ to 8’ and will include bars to discourage using benches for sleeping. Benches will be powder coated to match shelter color scheme and will be made of similar materials as the shelter structure.
- Trash receptacles should be an option for incorporation and attachment to the shelter.

Possible Manufacturers

There are many regional and national manufacturers of bus stop shelter kits. A competitive procurement process would be needed before selecting a manufacturer. A few examples include:

- Tolar Mfg.
- Austin Mohawk
- Brasco International
- Handi-Hut

Examples

Some examples of contemporary bus shelter kits installed are shown in **Figure 21**. These same kit designs typically come in a variety of sizes and options that can be configured as needed.

Figure 21: Bus Shelter Prefabricated Kit Examples

Public Art

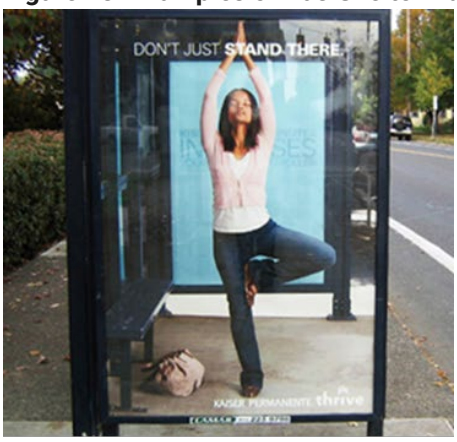
Once a bus shelter kit design has been selected, the shelter can become a canvas for a variety of interesting and compelling public art designs, which can be easily added to pre-fabricated shelter kits using vinyl graphics or metal (examples shown in **Figure 22**).

Figure 22: Examples of Public Art Added to Bus Shelters

Incorporation of Advertising

Most shelter kits will allow for the incorporation of advertising panels, which can help support transit system revenues, as shown in **Figure 23**. Bus shelter advertising may detract from the overall branding, in terms of cohesive and attractive look and feel, but it can be easily included. Advertising is already included in existing benches and shelters and is an important source of revenue to fund bus stop maintenance.

Figure 23: Examples of Bus Shelter Advertising Panels



Bus Stop Amenities

The package of passenger amenities at each stop will vary based on anticipated stop-level ridership demand and available space.

Minimum Amenity Package

The minimum bus stop amenity package is considered the bare minimum for each stop. Each stop will at a minimum include the following:

- Signage (static), including stop specific information on routes, and schedule (e.g., a sign could state that buses come at :15 and :45 past the hour from 6 AM to 8PM, etc.).
- Safe connections to pedestrian and bicycle infrastructure.
- 5’ wide by 8’ deep concrete landing pad.

Standard Amenity Package

Most bus stops on North Avenue will be designed to additionally have the following amenities so long as space allows:

- Signage (static), including stop specific information on routes.
- Safe connections to pedestrian and bicycle infrastructure.
- 5’ wide by 8’ deep concrete landing pad.
- Shelter and bench with full interior solar or hard-wired lighting package, possibly activated, or made brighter, by a push button for passengers.
- Dynamic signage that shows real-time bus arrival information (example of low-power e-reader technology shown in **Figure 24**).
- Trash receptacle.
- Single or double bike rack (at high boarding locations).

Figure 24 Example of Real-time Bus Sign (source: E Ink)

Branding

Bus stops and their associated amenities present an opportunity to apply the branding of the North Avenue corridor to the elements of the stop. The brand should be cohesive with the overall corridor branding so as to clearly convey that transit and its associated amenities are a key part of the transportation landscape of North Avenue.

Bus Stop Branding Elements

As the overall corridor brand develops, bus stops provide many possibilities for applying the corridor brand to the bus stops and associated amenities including:

- Color, design, and materials of the shelter, bike racks, and trash receptacle elements (prefab kit elements, limited to what may be available from a manufacturer).
- Application of brand to the bus shelter vertical elements using vinyl graphics or metal elements attached to the shelter.
- Bus stop signage and signposts.
- All printed materials showing bus schedule website and map information.
- Wayfinding signage telling passengers how to get to nearby destinations.
- Bus branding (although this has broader fleet implications).

Examples

Examples of bus stop branding from other agencies are shown in **Figure 25**.

Figure 25: Bus Stop Branding Examples from Other Transit Agencies

Examples of four potential ideas for branding bus stops on North Avenue are shown in **Figure 26**. These images are examples of themes that could be applied to bus stops up and down North Avenue. The color scheme is consistent with the GVT palette and the intent would be to provide a brand that is signifies North Avenue as an enhanced transit corridor, but is consistent with GVT branding. This type of branding could be applied as a vinyl to glass-paneled shelter and the metal frame of the shelters and benches could be powder coated with a consistent color scheme that matches the GVT color scheme.

Figure 26
North Avenue Bus Stop Branding Mockups

7. Transit - Speed & Reliability Recommendations

Analysis of the bus operations and traffic operations of the corridor, including interviews with bus drivers, identified the most common factors impacting speed and reliability of transit service in the corridor. In general, current transit service in the corridor does not regularly experience significant delay. CDOT conducted a TSMO analysis of existing and future traffic in the corridor and found no significant congestion related concerns in the corridor.

However, pre-COVID Routes 5 and 9, which serve North Avenue had lower on-time performance than other routes in the GVT system. This has improved largely due to a decrease in ridership. Interviews with two bus drivers in the corridor as well as field observations did identify several common causes of transit delay in the corridor when they occur. The most significant delay source is from passenger boarding, including passengers fumbling to find fare payment, and loading wheelchairs. Passenger boarding as a primary cause of delay would be consistent with better on-time performance observed on Routes 5 and 9 post-pandemic due to lower ridership on those routes (and the entire GVT system) since the onset of the pandemic.

Additionally, buses can occasionally be delayed (typically up to one minute per run) when waiting to pull back into traffic after stopping at a bus pullout. Due to the coordinated traffic system on North Avenue there are consistent gaps in traffic that bus drivers can use, but drivers may have to wait 20-30 seconds or more for a gap after stopping at a pullout.

Given these findings, four long-term improvements are recommended to improve transit speed and reliability in the corridor:

1. Increase Frequency of Service

One of the most effective actions GVT could take to improve transit reliability, grow ridership, and improve transit access in the North Avenue corridor is to increase frequency from every 60 minutes to every 30 minutes or better on Route 5 and/or Route 9. The current 60-minute frequencies are a significant barrier that prevents transit from being a viable transportation option for many people traveling in the corridor today.

2. Convert to Off-Board Fare Payment or Fare-Free Service

Converting to off-board fare payment or fare free service would allow passengers to board any door and would mitigate some delay caused by boarding and passengers finding fare payment. Off-board fare payment would necessitate installing ticket vending machines at all stops in the corridor so passengers can purchase a ticket prior to boarding (this is a common attribute of bus rapid transit systems), and can be expensive. Converting to fare-free or implementation of off-board fare payment would need further study to understand the feasibility and system-wide implications. Mobile ticketing could improve boarding speed, but because it still requires all passengers to board at one door and engage in payment, it would not improve speed and reliability as much as fare free or off-board fare payment.

3. Transit Signal Priority (TSP)

TSP would extend the green time at traffic signals by several seconds when a bus is approaching and the signal is about to turn red in order to allow the bus to clear the signal without waiting for the next cycle. A traffic analysis should be completed to understand impacts to side streets prior to implementation.

More detailed considerations and recommendations for implementing TSP in the North Avenue corridor is provided in a technical memorandum in **Appendix F**.

Key outcomes from the TSP analysis along North Avenue include:

- Recommendations for software technologies compatible with the existing infrastructure, including:
    - Infared-Based System (similar to existing emergency vehicle Opticom)
    - GPS-Based System
- Two TSP options would be feasible with the existing technology:
    - Conditional: TSP would only be engaged when a bus is behind schedule
    - Unconditional: TSP would always be engaged when a bus passes by a signal.
- In other cities TSP has been demonstrated to improve bus travel times by 4% to 15% depending on the study and location.
- Next steps for how to implement TSP in the corridor is also provided.

4. Convert from Pullouts to In-Line Bus Stops

The two possible designs for bus stops along North Avenue are:

1. In-line stops, where the bus stops in the travel lane adjacent to the curb; and
2. Bus pullouts, where a shift in the curb provides a space for buses to "pull out" of the travel lane when stopping.

In the near term all bus stops in the corridor will be designed as pullouts to mitigate delay and conflicts to vehicle traffic. However, as ridership grows and service frequency increases in the future, these pullouts can be converted to in-line stations to improve transit speed and reliability in the corridor. There is no identified threshold for when this will occur as the decision to convert to in-line stops would be a policy choice made by the City, CDOT, and the community to prioritize transit speed over vehicle speed on North Avenue. However, transit ridership and transit delay would be key considerations in making this policy decision.

Prioritizing Speed & Reliability Improvements

Given that existing service operates at 60-minute frequencies, the priority should be to improve frequency to at least 30 minutes prior to implementing other speed and reliability improvements. Providing higher frequency will generally have a higher benefit to reducing delay to more riders than the three infrastructure recommendations provided above. However, it should be noted that GVT's operating model relies significantly on timed transfers at the transit centers. Missed connections at the transit centers under the current schedule would result in 60-minute delays to passengers, which is significant. Therefore, if it is found that GVT routes on North Avenue are frequently missing connections at the transit centers due to delays incurred on North Avenue, implementing some or all of these speed and reliability recommendations prior to increasing frequencies may be warranted.

8. Policy Recommendations

Two policy recommendations are included to improve the safety and comfort of people walking, biking, and using transit in the North Avenue Corridor. These recommendations will help compliment the other operational and infrastructure recommendations in the corridor to achieve the corridor vision.

Consolidate Driveways and Manage Vehicle Access through Zoning

To reduce the frequency of curb cuts in the corridor it is recommended to consolidate driveways (including shared driveways for multiple businesses) and/or move driveways to side streets and alleys where feasible. This will reduce conflicts between vehicles and pedestrian and bicyclists along the planned multiuse trail. One of the most effective tools to implement this change is through zoning. Grand Junction currently has an overlay zone on North Avenue that requires consolidation of driveways as part of any redevelopment project. This tool is recognized as an important tool to managing access and improving the safety and comfort of people walking and biking along North Avenue. It is recommended to maintain this zoning tool into the future.

Amend the Municipal Code so Bicyclists Do Not Have to Dismount at Street Crossings

To support bicycle use of the existing and planned multiuse path along North Avenue it is recommended that the City revise language in existing ordinances and/or the Municipal Code to allow bicyclists to legally use crosswalks that are part of the planned multiuse trail along North Avenue without requiring them to dismount.

The Grand Junction Municipal Code section *10.04.1412 Operation of bicycles and other human-powered vehicles* includes the following text:

(10) (a) A person riding a bicycle or electrical assisted bicycle upon and along a sidewalk or pathway or across a roadway upon and along a crosswalk shall yield the right-of-way to any pedestrian and shall give an audible signal before overtaking and passing such pedestrian. A person riding a bicycle in a crosswalk shall do so in a manner that is safe for pedestrians.

> *(b) A person shall not ride a bicycle or electrical assisted bicycle upon and along a sidewalk or pathway or across a roadway upon and along a crosswalk where such use of bicycles or electrical assisted bicycles is prohibited by official traffic control devices or ordinances. A person riding a bicycle or electrical assisted bicycle shall dismount before entering any crosswalk where required by official traffic control devices or ordinances.*
>
> *(c) A person riding or walking a bicycle or electrical assisted bicycle upon and along a sidewalk or pathway or across a roadway upon and along a crosswalk shall have all the rights and duties applicable to a pedestrian under the same circumstances, including, but not limited to, the rights and duties granted and required by GJMC 10.04.802.*

Under this code, bicyclists may be required to dismount when crossing side streets in the crosswalk along North Avenue.

Furthermore, The Grand Junction Municipal Code section *10.04.704 Vehicle entering roadway.* includes the following text:

The driver of a vehicle about to enter or cross a roadway from any place other than another roadway shall yield the right-of-way to all vehicles approaching on the roadway to be entered or crossed. Any person who violates any provision of this section commits a traffic infraction.

(Ord. 4759, 9-6-17)

In the case of North Avenue, a bicyclist riding on the sidewalk and crossing a side street in the crosswalk could be considered a vehicle entering the roadway and therefore would need to yield to any vehicle in the street, even a car stopped at a STOP sign, unless they dismount. Several of the crashes on North Avenue involved a bicyclist that crossed a side street in the crosswalk and was hit by vehicle that had a stop sign. In many of these cases, the bicyclists was the one cited for not dismounting, despite crossing in a legal crosswalk and subsequently hit by a driver that had a STOP sign.

6. Action Plan

An action plan for implementing key recommendations identified for this project along with planning-level cost estimates are provided in **Table 4**. This includes identification of likely lead and partner agencies and a general time-frame for implementation based on a combination of project complexity, priority, and the logical sequence of actions.

The timeframe is divided into three general time periods and is a high-level estimate. Opportunities may emerge in the coming years to implement some projects sooner and others later:

- Short-Term: 1 – 2 years
- Mid-Term: 3 – 6 years
- Long-Term: 6+ Years

An estimated cost is included for recommended capital improvement projects, such as new sidewalk construction, new pedestrian crossings, and bus stop improvements, as well as recommended studies. For segments of the new multiuse trail where bus stops would be relocated, it is assumed that bus stop improvements would be made at the same time as the multiuse trail construction, therefore the cost of new bus pullouts is included (station area improvements, such as a shelter are not included in the multiuse trail estimate as those will vary by stop). Cost estimates are not included for most operational and policy recommendations given that these types of recommendations are not associated with specific projects that lend themselves to concrete costs. Cost estimates are also not provided for converting pullouts to in-line stops as costs for these recommendations are contingent on other factors and will vary depending on when and how they are implemented. The cost estimates are intended for planning purposes and it is recommended that more detailed project scoping and/or engineering analysis be conducted to refine the cost estimates closer to implementation.

Table 4 North Avenue ETC Implementation Action Plan and Cost Estimates.

Recommended Action/ Project	Implementation Lead (and Partner) Agency	Term	Planning-Level Cost Estimate
Multiuse Trail Buildout			
28 ½ Road to 29 Road, north side	City of Grand Junction	Short	$600,000 - $700,000
29 Road to 29 ½ Road, south side (1bus pullout)	City of Grand Junction (Mesa County)	Short	$900,000 - $1,000,000
1st Street to 7th Street, south side	City of Grand Junction	Medium	$800,000 - $900,000
7th Street to 12th Street, south side (2 bus pullouts)	City of Grand Junction	Medium	$900,000 - $1,000,000
23rd Street to 28 Road, north side	City of Grand Junction	Medium	$400,000 - $500,000
28 Road to 28 ½ Road, north side (2 bus pullouts)	City of Grand Junction	Medium	$800,000 - $900,000
29 ½ Road to I-70B, south side (1 bus pullout)	City of Grand Junction (Mesa County)	Medium	$600,000 - $700,000
1st Street to 7th Street, north side	City of Grand Junction	Long	$800,000 - $900,000

Recommended Action/ Project	Implementation Lead (and Partner) Agency	Term	Planning-Level Cost Estimate
7th Street to 12th Street, north side (1 bus pullout)	City of Grand Junction	Long	$700,000 - $800,000
23rd Street to 28 Road, south side	City of Grand Junction	Long	$400,000 - $500,000
28 Road to 28 ½ Road, south side	City of Grand Junction	Long	$600,000 - $700,000
28 ½ Road to 29 Road, south side (1 bus pullout)	City of Grand Junction	Long	$700,000 - $800,000
29 Road to 29 ½ Road, north side (1 bus pullout)	City of Grand Junction (Mesa County)	Long	$900,000 - $1,000,000
29 ½ Road to I-70B, north side	City of Grand Junction (Mesa County)	Long	$500,000 - $600,000
Pedestrian & Bicycle Safety Improvements			
Operational Safety Improvements	City of Grand Junction (CDOT, Mesa County)	Short/ Medium	Operational
Bicycle and Pedestrian Safety Study	RTPO (City of Grand Junction, Mesa County, CDOT)	Short	$75,000 - $100,000
Adjacent Sidewalk Network			
28 Road from North Avenue to Gunnison Avenue	City of Grand Junction	Long	$700,000 - $800,000
28 ½ Road from North Avenue to Elm Avenue	City of Grand Junction	Long	$700,000 - $800,000
28 ½ Road from North Avenue to Gunnison Avenue	City of Grand Junction	Long	$700,000 - $800,000
Elm Avenue from 28 Road to 28 ½ Road	City of Grand Junction	Long	$1,000,000 - $1,100,000
New Signalized Pedestrian Crossings			
North Avenue and 29 ¼ Road (3-leg)	City of Grand Junction/ Mesa County (CDOT)	Medium	$500,000 - $750,000
North Avenue and 15th Street (3-leg)	City of Grand Junction (CDOT)	Medium/ Long	$500,000 - $750,000
North Avenue and 21st Street (4-leg)	City of Grand Junction (CDOT)	Long	$500,000 - $750,000
Transit – Bus Stop Improvements			
Move bus stops closer to traffic signals	GVT (City of Grand Junction, CDOT, Mesa County)	Short/Medium	Varies
Bus pullout	GVT (City of Grand Junction, CDOT, Mesa County)	Varies	$100,000 – $125,000
Bus shelter and pad (w. lighting and real time bus arrival information)	GVT (City of Grand Junction, Mesa County)	Short/Medium	$30,000 - $40,000
Bench and pad only	GVT (City of Grand Junction, Mesa County)	Short/Medium	$2,000 - $4,000
Amenity pad (with trash receptacle and a bike rack)	GVT (City of Grand Junction, Mesa County)	Short/Medium	$2,000 - $3,000

Recommended Action/ Project	Implementation Lead (and Partner) Agency	Term	Planning-Level Cost Estimate
Transit – Speed & Reliability Improvements			
Increase frequency of service on North Avenue	GVT	Short/ Medium	Operational
Implement off-board fare payment or fare-free service	GVT	Medium	Needs Further Study
Transit signal priority	GVT (City of Grand Junction, Mesa County)	Medium	$200,000 - $400,000
Convert to in-line stops	GVT/ City of Grand Junction (CDOT, Mesa County)	Long	Needs Further Study
Policy Recommendations			
Consolidate driveways and access through zoning	City of Grand Junction/ Mesa County	Short	N/A
Amend municipal code related to biking on North Ave multiuse trail	City of Grand Junction/ Mesa County	Short	N/A