SH 119 Bicycle and Pedestrian Connectivity Study

Basis of Design Memo

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1 PURPOSE OF MEMO

The purpose of this memo is to document background information and details related to the concept level design for a separated bikeway along SH 119 between northeast Boulder and southwest Longmont, CO. The study area, shown in **Figure 1**, extends from northeast Boulder near the intersection of Iris Avenue and SH 119 to southwest Longmont near Hover Road and SH 119. This information is being provided in order to aid preliminary and final design activities in the future.

Figure 1: Study Area

2 BACKGROUND FOR CONCEPT DESIGN

The Colorado Department of Transportation (CDOT) Region 4 is leading the SH 119 Bicycle and Pedestrian Connectivity Study between Boulder and Longmont. This Study is intended to be a companion study to the Regional Transportation District's Bus Rapid Transit (BRT) study of the SH 119 corridor with the intent of improving bus service between Longmont and Boulder. A key reason for the CDOT Bicycle and Pedestrian Connectivity Study is that one of the BRT study alternatives being considered would allow buses to operate on the outside shoulder of SH 119 during periods of peak congestion. Currently, the outside shoulder serves as a primary bicycle route for commuter and recreational bicycle riders. The BRT bus on shoulder option would create conflicts with existing bicycle users traveling in the shoulder. If this option is recommended by the SH 119 Bus Rapid Transit Study, the continued operation of bicycles in the SH 119 corridor will require alternate improvements. As a result, the core purpose of the CDOT SH 119 Bicycle and Pedestrian Connectivity study is to develop and evaluate alternatives to provide a designated bicycle facility along SH 119 to avoid conflicts with potential BRT improvements and to evaluate the potential to upgrade the bicycle and pedestrian facilities in the corridor.

3 EXISTING CONDITIONS AND ASSUMED IMPROVEMENTS

3.1 Existing Conditions

A full assessment and cataloging of existing conditions in the Study Area was previously completed and documented in the Existing Conditions Memo for this Study. The purpose of this section is to identify the key characteristics along the SH 119 corridor that influenced the concept design alignment and configuration.

- The BNSF railroad travels along the east side of SH 119 in the entire Study Area. It is located relatively close to SH 119, limiting the amount of separation possible between the BNSF corridor, a potential shared use path, and the edge of the traveled way of SH 119.
- South of 63rd Avenue, the east side of SH 119 generally has more standing water and wetlands which could result in constructability or environmental challenges for a shared use path on the east side of SH 119. This is partially due to the presence of both the SH 119 embankment and the BNSF RR embankment, which tends to trap water.
- There are generally higher traffic volumes on both SH 119 and the cross streets in the southern end of the Study Area as compared to the northern end.
- The limits of right-of-way on both sides of the SH 119 corridor are relatively close to the edge of the traveled way in the Study Area.
- In most parts of the Study Area, SH 119 is a divided highway with significant median width between the two directions of travel. The median area, where present, generally ranges from 150' - 300' in width.
- Grade separation of the path with higher volume roadways is desired. Based on topography, available right-of-way, and other features it appears difficult to achieve grade separation on both the east and west side of the SH 119 corridor.

3.2 Assumed Improvements

There are several potential improvements that have been included in the alignment and concept design development including:

- The proposed BRT improvements in the SH 119 corridor will require widening towards the median area in most places and that BRT stations will be located in the median areas. This is based on the most current concept designs provided by RTD.
- The SH 52 (IBM Drive) intersection with SH 119 will be modified in the future. The plans for the potential BRT improvements show a widening of the intersection to accommodate the BRT system. Also, CDOT has previously developed plans for a grade separated interchange at this location. The concept alignment should not preclude either of these possibilities.
- New shared use paths are planned on the west side of SH 119 near Longmont.

4 Design Criteria

4.1 Key Design Criteria

The primary source for design criteria for the SH 119 shared use path concept design was the CDOT Roadway Design Guide: Chapter 14- Bicycle and Pedestrian Facilities. The AASHTO Guide for the Development of Bicycle Facilities (2012) was also consulted. Key design criteria include:

- The shared use path should have a paved surface and be usable during all times of the year including during non-daylight hours.
- The width of the shared use path is assumed to be 12’ with the possibility of reducing that width to 10’ based on topographical constraints or expected levels of use.
- The run slope and cross slope will meet the ADA and PROWAG requirements and guidelines.
- At grade crossing designs and control will follow the criteria provided in section 14.3.9.3 of the CDOT Roadway Design Guide.
- Consideration of grade separated crossings of high-volume streets will be included in the concept design. All locations where the shared use path crosses SH 119 mainline should be grade separated.
- Connections to cross streets and local and regional bicycle and pedestrian facilities that intersect with the corridor will be made.
- No right-of-way acquisition will be required.
- The horizontal separation of the path from the edge of the SH 119 traveled way will be maximized to the greatest extent possible.
- Consideration of anticipated noise levels along the shared use path was included in the concept alignment study and will be included in the preliminary and final design alignment plans.
- Consideration of avoidance of impacts to existing trees and other natural features and wildlife habitat was included in the concept alignment study and will be included in the preliminary and final design alignment plans.
- The concept alignment should not preclude identified improvements related to the SH 119 BRT system or capacity improvements at the SH 52/ SH 119 intersection.

4.2 Grade Separated Crossings

Locations where grade separated crossings such as overpasses, underpasses, and creek crossings are to be used should be configured as shown in the following figures.

Figure 2: Typical Underpass Configuration

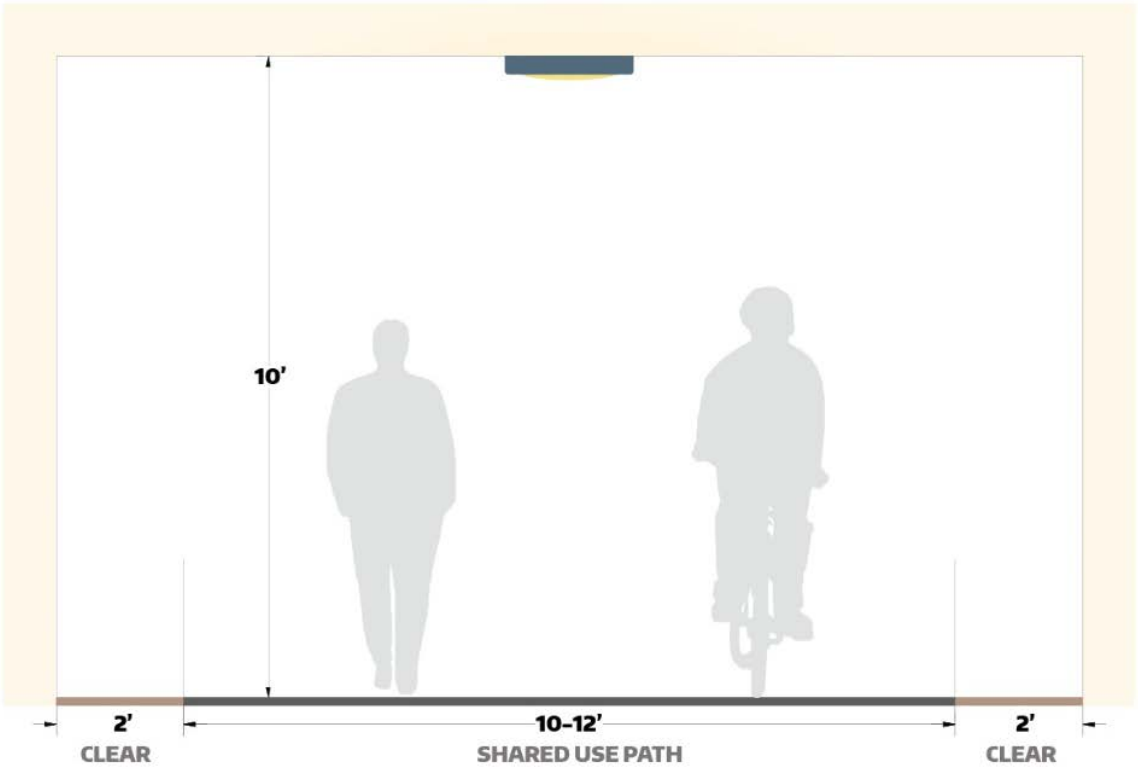
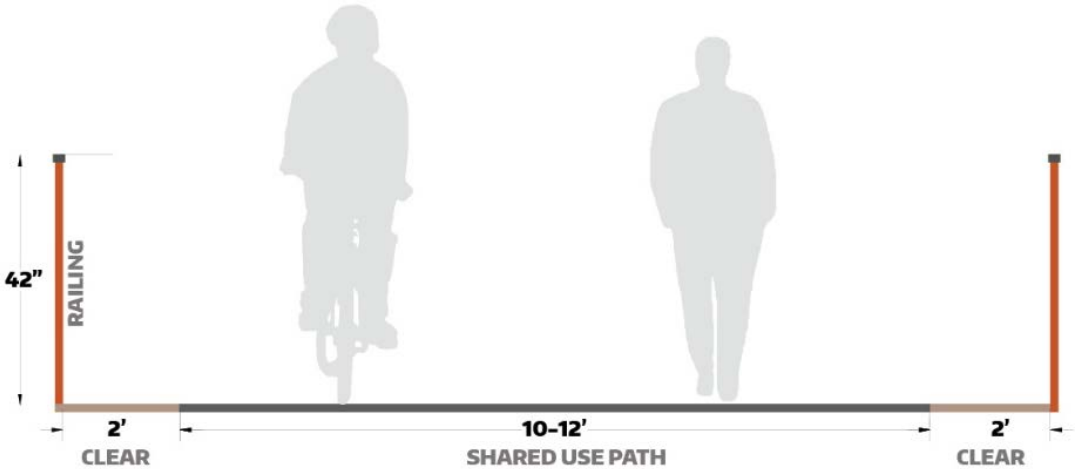


Figure 3: Typical Overpass / Bridge / Creek Crossing Configuration



4.3 At-Grade Crossings

Where at-grade crossings of roadways are implemented, the criteria provided in the CDOT Roadway Design Guide, Chapter 14, section 14.3.9.3 should be followed. The following figures illustrate typical at grade crossing configurations for various scenarios. These figures are based on information provided in section 14.3.9.3.

Figure 4: Typical Low Volume Road Crossing

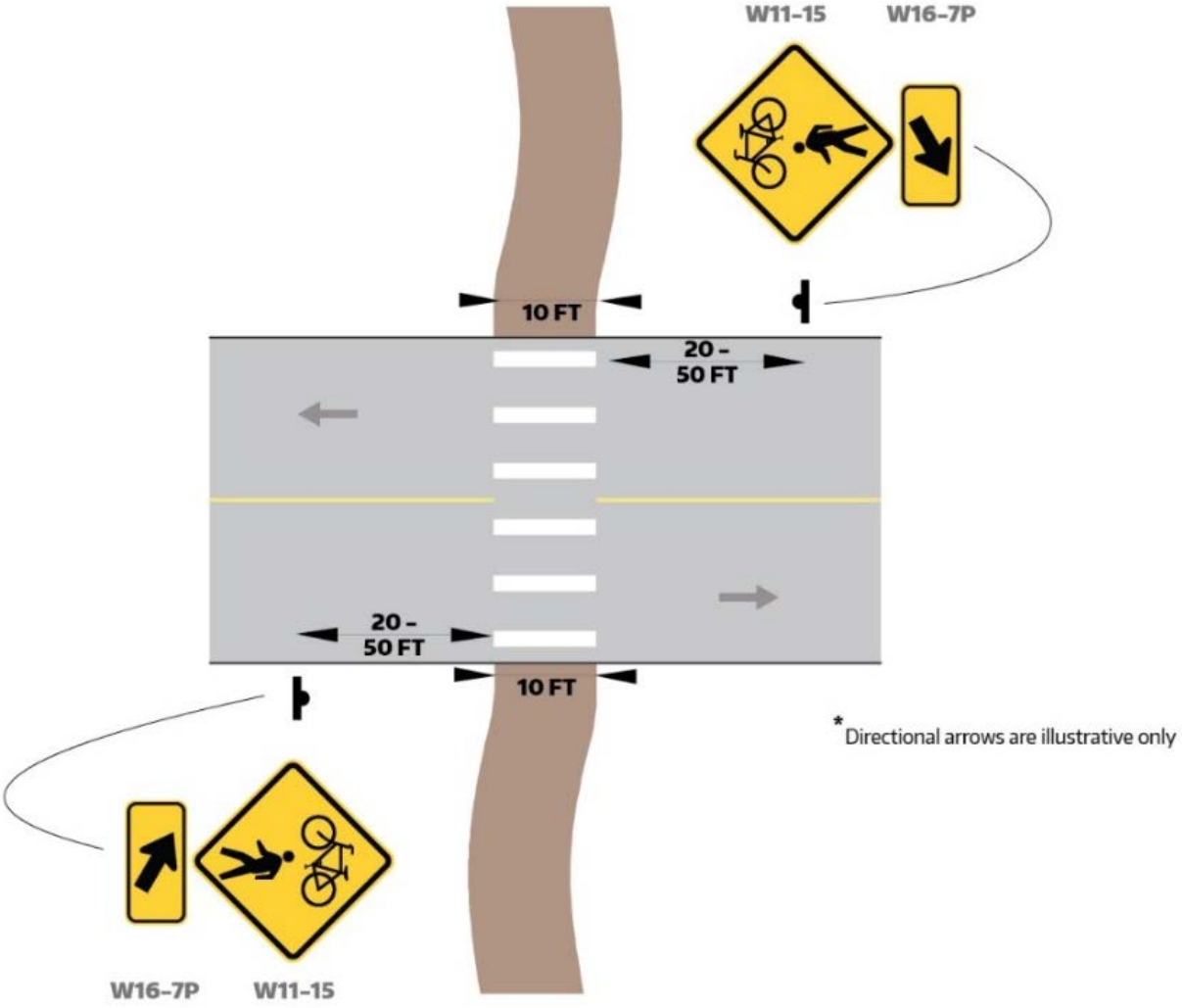


Figure 5: Typical Medium Volume Road Crossing with Angled Crossing in Median

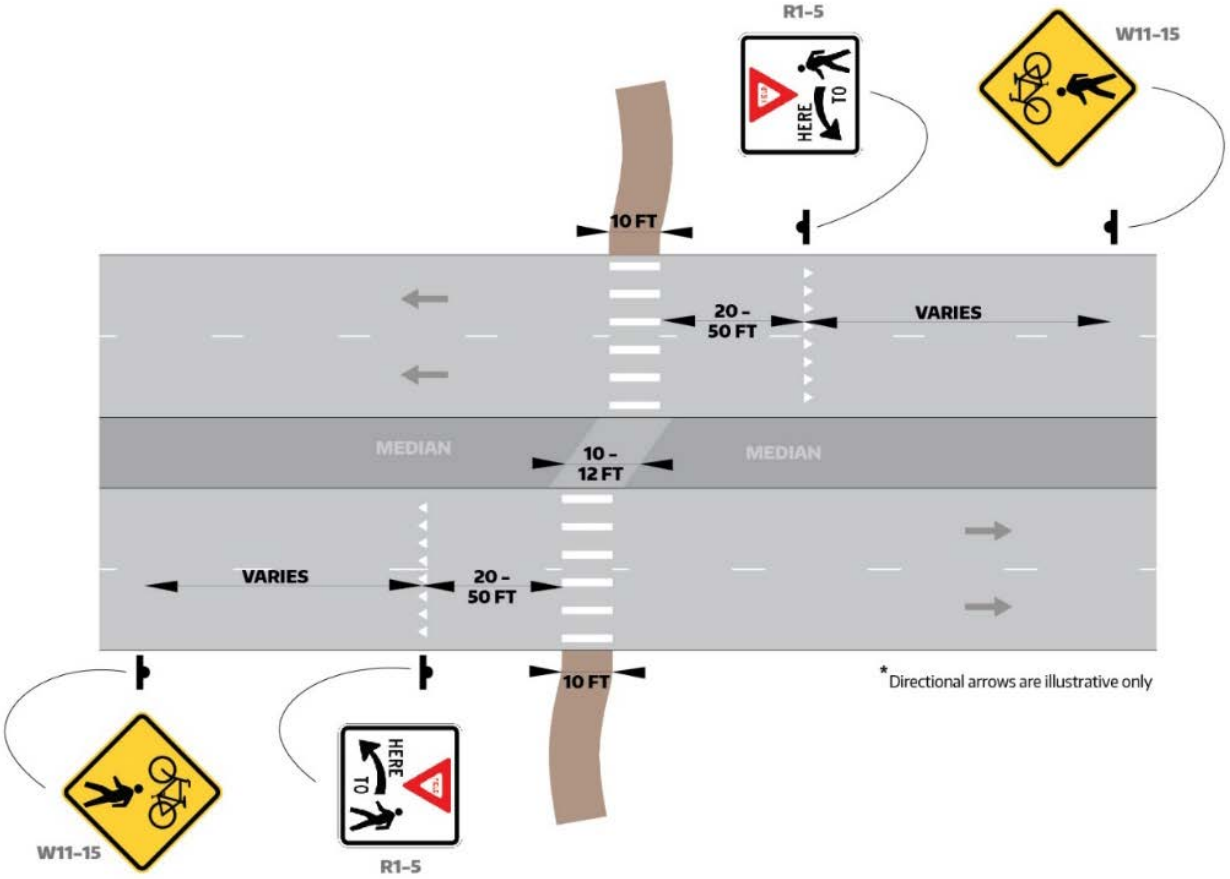
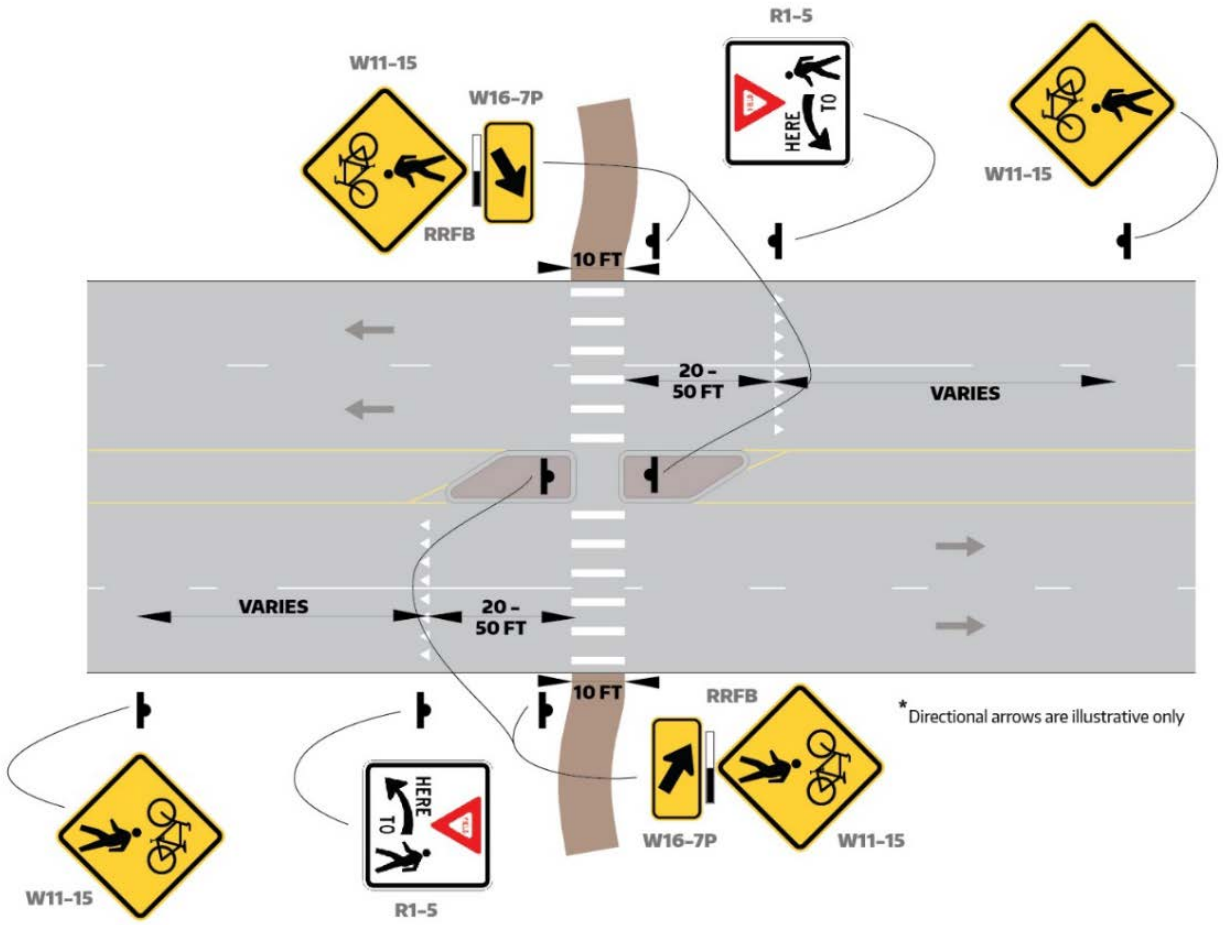


Figure 6: Typical High Volume Road Crossing with Rectangular Rapid Flashing Beacon (RRFB)*



**A Hybrid Activated Crosswalk Signal (HAWK) can be utilized in place of RRFB's if the criteria in section 14.3.9.3 are met*

5 Alignment Details

The following information documents key concept design decisions and factors affecting those decisions. It also provides discussion of other options considered. The information begins at the south end of the Study Area and continues north.

Iris Avenue Connection

Connecting to Iris Avenue and the Four Mile Creek Trail at the south end of the Study Area is a key goal of the concept alignment. Several alternatives such as ending the new shared use path at Four Mile Creek were evaluated. It was determined that continuing improvements all the way to Iris Avenue to facilitate safe and efficient connections to the directional cycle track facility on Iris Avenue was the best option. Using the existing path system through the Pleasant View Fields Complex was also evaluated. It was determined that the alignment of the existing path through high use pedestrian areas and a parking lot was not consistent with the function of a regional shared use path. Therefore, a new section of shared use path was developed for the area between the Four Mile Creek Trail and Iris Avenue.

Along SH 119 between Four Mile Creek and Jay Road

Because of the narrow width of the median in the south end of this area as well as some potential wetlands identified along Four Mile Creek, a center alignment for the shared use path was eliminated as an option. The east side of SH 119 has constrained right-of-way, wetlands, and the BNSF Railroad corridor. For these reasons, continuing the shared use path along the west side of SH 119 was deemed the best option. Because of the conditions described in the next section (Jay Road), an underpass of southbound SH 119 to cross the shared use path to the median area was included in the concept design.

Jay Road

Jay Road is a high volume roadway that crosses SH 119. Providing a grade separated crossing of Jay Road is a high priority for the SH 119 shared use path. Based on available right-of-way, location of wetlands, length of crossing, and constructability factors, it was determined that crossing Jay Road at a location between northbound and southbound SH 119 was the best option.

Jay Road to 63rd Street

This section of shared use path continues northward in the median area between northbound and southbound SH 119. There is ample width to achieve good separation travel lanes throughout this area. An at-grade crossing of 55th Street is assumed in this concept design. A future connection to Spine Road is being planned by Boulder County. Future design activities should not preclude this possibility.

63rd Street

63rd Street is a high volume roadway that crosses SH 119. Providing a grade separated crossing of 63rd Street is a high priority for the SH 119 shared use path. Several factors led to the decision that this grade separated crossing is best achieved in the median area including the fact that the shared use path is located in the median area north and south of 63rd Street, constrained right-of-way on the east and west sides of SH 119, and the planned SH 119 BRT system park-n Ride lot currently shown in the median area north of 63rd Street. Connecting directly to the park-n-Ride lot and BRT station is preferred. Future design activities will need to coordinate with RTD's park-n-Ride and station design team to ensure good integration of the shared use path with the RTD facilities.

63rd Street to SH 52

The shared use path continues in the median area in this section until it gets closer to SH 52, where it crosses to the west side of SH 119. A key connection that needs to occur in this area is to the Reservoir Trail, which crosses SH 119 in this section.

SH 52/IBM Drive

The shared use path crosses to the west side of SH 119 in this area. The main reasons for this are that there is no median area at SH 52 in the current configuration, that the planned improvements for this area include constructing facilities in the center of SH 119, the IBM offices are located on the west side of SH 119, and there is sufficient right-of-way on the west side of SH 119 to accommodate the shared use path. The shared use path crosses back to the median area north of SH 52. This configuration requires two grade separated crossings of southbound SH 119. An at-grade crossing of IBM Drive is shown in the concept design. IBM drive is a medium volume roadway where a road diet could be implemented to develop a raised median crossing similar to the one shown in Figure 5 of this memorandum. The preliminary and final design team for the SH 119 shared use path should coordinate with RTD and CDOT as plans for the proposed roadway and BRT improvements become more fully developed to ensure that all the facilities work together.

SH 52 to Niwot Road

Once the shared use path crosses from the west side of SH 119 back to the median area, it continues northwards in the median area. An at-grade crossing of Monarch Road is assumed in this concept design.

Niwot Road

Niwot Road is a high volume roadway that crosses SH 119. Providing a grade separated crossing of Niwot Road is a high priority for the SH 119 shared use path. Several factors led to the decision that this grade separated crossing is best achieved in the median area including the fact that the shared use path is located in the median area north and south of Niwot Road, constrained right-of-way on the east and west sides of SH 119, and the planned SH 119 BRT system park-n Ride lot currently shown in the median area north of Niwot Road. Connecting directly to the park-n-Ride lot and BRT station is preferred. Future design activities will need to coordinate with RTD's park-n-Ride and station design team to ensure good integration of the shared use path with the RTD facilities. Just north of Niwot Road is 2nd Street. There is a right in/right out access from northbound SH 119 at this location. The Town of Niwot has potential plans to create a grade separated crossing of northbound SH 119 to provide more direct access from their downtown area to the RTD park-n-Ride lot and BRT station. If this proposed underpass is realized, the SH 119 shared use path should connect to it. There were also comments made by people from the Niwot area that any future path construction and alignment should be sensitive to existing trees and raptor nesting areas, especially in this section of SH 119.

Niwot Road to Airport Road

The shared use path continues in the median as it travels northward in this section. There are two planned at-grade crossings of low volume streets (Oxford Road and 83rd Street) in this section.

Airport Road

At airport Road the SH 119 shared use path intersects the existing Airport Road trail. The Airport Road trail crosses under SH 119 northbound to provide access to the unpaved Longmont-Boulder (LOBO) Trail that continues north from this area to Longmont. Utilizing the existing underpass of northbound SH 119 and continuing north on the LOBO trail was considered as an alternative. It was ultimately discarded due to several factors including:

- The LOBO trail is an unpaved trail and significant modifications would be required for it to meet the goals and criteria for the SH 119 shared use path,
- the right-of-way for the LOBO trail was provided to Boulder County Open Space with specific terms that appear to restrict paving the existing trail,
- and the LOBO trail alignment leaves the SH 119 vicinity and continues further east to a location that does not achieve the goal of connecting to the south end of Longmont and the transit station improvements.

For these reasons, the LOBO trail alignment was removed from further consideration.

The current configuration of the concept design for the SH 119 shared use path assumes an at-grade crossing of Airport Road utilizing the existing traffic signal at the SH 119 southbound/Airport Road intersection.

Airport Road to Hover Road

The SH 119 shared use path continues northward in the median area north of Airport Road. The median is wide in this section and can easily accommodate the SH 119 shared use path. The west side of SH 119 was not chosen for the shared use path in this section due to constrained right-of-way near Airport Road and surface water conditions approximately 2,000’ north of Airport Road. There is an assumed at-grade crossing of Fordham Street in this section. Once the SH 119 shared use path crosses Fordham Street, the concept design crosses the shared use path to the west side of SH 119 to connect with an existing and planned shared use path system constructed by the City of Longmont. Continuing north in the median area is not an option since the median area does not exist near Hover Road. Crossing to the east side of SH 119 was considered but topography and right-of-way constraints cause significant constructability challenges on the east side of SH 119 near Hover Road.