

CHAPTER 4 – Trail Cross Section Development

Leelanau Scenic Heritage Route Trailway Plan

- 4.1 TYPICAL CORRIDOR CROSS SECTIONS
- 4.2 TYPICAL TRAILWAY CONSTRUCTION SECTIONS

4.1 TYPICAL CORRIDOR CROSS-SECTIONS

Typical corridor cross-sections were developed as a basis for studying proposed cross-sections within each alternative. Several different proposed cross-sections exist throughout the alternatives; moreover, the development of the cross-sections has aided in the planning and evaluation of different types of bicycle facilities. Several types of bicycle facilities exist that include **shared roadway** (no bikeway designation), **signed shared roadway**, **bike lane or bicycle lane**, and **shared use paths**.

Typical cross-sections are an important step towards developing construction documents, plans, and details. Typical cross-sections have also been used for cost estimating. While not all of the following bicycle facilities may be found along the proposed trailway, it is important to understand the differences between them.

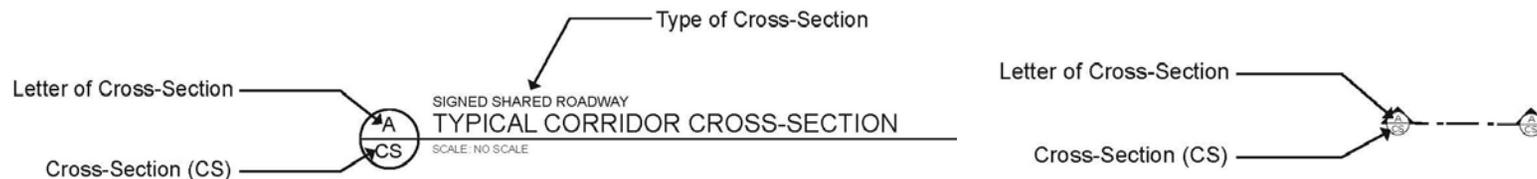
Shared Roadway (no bikeway designation). Shared bikeways refer to bike use on a community's existing street system without bikeway designation (AASHTO 1999). A minimum 4-foot paved shoulder with a 4" stripe is recommended.

Signed Shared Roadway. Signed shared roadways are designated by bike route signs, and serve either to provide continuity to other bicycle facilities or to designate preferred routes (AASHTO 1999).

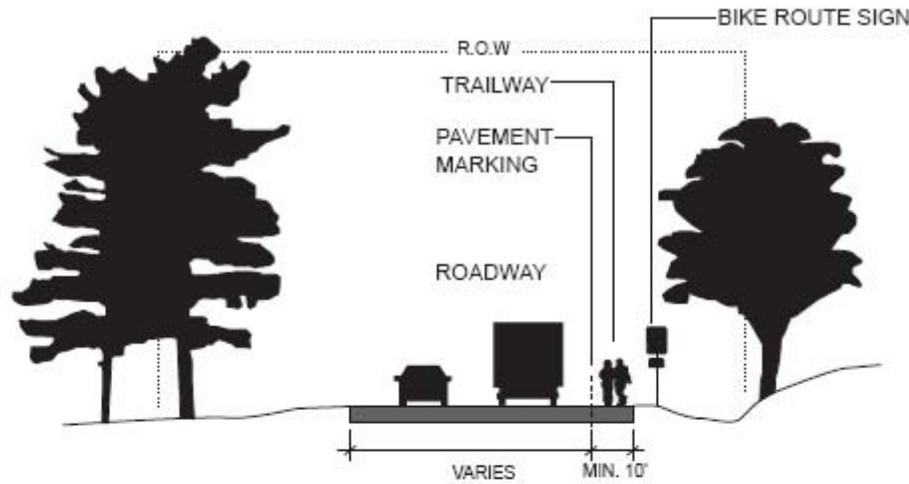
Bike Lane or Bicycle Lane. Bike lanes or bicycle lanes provide the safest alternative for shared roadway facilities. Bike lanes are most often used along streets in corridors where there is significant bicycle demand (AASHTO 1999).

Shared Use Paths. This master plan refers to shared use paths as a trailway. Shared use paths are separated from the roadway by a buffer of at least 5 to 10 feet and serve multiple uses including pedestrians, joggers, dog walkers, people pushing baby carriages, persons in wheelchairs, skate boarders, and in-line skaters. Shared use paths offer opportunities not provided by the road system. They can provide a recreational opportunity or, in some instances, can serve as direct commute routes (AASHTO). A minimum 10-12 foot width path is recommended.

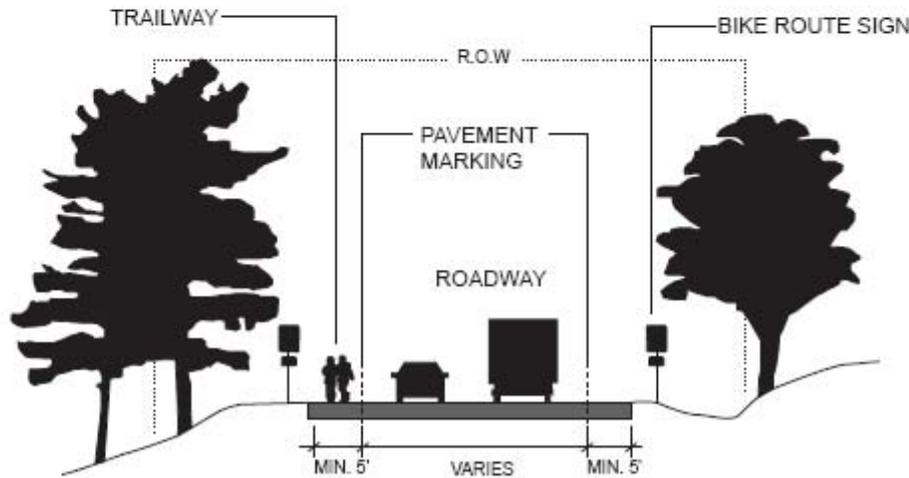
The following **typical corridor cross-sections** can be located on the "Proposed Trailway Alternatives" mapping using the cross-section or section letters, title and symbol.



Typical Corridor Cross-Sections



A
CS
 SIGNED SHARED ROADWAY
TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE



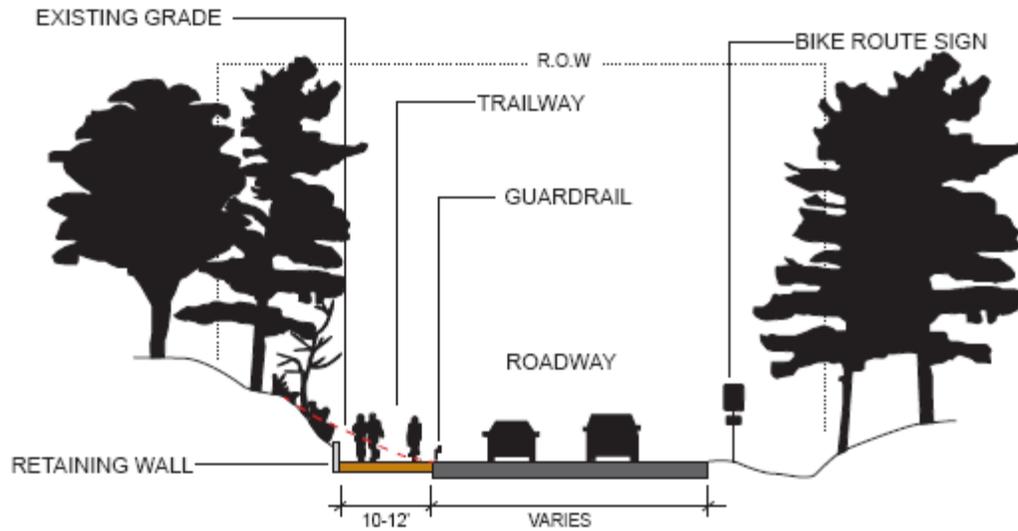
B
CS
 BIKE LANE
TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE

TYPICAL CORRIDOR CROSS-SECTIONS LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

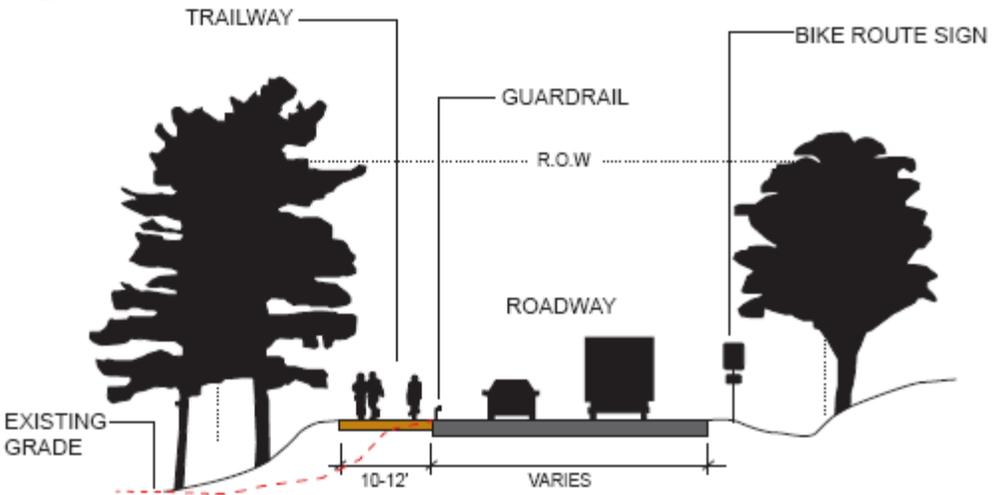
**SIGNED SHARED ROADWAY:
 CROSS-SECTION A**
 CROSS-SECTION A REFERS TO A DESIGNATED SIGNED SHARED ROADWAY THAT IS DELINEATED BY A STRIPED PAVEMENT MARKING (BIKE LANE) OR TEXTURED STRIP. A MINIMUM 8 TO 10 FOOT WIDTH IS RECOMMENDED.

BIKE LANE: CROSS-SECTION B
 CROSS-SECTION B REFERS TO A DESIGNATED BIKE LANE THAT IS DELINEATED BY A STRIPED PAVEMENT MARKING (BIKE LANE) OR TEXTURED STRIP (REFER TO AASHTO AND MUTCD FOR APPROPRIATE PAVEMENT MARKINGS, SIGNAGE, AND ROAD CROSSING SPECIFICATIONS. A MINIMUM 5 FOOT WIDTH IS RECOMMENDED.





C
CS SIGNED SHARED ROADWAY WITH GUARDRAIL & RETAINING WALL
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE



D
CS SIGNED SHARED ROADWAY WITH GUARDRAIL
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE

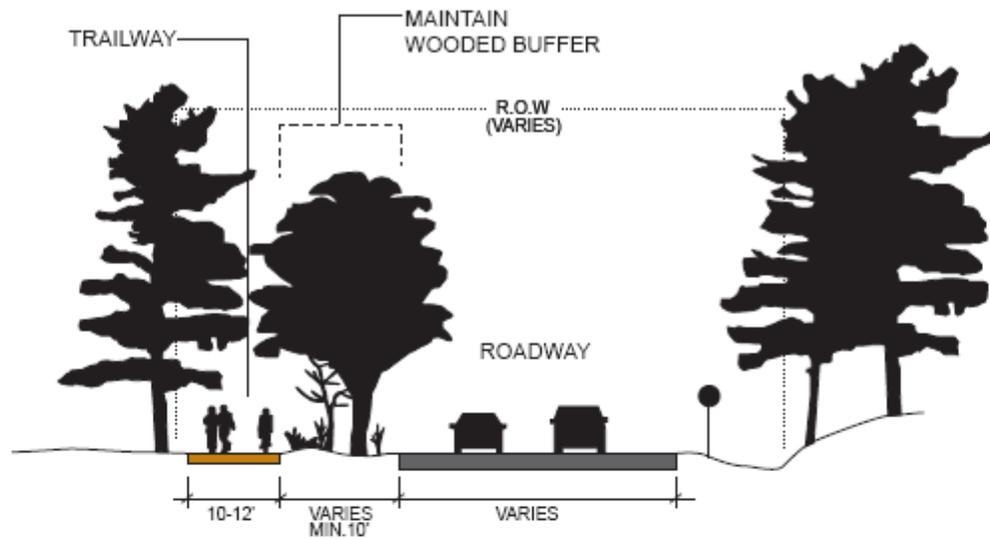
TYPICAL CORRIDOR CROSS-SECTIONS
 LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

SIGNED SHARED ROADWAY WITH GUARDRAIL & RETAINING WALL: CROSS-SECTION C
 CROSS-SECTION C REFERS TO A (MODIFIED) SHARED ROADWAY THAT IS SEPARATED BY GUARDRAIL. THE SEPARATED TRAILWAY PROVIDES A CROSS-SECTIONAL DESIGN THAT CAN BE USED WHERE LIMITED RIGHT-OF-WAY IS AVAILABLE. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

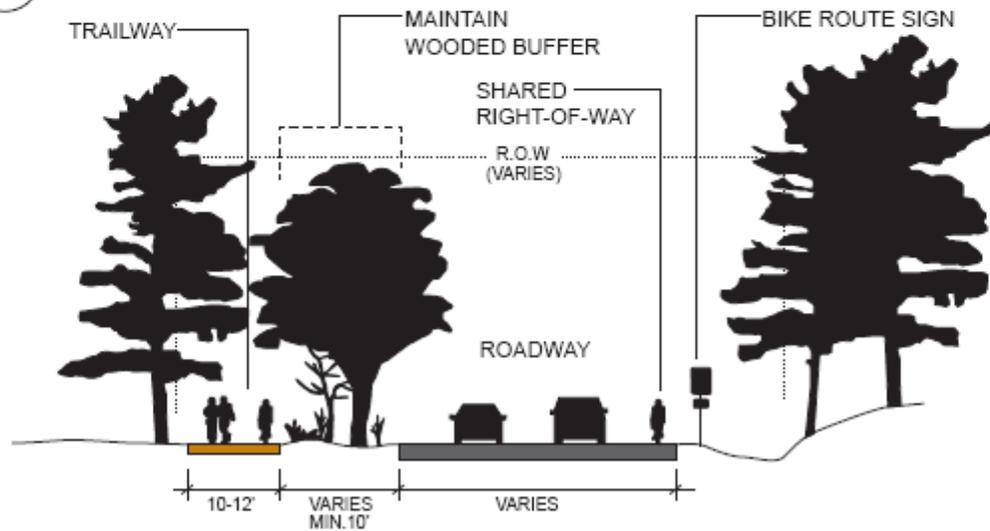
RETAINING WALLS MAY HAVE TO BE USED WHEN THE SIDESLOPE EXCEEDS 25% (3:1) OR THE ANGLE OF REPOSE.

SIGNED SHARED ROADWAY WITH GUARDRAIL: CROSS-SECTION D
 CROSS-SECTION D REFERS TO A (MODIFIED) SHARED ROADWAY THAT IS SEPARATED BY GUARDRAIL. THE SEPARATED TRAILWAY PROVIDES A CROSS-SECTIONAL DESIGN THAT CAN BE USED WHERE LIMITED RIGHT-OF-WAY IS AVAILABLE. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.





E
CS
SEPARATED SHARED USE TRAILWAY
TYPICAL CORRIDOR CROSS-SECTION
SCALE: NO SCALE



F
CS
SEPARATED SHARED USE TRAILWAY WITH SHARED ROADWAY
TYPICAL CORRIDOR CROSS-SECTION
SCALE: NO SCALE

TYPICAL CORRIDOR CROSS-SECTIONS
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

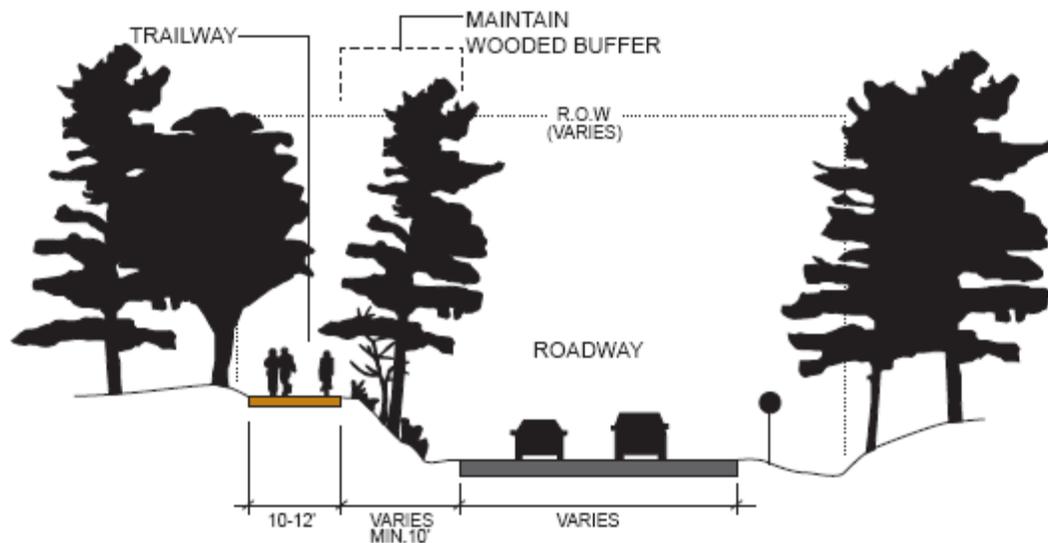
**SEPARATED SHARED USE TRAILWAY:
CROSS-SECTION E**

CROSS-SECTION E REFERS TO A SEPARATED TRAILWAY WITHIN THE RIGHT-OF-WAY. THE TRAILWAY IS SEPARATE FROM MOTOR VEHICLE TRAFFIC BY AN OPEN SPACE OR BUFFER EITHER WITHIN THE ROAD RIGHT-OF-WAY OR AN INDEPENDENT RIGHT-OF-WAY, AND FOR NON-MOTORIZED USES. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

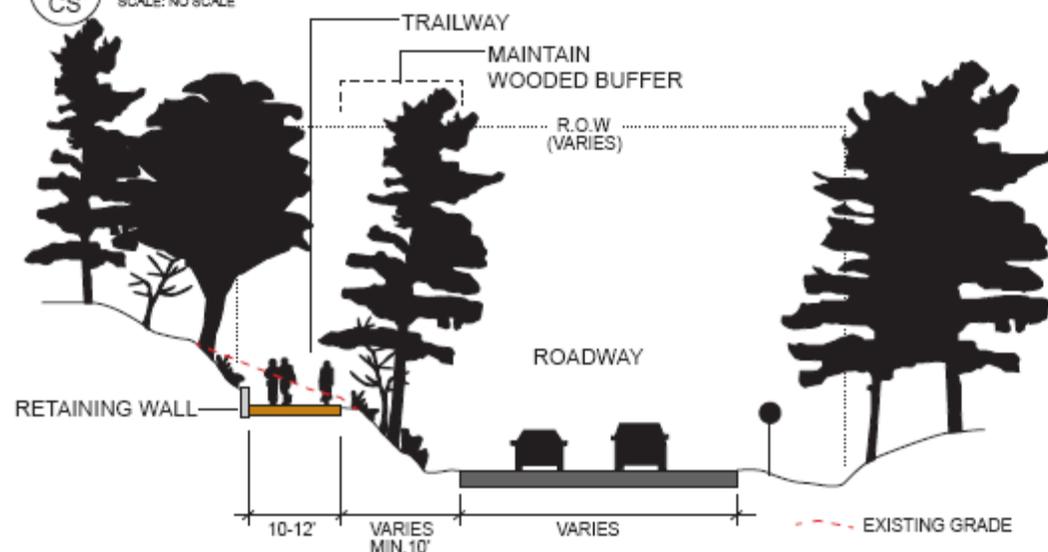
SEPARATED SHARED USE TRAILWAY WITH SHARED ROADWAY: CROSS-SECTION F
CROSS-SECTION F REFERS TO A SEPARATED TRAILWAY IN THE RIGHT-OF-WAY. THE TRAILWAY IS SEPARATE FROM MOTOR TRAFFIC BY AN OPEN SPACE OR BARRIER EITHER WITHIN THE ROAD RIGHT-OF-WAY OR AN INDEPENDENT RIGHT-OF-WAY, AND FOR NON-MOTORIZED USES. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

THE SHARED ROADWAY IS RECOMMENDED FOR BICYCLISTS ONLY AND MAY NOT ALWAYS BE DESIGNATED BY SIGNS OR PERMANENT MARKINGS AS A BICYCLE ROUTE. THE SHARED ROADWAY PROVIDES AN ALTERNATIVE ROUTE FOR MORE ADVANCED BICYCLISTS.





G
CS
 SEPARATED SHARED USE TRAILWAY WITH SIDESLOPE
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE



H
CS
 SEPARATED SHARED USE TRAILWAY WITH SIDESLOPE AND RETAINING WALL
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE

TYPICAL CORRIDOR CROSS-SECTIONS
 LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

SEPARATED SHARED USE TRAILWAY WITH SIDESLOPE: CROSS-SECTION G

CROSS-SECTION G REFERS TO A SEPARATED TRAILWAY IN THE RIGHT-OF-WAY. THE TRAILWAY IS SEPARATE FROM MOTOR TRAFFIC BY AN OPEN SPACE OR BARRIER EITHER WITHIN THE ROAD RIGHT-OF-WAY OR AN INDEPENDENT RIGHT-OF-WAY, AND FOR NON-MOTORIZED USES. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

MAINTAINING A WOODED BUFFER BETWEEN THE ROADWAY AND TRAIL WILL PROTECT HERITAGE ROUTE VIEWSHEDS AND LIMIT POTENTIAL IMPACT TO SLEEPING BEAR NATIONAL LAKESHORE (LAKESHORE) VISITOR EXPERIENCE AND CULTURAL AND HISTORIC LANDSCAPES.

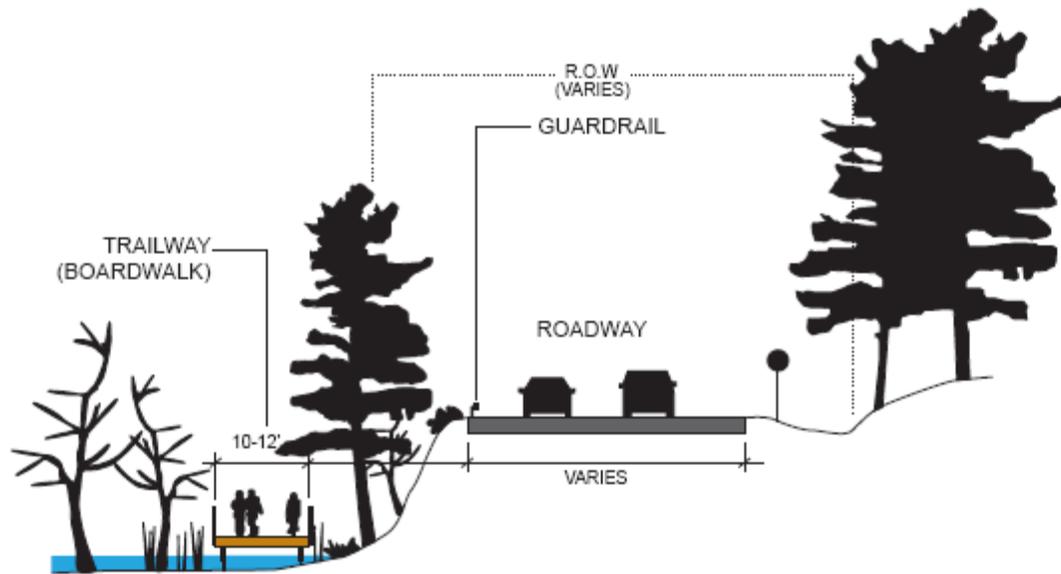
SEPARATED SHARED USE TRAILWAY WITH SIDESLOPE & RETAINING WALL: CROSS-SECTION H

CROSS-SECTION H REFERS TO A SEPARATED TRAILWAY IN THE RIGHT-OF-WAY. THE TRAILWAY IS SEPARATE FROM MOTOR TRAFFIC BY AN OPEN SPACE OR BARRIER EITHER WITHIN THE ROAD RIGHT-OF-WAY OR AN INDEPENDENT RIGHT-OF-WAY, AND FOR NON-MOTORIZED USES. A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

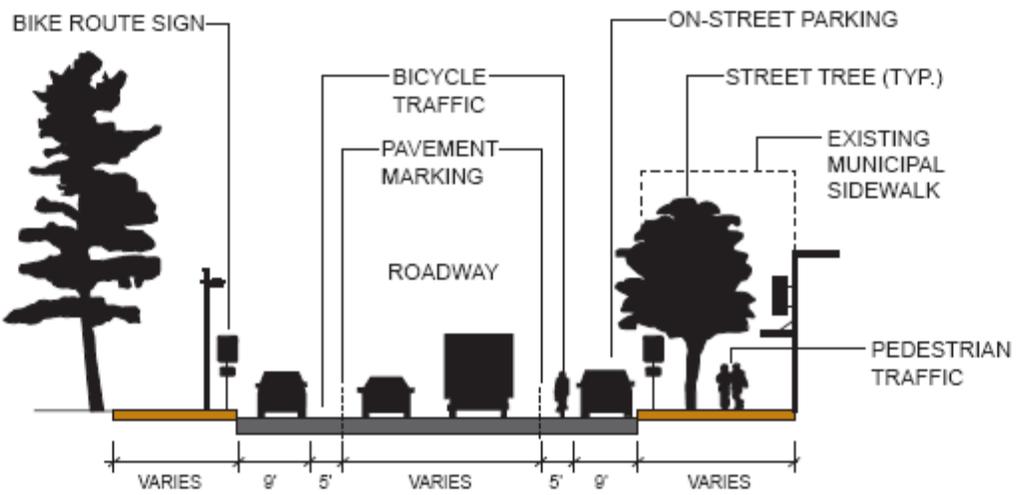
MAINTAINING A WOODED BUFFER BETWEEN THE ROADWAY AND TRAIL WILL PROTECT HERITAGE ROUTE VIEWSHEDS AND LIMIT POTENTIAL IMPACT TO SLEEPING BEAR NATIONAL LAKESHORE (LAKESHORE) VISITOR EXPERIENCE AND CULTURAL AND HISTORIC LANDSCAPES.

RETAINING WALLS MAY HAVE TO BE USED WHEN THE SIDESLOPE EXCEEDS 25% (3:1) OR THE ANGLE OF REPOSE.





I
CS
 HELICAL PIER SUPPORTED BOARDWALK
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE



J
CS
 BIKE LANE IN A VILLAGE
 TYPICAL CORRIDOR CROSS-SECTION
 SCALE: NO SCALE

TYPICAL TRAILWAY CROSS-SECTIONS
 LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

HELICAL PIER SUPPORTED BOARDWALK: CROSS-SECTION I

CROSS-SECTION I REFERS TO A SEPARATED TRAILWAY IN THE RIGHT-OF-WAY. THE TRAILWAY IS SEPARATE FROM MOTOR TRAFFIC BY AN OPEN SPACE OR BARRIER EITHER WITHIN THE ROAD RIGHT-OF-WAY OR AN INDEPENDENT RIGHT-OF-WAY, AND FOR NON-MOTORIZED USES.

HELICAL PIER SUPPORTED BOARDWALK WILL BE USED FOR TRAIL SECTIONS THAT SPAN WET AREAS (WETLANDS, CREEKS) INCLUDING NARADA LAKE. INCLUDING BOARDWALK AS AN OPTION WILL ALLOW THE TRAILWAY TO LEAVE THE RIGHT-OF-WAY IN CASES WHERE NARROW ROAD SHOULDER, GUARDRAIL LIMITATIONS, AND SAFETY ARE A CONCERN.

A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

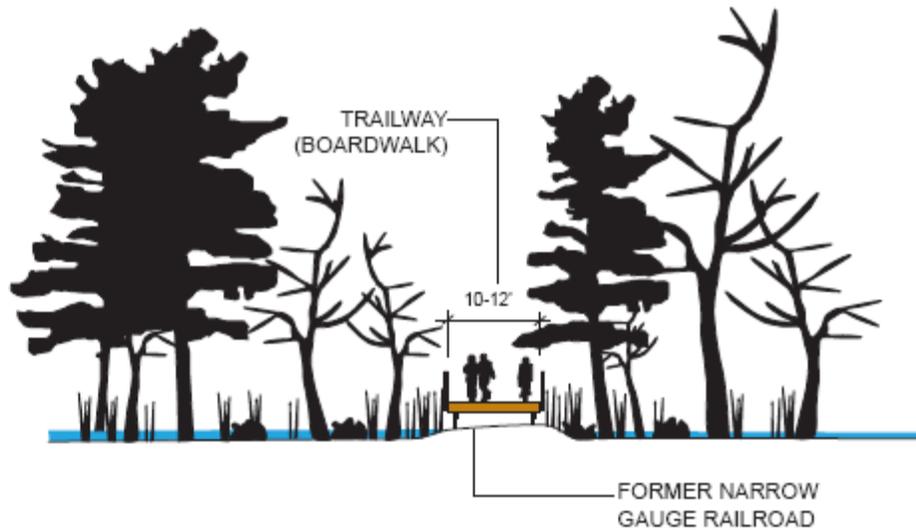
BIKE LANE IN A VILLAGE: CROSS-SECTION J

CROSS-SECTION J REFERS TO A DESIGNATED BIKE LANE THAT IS DELINEATED BY A STRIPED PAVEMENT MARKING OR TEXTURED STRIP.

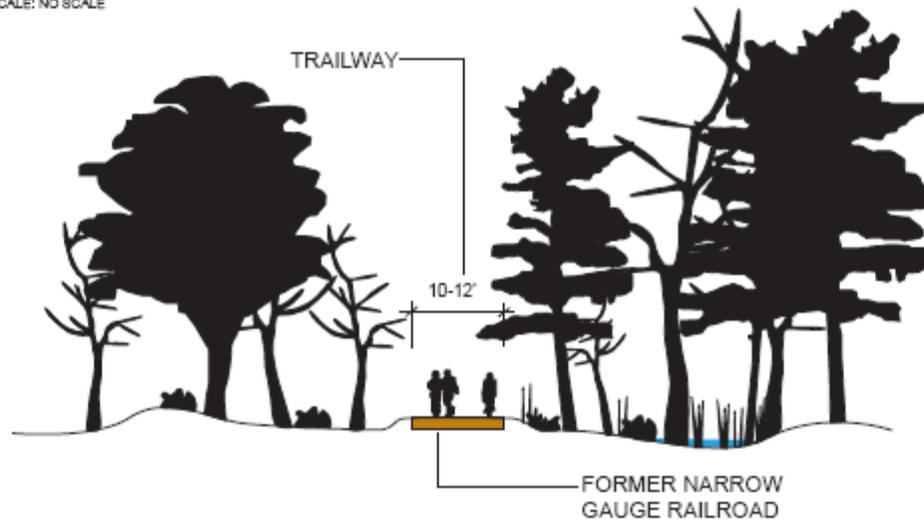
AS TRAILWAY USERS MOVE INTO VILLAGES (GLEN ARBOR, EMPIRE) DIFFERENT TRAIL USER GROUPS (I.E. BICYCLISTS, WALKERS, RUNNERS, ROLLERBLADING) WILL BE ENCOURAGED TO USE DIFFERENT ROUTING IN ORDER TO ENSURE SAFETY.

5 FEET IS THE MINIMUM RECOMMENDED WIDTH FOR BIKE LANES.





K
CS
BOARDWALK IN FORMER NARROW GAUGE RAILROAD
TYPICAL CORRIDOR CROSS-SECTION
SCALE: NO SCALE



L
CS
SHARED USE TRAILWAY IN FORMER NARROW GAUGE RAILROAD
TYPICAL CORRIDOR CROSS-SECTION
SCALE: NO SCALE

TYPICAL TRAILWAY CROSS-SECTIONS
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

BOARDWALK IN FORMER NARROW GAUGE RAILROAD: CROSS-SECTION K

CROSS-SECTION K REFERS TO SHARED USE TRAILWAY THAT LEAVES THE ROAD RIGHT-OF-WAY AND FOLLOWS THE FORMER NARROW GAUGE RAILROAD.

IT WILL NEED TO BE DETERMINED WHICH AREAS ARE MORE SENSITIVE, ARE MORE LIMITING WITH REGARD TO MESIC CONDITIONS, IN ORDER TO DETERMINE THE AREAS THAT WILL RECEIVE BOARDWALK (REFER TO PROPOSED TRAILWAY ALTERNATIVES MAPPING).

A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.

SHARED USE TRAILWAY IN FORMER NARROW GAUGE RAILROAD: CROSS-SECTION L

CROSS-SECTION L REFERS TO TRAILWAY THAT LEAVES THE ROAD RIGHT-OF-WAY AND FOLLOWS THE FORMER NARROW GAUGE RAILROAD. THE TRAILWAY WILL UTILIZE THE EXISTING ELEVATED NARROW GAUGE RAILROAD.

A 10 TO 12 FOOT WIDE TRAILWAY IS RECOMMENDED.



4.2 TYPICAL TRAILWAY CONSTRUCTION SECTIONS

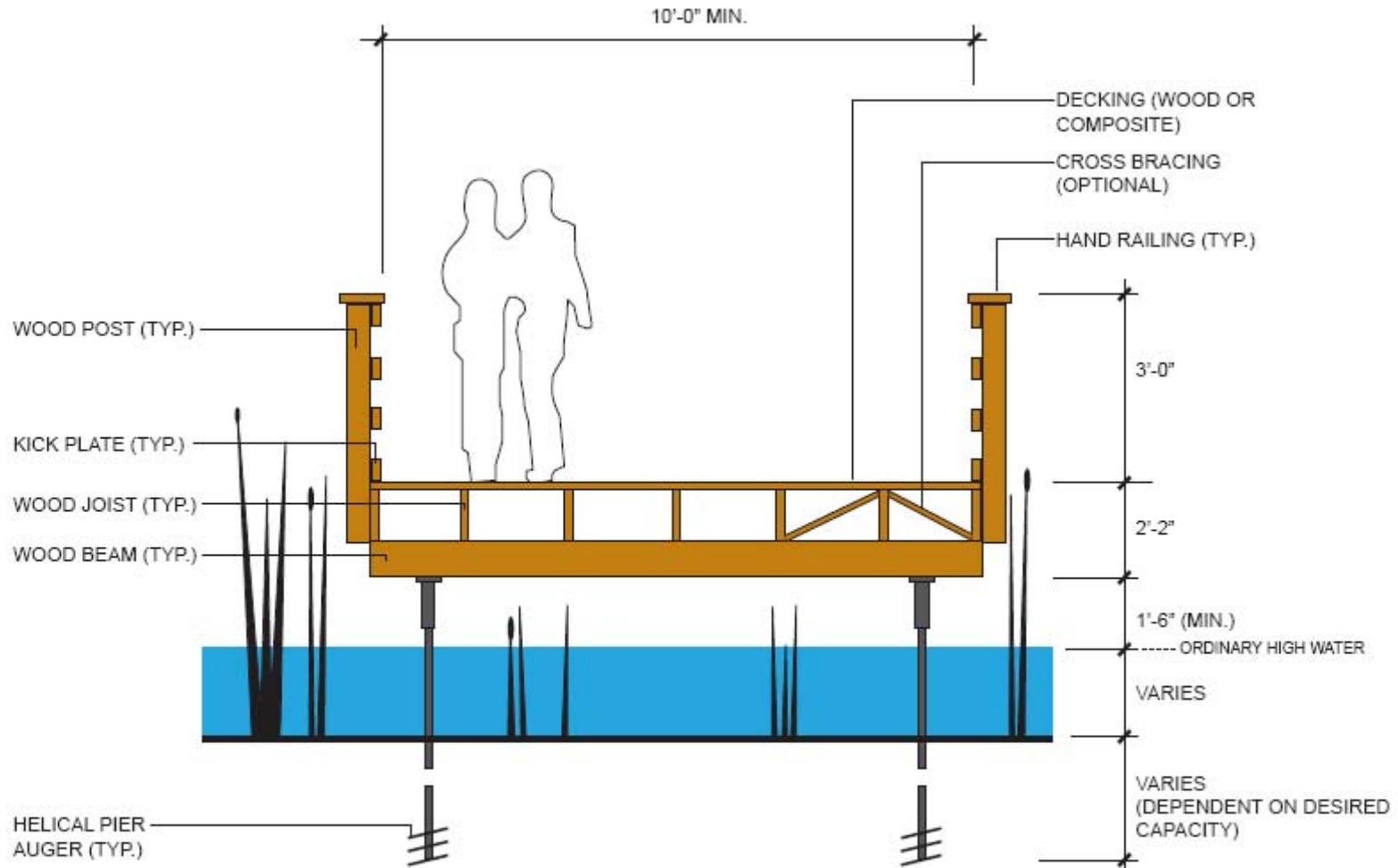
Typical trailway construction sections were also developed as a basis for studying proposed cross-sections within each alternative. Typical construction sections are an important step towards identifying trail surfaces, developing construction documents, plans, and details. Typical construction sections have also been used for cost estimating.

Typical trailway surfaces for shared use pathways include **asphalt**, **crushed limestone**, **boardwalk**, and **existing gravel roads**. The most common and often preferred trail surface is asphalt; however, crushed limestone paths offer an alternative that provides a trail surface that is more economically feasible in the short-term, is more environmentally friendly with regard to permeability, and does provides barrier-free accessibility. The downfall of crushed limestone is the high-cost of operation and maintenance in the long-term. Boardwalk trailway is the most expensive and is used to span streams, creeks, and wetlands.

A typical trailway construction section of a road crossing is also shown below. The construction section includes sign types, traffic bollards, location, and approximate mounting heights. Refer to AASHTO and Manual on Uniform Traffic Control Devices (MUTCD) standards for the most current trailway facility standards.

The following **typical trailway construction sections** can be located on the “*Proposed Trailway Alternatives*” Mapping using the title and map symbols shown above in section 4.1.

Typical Trailway Construction Sections

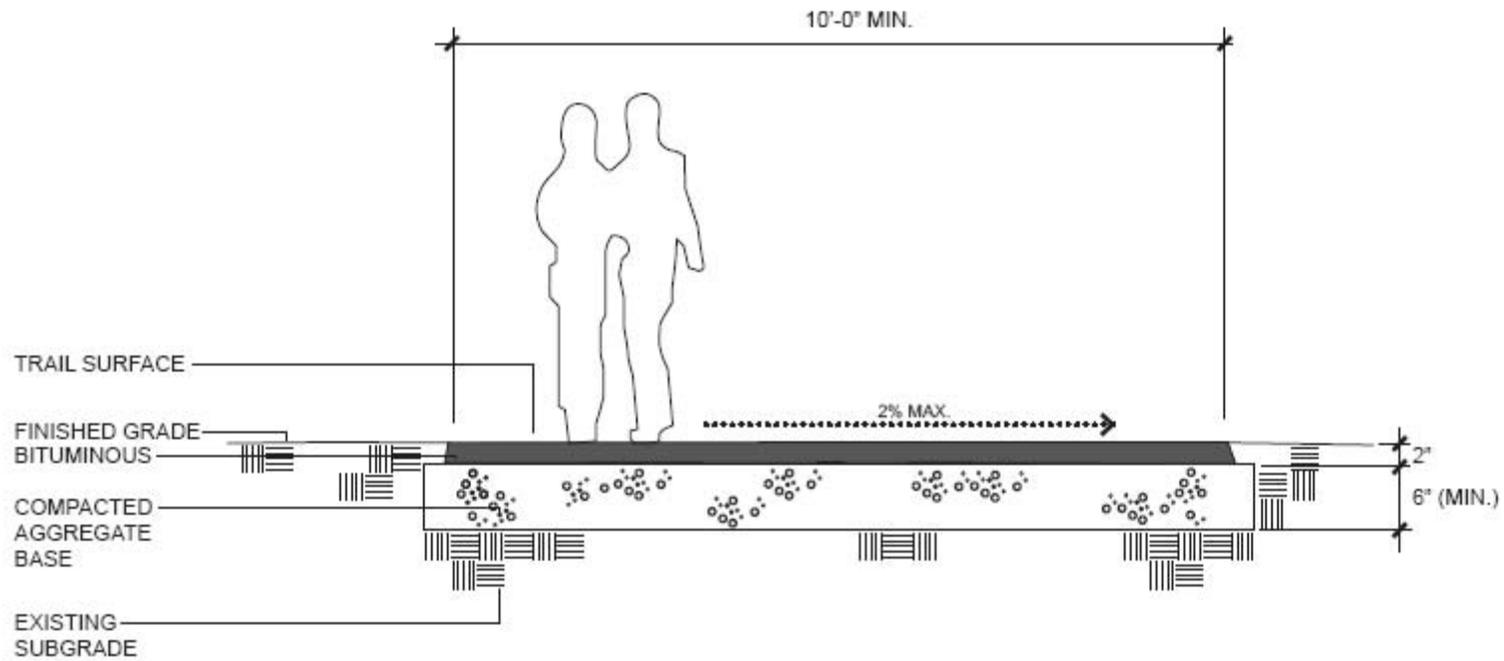


A1
S

HELICAL PIER SUPPORTED BOARDWALK
TYPICAL TRAILWAY CONSTRUCTION SECTION

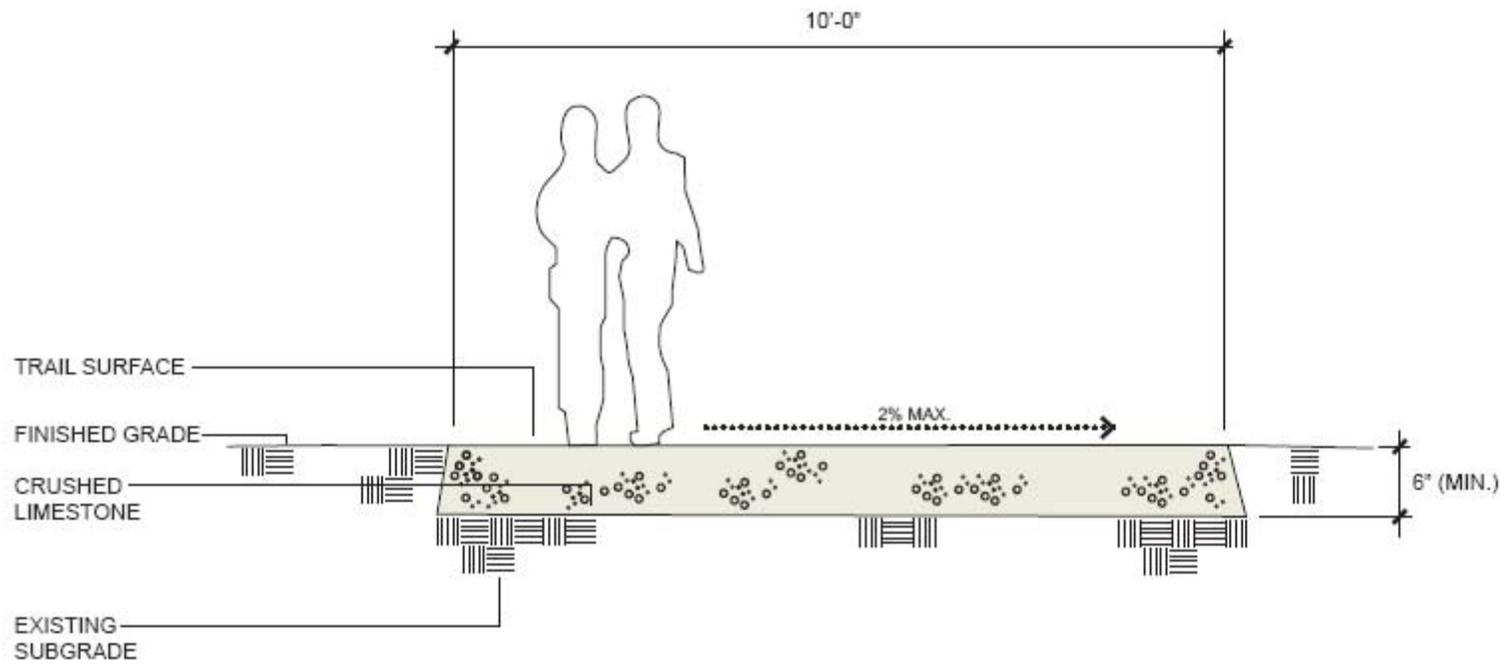
SCALE: NO SCALE





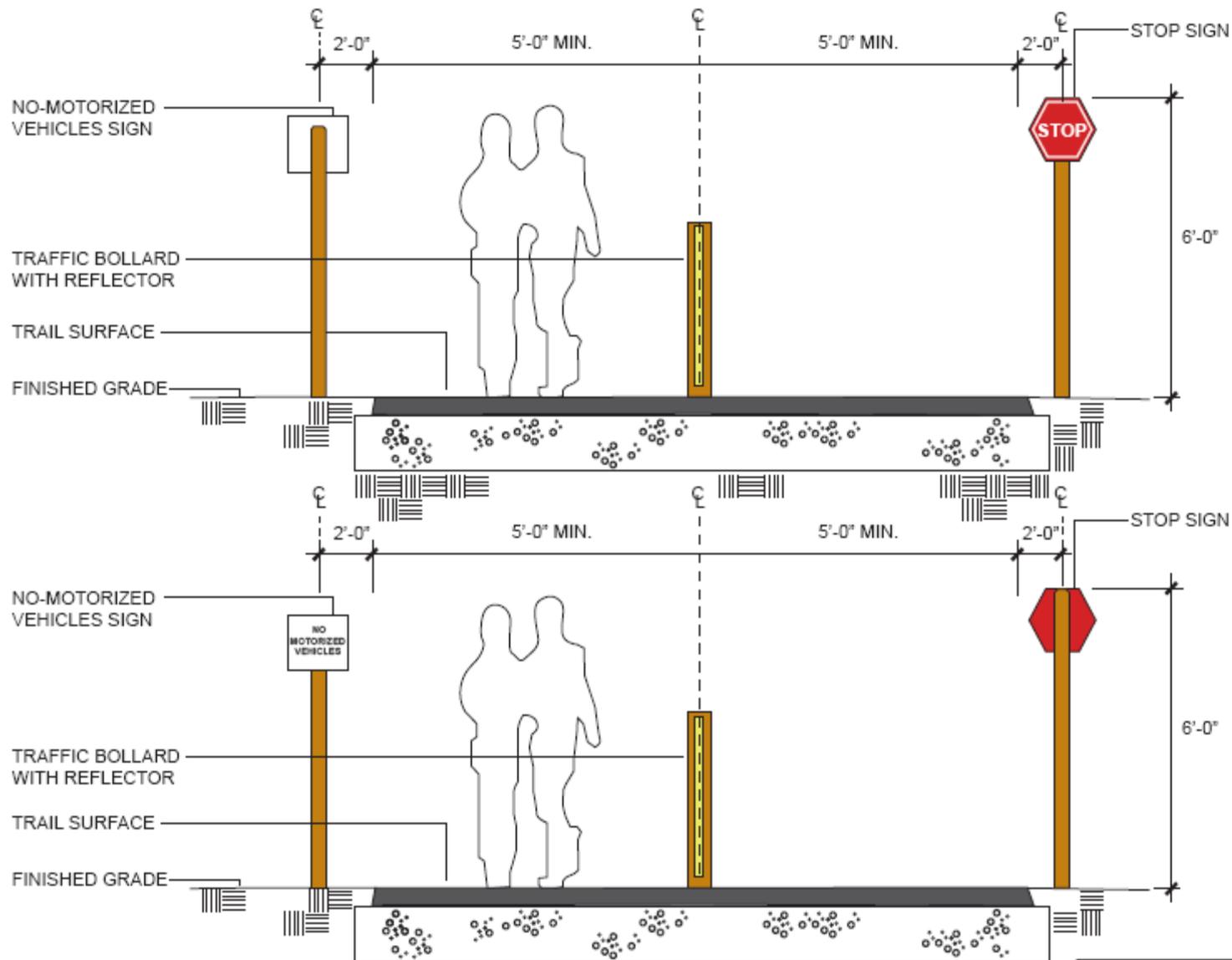
B1
S
 ASPHALT TRAILWAY
TYPICAL TRAILWAY CONSTRUCTION SECTION
 SCALE: NO SCALE





C1
S
 CRUSHED LIMESTONE
TYPICAL TRAILWAY CONSTRUCTION SECTION
 SCALE: NO SCALE





ROAD CROSSING
TYPICAL TRAILWAY CONSTRUCTION SECTION
 D1
 S
 SCALE: NO SCALE

