5 Alignment Alternatives

The project area has been divided into three sections for study purposes.

- Section 1: South Orleans Village to Watershed Limit
- Section 2: Watershed Limit to Eldredge Park Way
- Section 3: Eldredge Park Way to Orleans Center

Within each section, there are a variety of alternatives that could be combined to form a recommended alternative.

Conceptual alignments of each alternative are included under separate cover as Appendix D.

5.1 Section 1: South Orleans Village to Watershed Limits

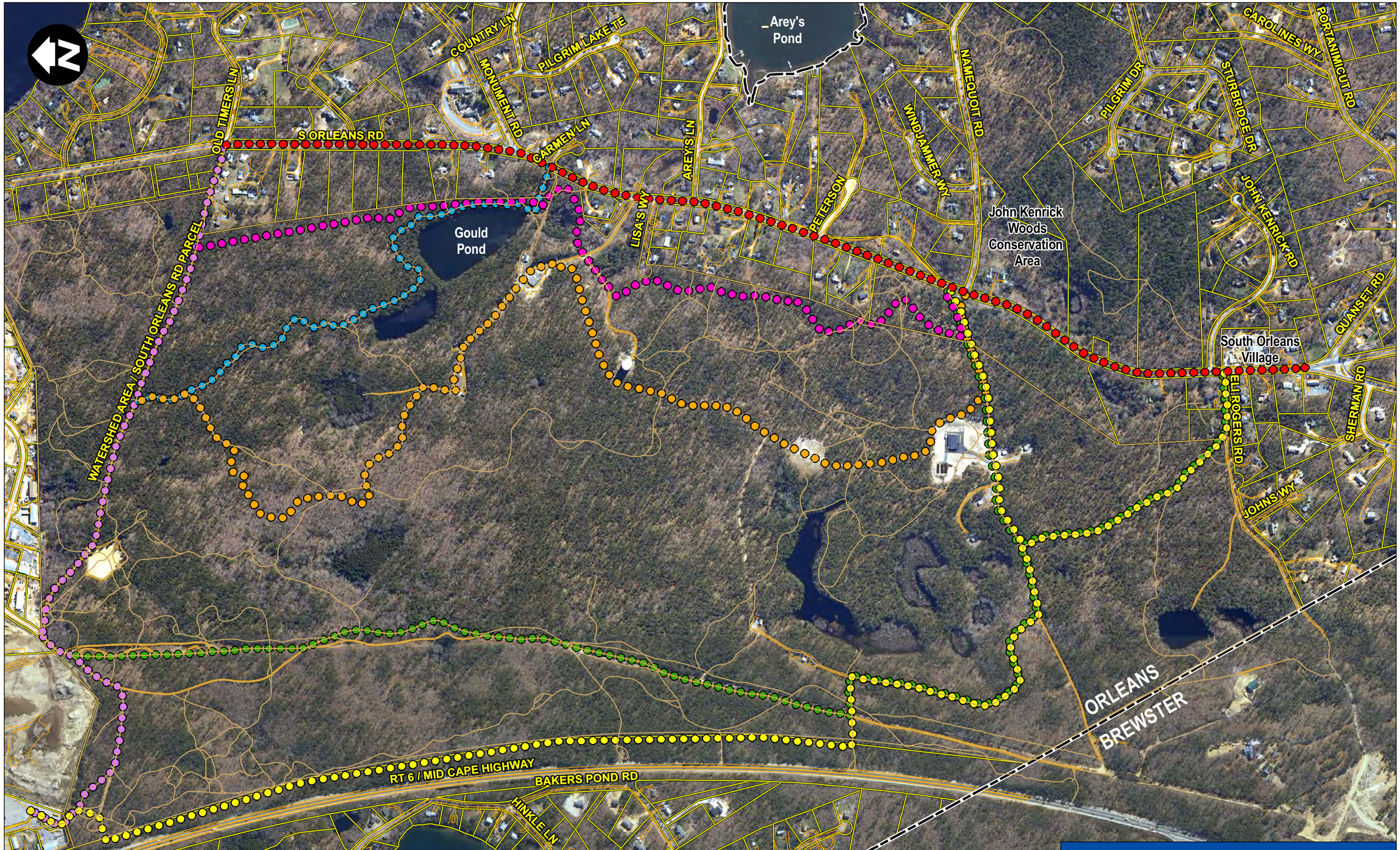
The following text describes the design issues associated with the construction of a bicycle and/or pedestrian facility within Section 1 of the project area. Section 1 begins near the intersection of Routes 28/39 and travels northward to the edge of the watershed property (near Old Timers Lane). The key destinations in South Orleans Village include the post office and Hess station and convenience store.

Alignment alternatives considered in Section 1 are listed in Table 5 and graphically shown on Figure 30 on the following page.

Table 5: Section 1 Alignment Alternatives

Alternative	General Description	Appendix Figure	Map Color
1A	Route 28 Corridor	D-1	Red
1B	Eastern Watershed Trail	D-2	Magenta
1C	Route 6 Trail	D-3	Yellow
1D	Powerline Trail	D-4	Green
1E	Windmill Trail	D-5	Orange
1F	Pond Trail	D-6	Blue
1G	Northern Fire Road	D-7	Purple

A graphic showing each individual alternative alignment is included in Appendix D.



Data Source: The *Office of Geographic and Environmental Information (MassGIS) Commonwealth of Massachusetts Executive Office of Environmental Affairs*, and *Town of Orleans.*

0 250 500 1,000 Feet

Legend

- Alignment Alternative 1A
- Alignment Alternative 1B
- Alignment Alternative 1C
- Alignment Alternative 1D
- Alignment Alternative 1E
- Alignment Alternative 1F
- Alignment Alternative 1G

SOUTH ORLEANS TO ORLEANS TRAIL STUDY

Orleans, Massachusetts

Figure 30: Section 1 Alignment Alternatives

5.1.1 Alternative 1A: Route 28 Corridor

Alternative 1A is an alignment following the Route 28 corridor. Route 28 (South Orleans Road) is a north-south minor arterial that parallels Route 6 and serves as the main route connecting Chatham and South Orleans with Orleans Center. The posted speed along this section is 40 to 45 MPH.

Route 28 is under the jurisdiction of MassHighway and therefore the design and/or construction of any new bicycle or pedestrian facility within the state highway right of way (layout) would be subject to MassHighway review and approval.

Based on the Town's GIS layers, the state highway layout is approximately:

- 50 feet wide from South Orleans Village to just north of Monument Road
- 60 feet wide from just north of Monument Road to Old Timers Lane
- 80 feet wide from Old Timers Lane to just south of Finlay Road (near Crystal Lake)

Route 28 is not centered within the state highway layout. Therefore, the construction impacts upon abutting properties will vary along the corridor based on the location of the proposed facility and the layout width. The abutting properties include a mix of residential homes and watershed property on the west side. The east side is characterized by a combination of residential homes, roadways connecting to residential neighborhoods and open space parcels, and intermittent tracts of undeveloped land.

Figure 31: Existing Worn Walking Path Along Route 28 Corridor

As shown in the figures on the following page, the terrain and roadside features vary greatly along this section of Route 28 corridor.

Based on the Town's GIS mapping and a field investigation, the suitability of various facility types were considered along the Route 28 corridor.

Figure 32: Small Town-Owned Park Intersection of Routes 28/39

Figure 33: Hess Frontage

Figure 34: Varying Terrain Along Route 28

Figure 35: Varying Terrain and Roadside Features Along Route 28

Figure 36: Monument Road Intersection

Figure 37: Sight Distance Constraint West Side of Route 28 at Monument Road

Shared Use Trail
An 8 to 10 foot shared use trail could be constructed adjacent to and parallel to Route 28 within this section. This trail would be located a minimum of 5 feet from the edge of Route 28.

Constructing a trail along the west side of Route 28 would require:

- Approval from MassHighway
- Significant grading to accommodate the proposed cross section and be ADA compliant
- Tree clearing to provide the required minimum offset to obstructions
- Land takings and temporary and permanent easements for construction
- Utility pole relocation along the majority of the corridor
- A proposed crosswalk at Monument Road

Constructing a trail along the east side of Route 28 would require:

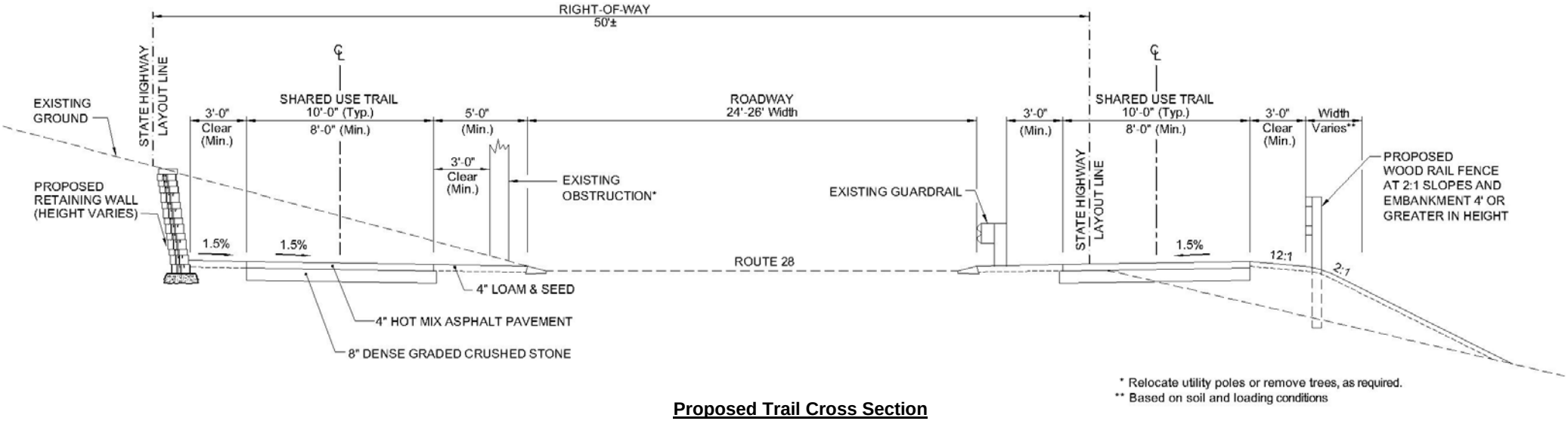
- Approval from MassHighway
- Significant grading and tree clearing to provide the required minimum offset to obstructions
- Land takings and temporary and permanent easements for construction
- Utility pole relocation on a location specific basis

Based on conversations with MassHighway District 5, the agency was concerned that the construction of a shared use trail adjacent to Route 28 would preclude future roadway improvements along this section of corridor. Also, the agency does not typically build shared use trails within its layouts unless the facilities are part of a larger roadway improvement project. As the existing roadway width is substandard, MassHighway indicated that the roadway would need to be upgraded before any other amenities could be constructed.

The typical sections shown on the following pages illustrate the roadside impacts of shared use trail construction at critical locations along the corridor. A shared use trail has been shown on either side of Route 28 to demonstrate the differences in slope, utility and property impacts. The approximate location of each section is shown on Figure D-1 in Appendix D.

Existing Condition – West Side

Existing Condition – East Side

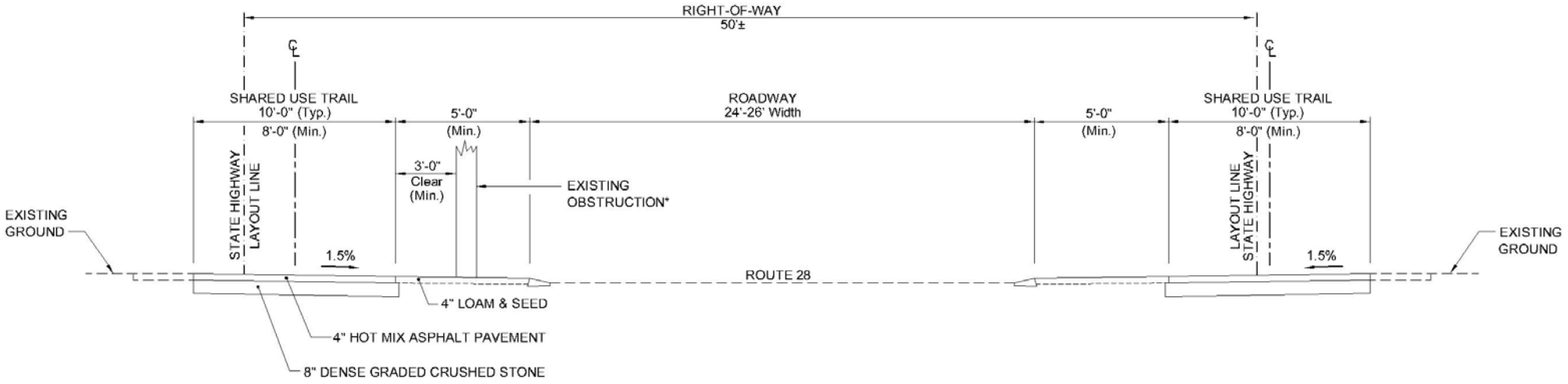


Proposed Trail Cross Section

Figure 38: Alternative 1A – Typical Section

Existing Condition – West Side

Existing Condition – East Side

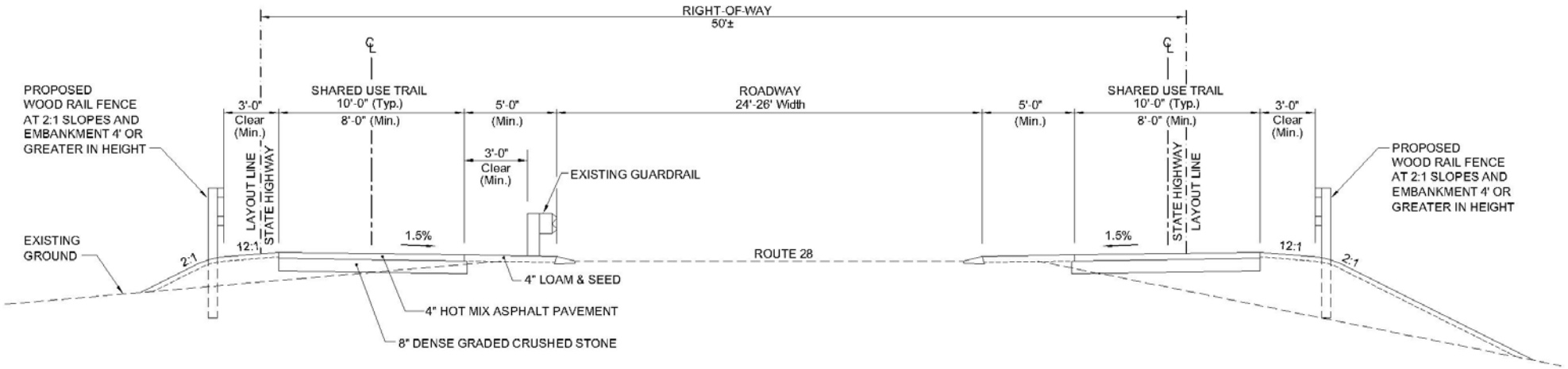


Proposed Trail Cross Section

Figure 39: Alternative 1A – Typical Section

Existing Condition – West Side

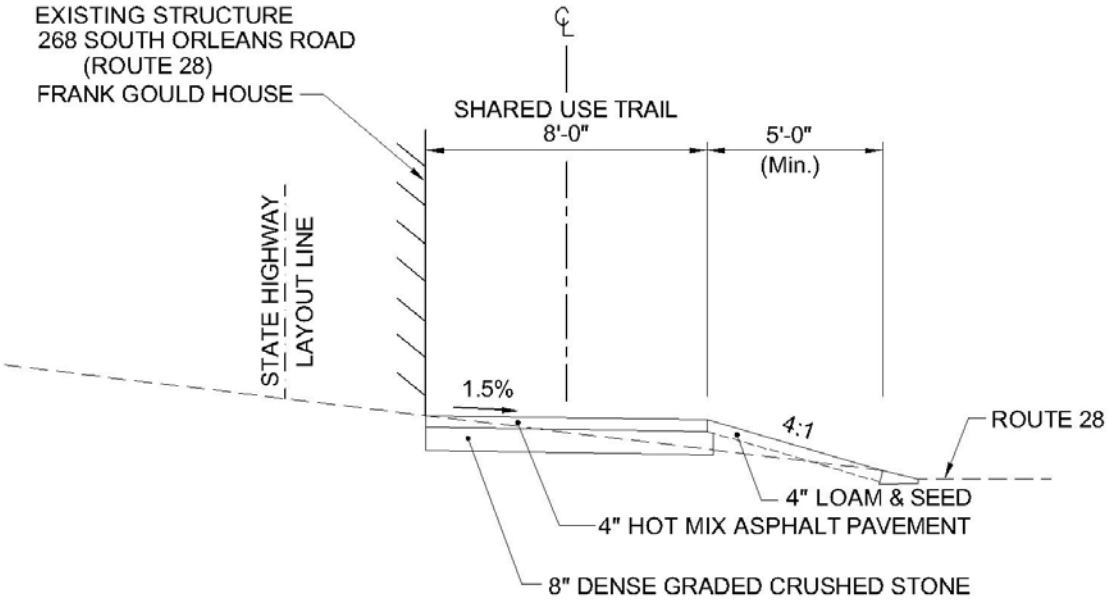
Existing Condition – East Side



Proposed Trail Cross Section

Figure 40: Alternative 1A – Typical Section

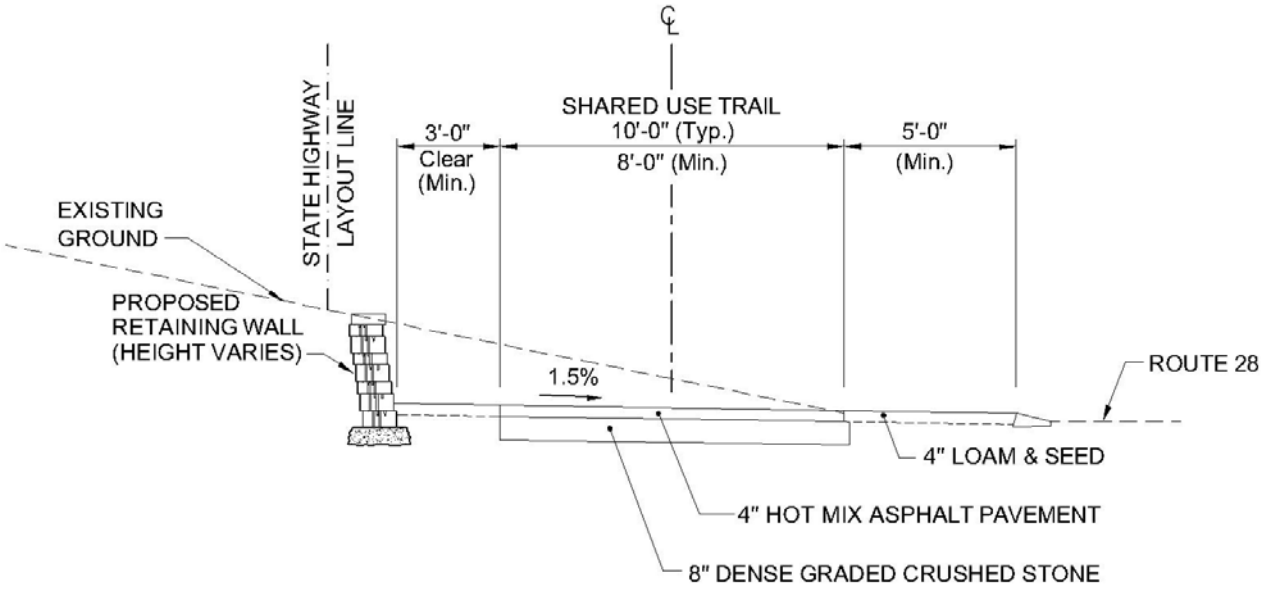
Existing Condition



Proposed Trail Cross Section

Figure 41: Alternative 1A – Trail Typical Section

Existing Condition



Proposed Trail Cross Section

Figure 42: Alternative 1A – Trail Typical Section

Sidewalk

A sidewalk could be constructed adjacent to and parallel to Route 28 within this section to minimize the roadside impacts. There is no minimum offset between the sidewalk and the edge of the roadway. However, in the interest of user safety and security, it is recommended that a grass strip separate the two facilities in locations where there is no guardrail. Although a sidewalk is typically intended for pedestrian use, according to the Committee, Town bylaws allow bicyclists to travel on sidewalks, except in the immediate village center.

Constructing a sidewalk along the west side of Route 28 would require:

- Approval from MassHighway
- Grading and tree clearing to accommodate the proposed cross section
- Temporary and permanent easements for construction
- Utility pole relocation on a location specific basis to provide a 36” clear path of travel
- A proposed crosswalk at Monument Road

Constructing a sidewalk along the east side of Route 28 would require:

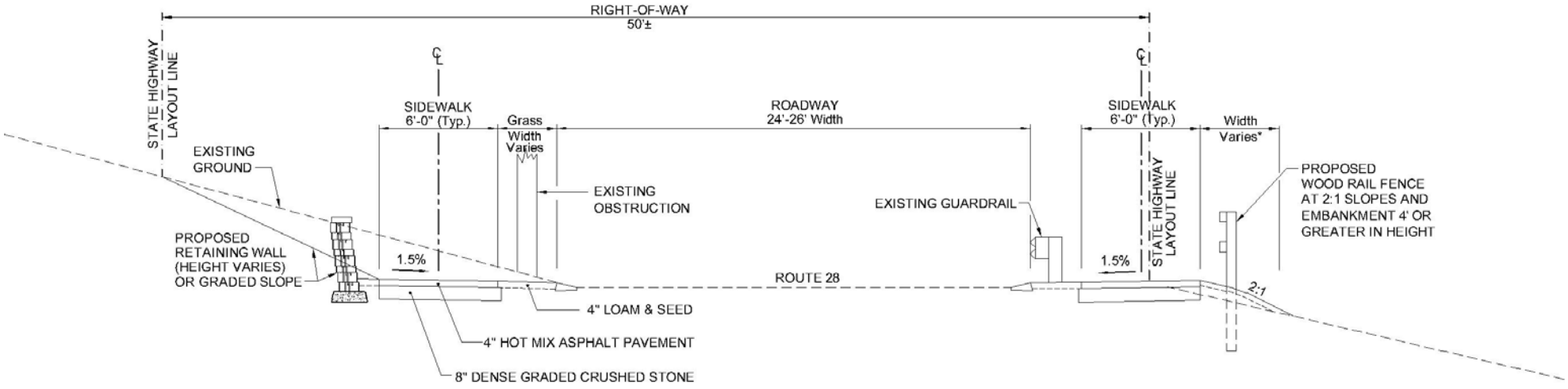
- Approval from MassHighway
- Grading and tree clearing for construction
- A f few land takings in the 50 foot section of state highway layout
- Temporary and permanent easements for construction

As discussed above, based on conversations with MassHighway District 5, the agency was concerned that the construction of a sidewalk adjacent to Route 28 would preclude future roadway improvements along this section of corridor. Also, the agency does not typically build sidewalks within its layouts unless the facilities are part of a larger roadway improvement project. As the existing roadway width is substandard, MassHighway indicated that the roadway would need to be upgraded before any other amenities could be constructed.

The typical sections shown on the following pages illustrate the roadside impacts of sidewalk construction at critical locations along the corridor. A sidewalk has been shown on either side of Route 28 to demonstrate the differences in slope, utility and property impacts. The approximate location of each section is shown on Figure D-1 in Appendix D.

Existing Condition – West Side

Existing Condition – East Side

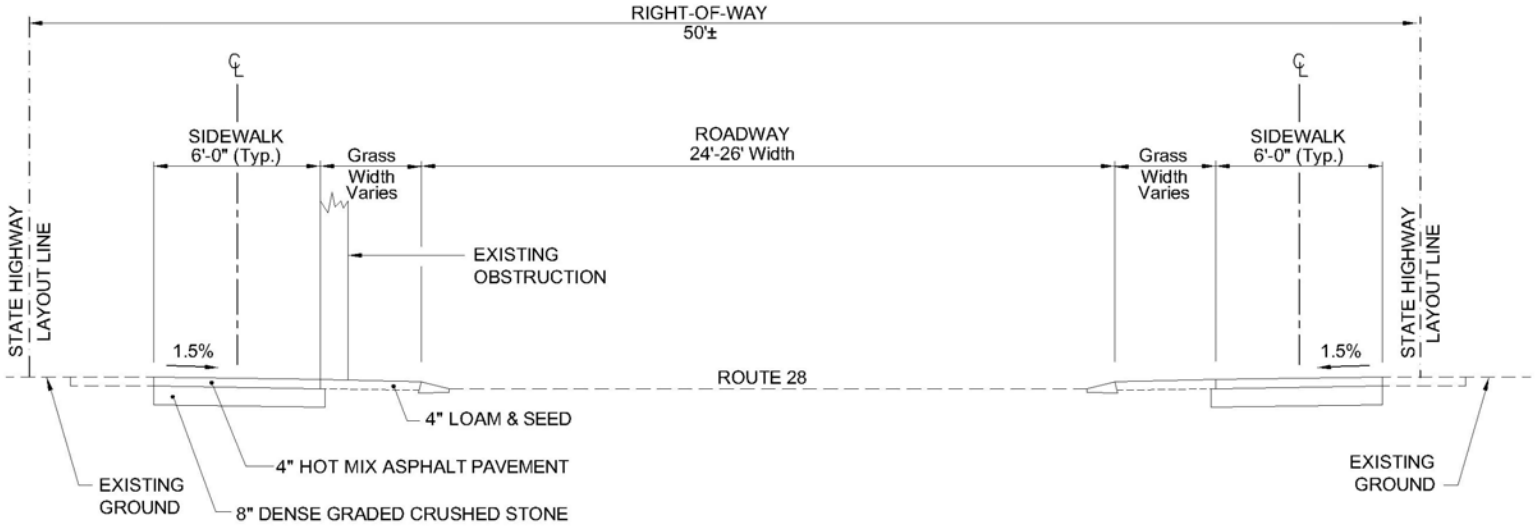


Proposed Sidewalk Section

Figure 43: Alternative 1A – Typical Section

Existing Condition – West Side

Existing Condition – East Side

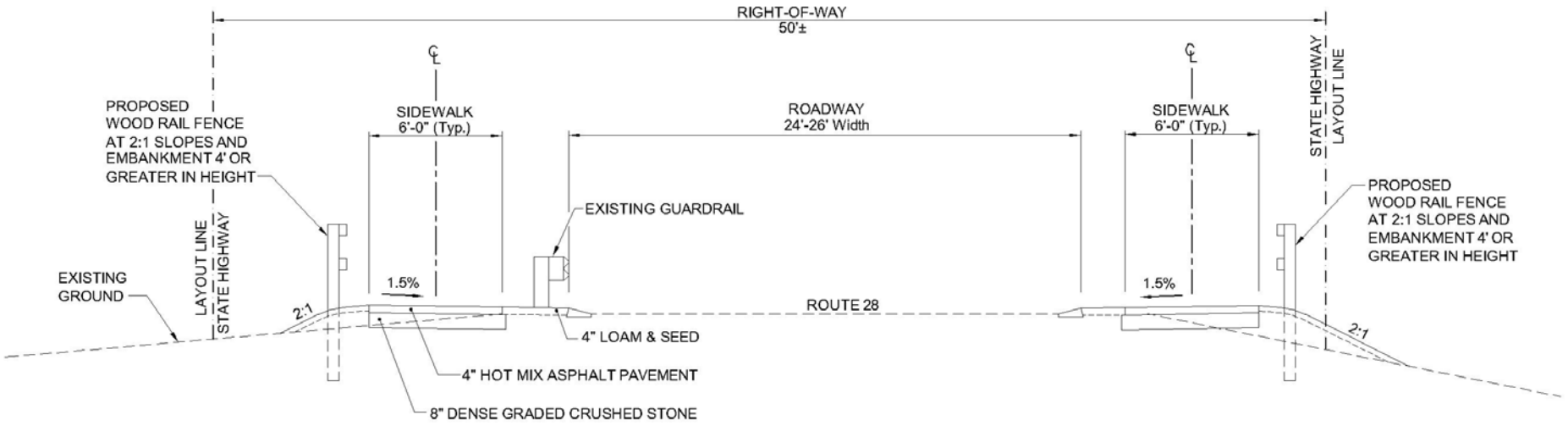


Proposed Sidewalk Cross Section

Figure 44: Alternative 1A – Typical Section

Existing Condition – West Side

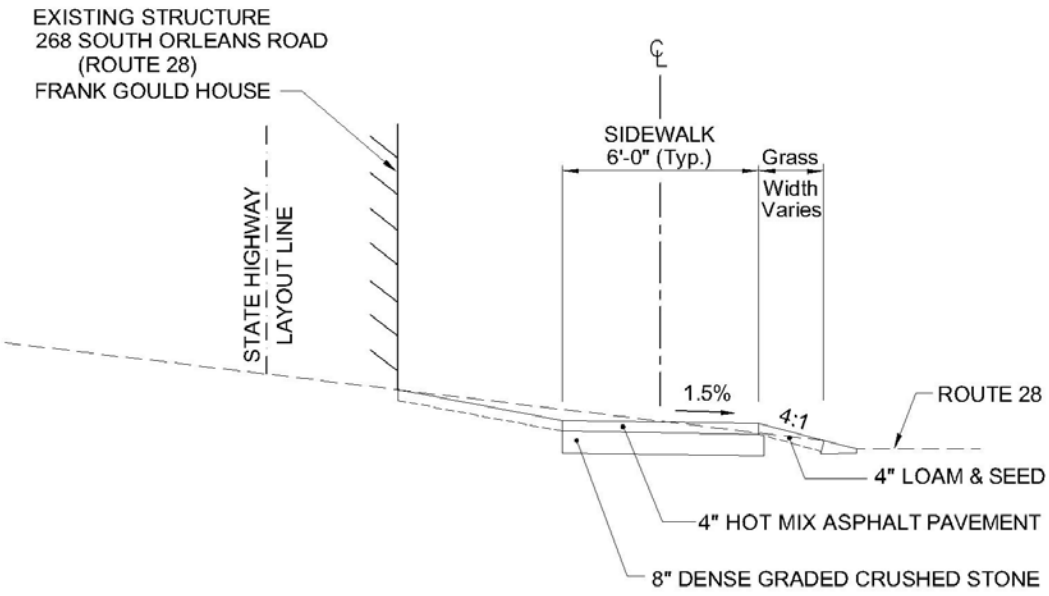
Existing Condition – East Side



Proposed Sidewalk Cross Section

Figure 45: Alternative 1A – Typical Section

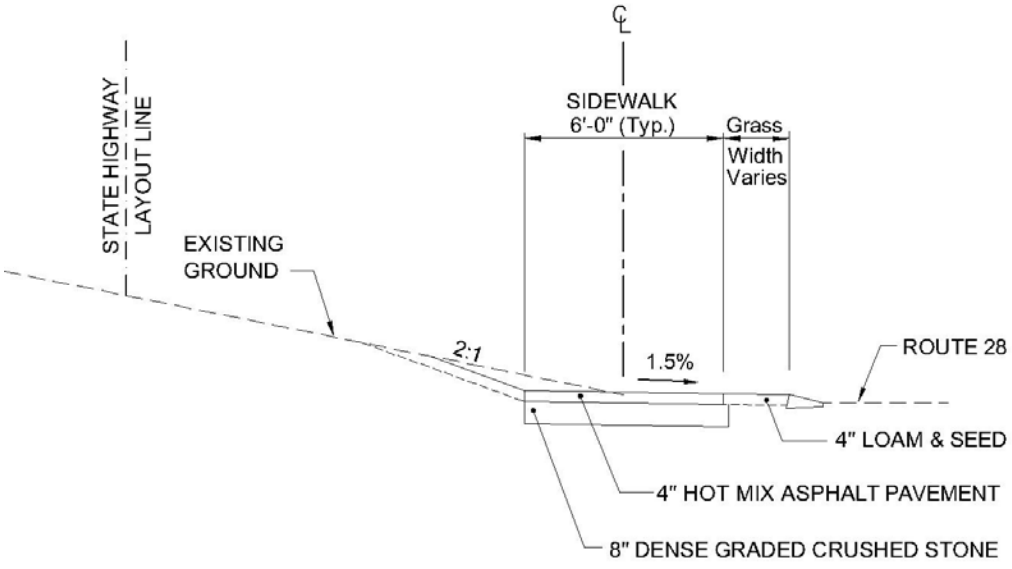
Existing Condition



Proposed Sidewalk Cross Section

Figure 46: Alternative 1A – Sidewalk Typical Section

Existing Condition



Proposed Sidewalk Cross Section

Figure 47: Alternative 1A – Sidewalk Typical Section

Bicycle Lane

Route 28 would need to be widened to accommodate 4 to 5 foot bicycle lanes. The existing paved roadway width varies from 24 to 26 feet. This width is substandard based on the roadway classification. The lane width should be 11 to 12 feet wide with 4-foot minimum shoulders. Based on conversations with MassHighway District 5, the agency indicated that the roadway would need to be upgraded to current design standards before any other roadside bicycle/pedestrian facilities could be constructed.

As part of this effort, a Road Safety Audit (RSA) would need to be conducted to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. Under current conditions, the curvilinear alignment of the roadway matched with the rolling terrain creates sight distance concerns for both bicyclists and motorists. In addition, speeds are relatively high along this stretch of roadway. These factors would need to be taken into account as part of the RSA. The RSA may result in additional improvement recommendations including for example, geometric improvements to the roadway alignment or intersecting roadways, roadside grading or vegetative clearing for sight distance, upgrades/installation of traffic control systems, etc.

Widening Route 28 to accommodate bicycle lanes would require:

- Grading and tree clearing for construction
- Temporary and permanent easements for construction
- Utility pole relocation along the majority of the corridor
- Reconstruction and upgrades to the existing roadway drainage system
- Installation of new signs and pavement markings
- Potential environmental impacts

The construction of bicycle lanes along this section of Route 28 would only be suitable for use by bicyclists that are experienced in sharing roadways with motor vehicle traffic. Therefore, although an on-road facility would result in fewer right of way impacts than a separated roadside facility, it would not serve a variety of user types or users of differing skill levels or ages.

Bicycle Route

It is not recommended that Route 28 be designated as a bicycle route. The curvilinear alignment of the roadway matched with the rolling terrain creates sight distance concerns for both bicyclists and motorists. Similar to bicycle lanes, a bike route is would only be suitable for use by bicyclists that are experienced in sharing roadways with motor vehicle traffic.

Designating Route 28 as a bicycle route would require the installation of new signs.

5.1.2 Alternative 1B: Eastern Watershed Trail

Alternative 1B is an alignment along the eastern perimeter of the watershed property, parallel to the Route 28 corridor.

Figure 48: Southern Watershed Service Road Connects to Route 28 Across from Namequoit Road

Routing a trail though the watershed property will require review and approval by the Town of Orleans Board of Water Commissioners and Board of Selectmen. The Board of Water Commissioners are responsible for setting policy to ensure high quality potable water for the Town and the Board of Selectman, in consultation with the Commissioners, are responsible for granting rights-of-way or easements.

From Route 28, this alternative enters the watershed property through the southern service road and heads north along the eastern perimeter of the watershed. This alternative requires blazing a new trail through the wooded watershed property. The trail would follow the natural topography to the extent feasible and retain a wooded buffer adjacent to the abutting residential properties.

Figure 49: Watershed Service Road Connects to Route 28 Near Lisa's Way

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

Shared Use Trail

An 8 to 10 foot shared use trail could be constructed along the eastern perimeter of the watershed property, abutting residential and undeveloped properties.

Constructing a shared use trail along the eastern watershed perimeter would require:

- Substantial cuts and fills to accommodate the proposed cross section and be ADA compliant
- Significant tree clearing to provide the required minimum offset to obstructions
- A proposed connection to Route 28 near Monument Road
- Installation of directional signage

Figure 50: Power Line Easement Connects to Route 28 Across from Carmen Lane

Greenway Trail

A greenway trail could also be constructed along the eastern perimeter of the watershed property. The width, grades and surface material of the proposed trail should be selected based on the anticipated uses and desired level of accessibility. It is anticipated that significant land and vegetative disturbance would be required to create an ADA compatible trail in this location.

Constructing a greenway trail along the eastern watershed perimeter would require:

- Re-grading and tree clearing
- A proposed connection to Route 28 near Monument Road
- Installation of directional signage

5.1.3 Alternative 1C: Route 6 Trail

Alternative 1C is an alignment along the eastern perimeter of the Route 6 right of way, adjacent to the watershed property. Route 6 runs in a north-south direction parallel to Route 28. The entire Route 6 right of way is approximately 200 feet wide and the distance from the roadway centerline to the eastern edge of the right of way is approximately 125 feet.

Figure 51: Eli Rodger's Road

Route 6 is under the jurisdiction of MassHighway and therefore the design and/or construction of any trail within the state highway right of way (layout) would be subject to MassHighway review and approval.

Trail facilities have been built within and parallel to state highway layouts in other locales. For example, the Androscoggin River Bike Path in Brunswick, Maine follows Route 1 along its 2.6-mile length. A portion of the Blackstone River Bikeway in Millbury, Massachusetts runs adjacent to Route 146. A 2,000 linear foot section of the Quinebaug River Trail was built within the Route 6 right in Danielson, Connecticut. Through proper design, these trails utilize the unused portions of these highway layouts without drawing users attention to the adjacent roadway.

Figure 52: Existing Trail from Eli Rodgers Road to Watershed Service Road

In order to reach the Route 6 layout, the trail would need to pass through the southern and northern borders of the watershed property. As previously discussed, routing a trail though the watershed property will require review and approval by the Town of Orleans Board of Water Commissioners and Board of Selectmen.

From Route 28, this alternative would begin either from Eli Rodgers Road or the southern watershed service road to connect to the Route 6 layout.

If the Eli Rodgers Road option were pursued, the proposed facility would:

- Begin as a bike route along Eli Rodgers Road for approximately 400 linear feet
- Enter the watershed property and follow an existing hiking trail for a distance of 1,500 linear feet
- Continue as a bike route along watershed service roads towards Well 6 for approximately 2,450 linear feet
- Cut west along an existing hiking trail just outside of the Well 6 buffer
- Cross the power lines to connect to the Route 6 layout

If the southern watershed service road option were pursued, the proposed facility would:

- Continue as a bike route along watershed service roads towards Well 6
- Cut west along an existing hiking trail just outside of the Well 6 buffer
- Cross the power lines to connect to the Route 6 right of way

Once within the Route 6 layout, the trail would travel approximately 5,100 linear feet north to the end of the watershed property. At this point, this alternative would either climb a steep hill to meet Lots Hollow Road or connect to Giddiah Hill Road via Alternative 1G.

Figure 53: Watershed Service Road Towards Well 6

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

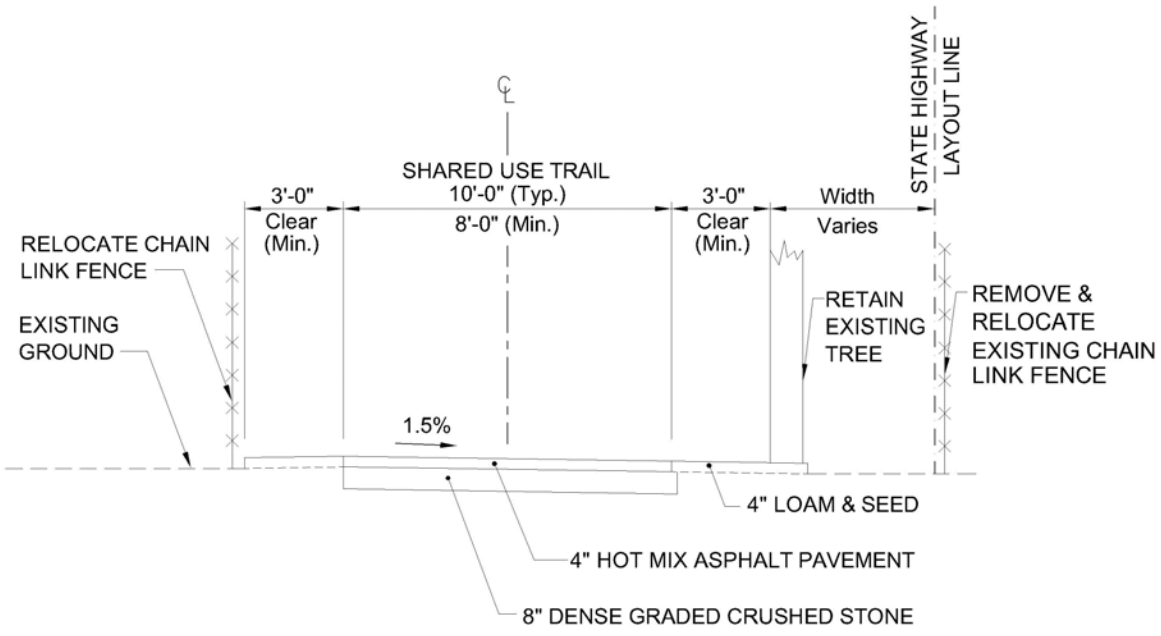
Shared Use Trail
An 8 to 10 foot shared use trail could be constructed within the Route 6 layout.

Constructing a shared use trail within the Route 6 layout would require:

- Blazing a new trail through a heavily wooded area with varying terrain
- Substantial amount of tree clearing and land disturbance activities in order for such a trail to be ADA compliant and meet other design criteria
- Installation of directional signage

The typical section shown on the following page illustrates the proposed design treatment for shared use trail construction within the Route 6 layout.

Existing Condtion



Proposed Trail Cross Section

Figure 54: Alternative 1C – Trail Typical Section

Greenway Trail

A greenway trail could also be constructed within the Route 6 layout. The width, grades and surface material of the proposed trail should be selected based on the anticipated uses and desired level of accessibility. It is anticipated that significant land and vegetative disturbance would be required to create an ADA compatible trail in this location.

Constructing a greenway trail along the eastern watershed perimeter would require:

- Grading and tree clearing
- A smaller footprint and therefore less impacts
- Installation of directional signage

There is an existing chain link fence separating the Route 6 right of way from the watershed property. It is recommended that this chain link fence be relocated closer to the highway to block trail users from trespassing closer to Route 6. Lining each side of the trail corridor with a chain link fence would create an inferior space. Therefore, it is recommended that a dense vegetative buffer be maintained from the edge of the watershed property to the trail shoulder. This vegetative buffer would help block unauthorized all terrain vehicle (ATV) access from the trail surface.

5.1.4 Alternative 1D: Power Line Trail

Alternative 1D is an alignment along the existing overhead utility corridor (power lines) on the western edge of the watershed property. This corridor is used for overhead utility transmission by NStar. This alternative was investigated as a potential route by the Bike and Walkways Committee as part of their 2007 study.

Figure 55: Cleared Power Line Corridor

Alternative 1D would follow the same alignment as Alternative 1C except rather than connecting to the Route 6 right of way, this alternative would instead connect to and travel within the existing power line corridor. At the end of the watershed property, this alternative would either descend down a steep hill to meet Giddiah Hill Road or connect to Lots Hollow Road via Alternative 1G.

As previously discussed, routing a trail though the watershed property will require review and approval by the Town of Orleans Board of Water Commissioners and Board of Selectmen. This alterative would also require coordination with NStar to ensure that the proposed trail will not interfere with the safe operation, maintenance and future use of the utility infrastructure. Or compromise the safety of the public and their workers.

The existing power lines follow the natural rolling terrain of the watershed property. This rolling terrain has also attracted illegal use by all terrain vehicles (ATV), which have carved paths around the utility poles along the length of the corridor. This use matched with routine maintenance by NStar has resulted in a sparsely vegetated corridor when compared to other alternatives.

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

Shared Use Trail

An 8 to 10 foot shared use trail could be constructed along the power line corridor. It is recommended that the proposed trail be constructed proximate to the wooded Route 6 layout line rather than follow the existing trail and/or access road. This location will allow for the installation of fencing to keep ATVs off of the proposed trail and preserve the long-term structural stability of the trail surface. The other part of this effort would include enforcement to keep ATVs out of the watershed property in its entirety.

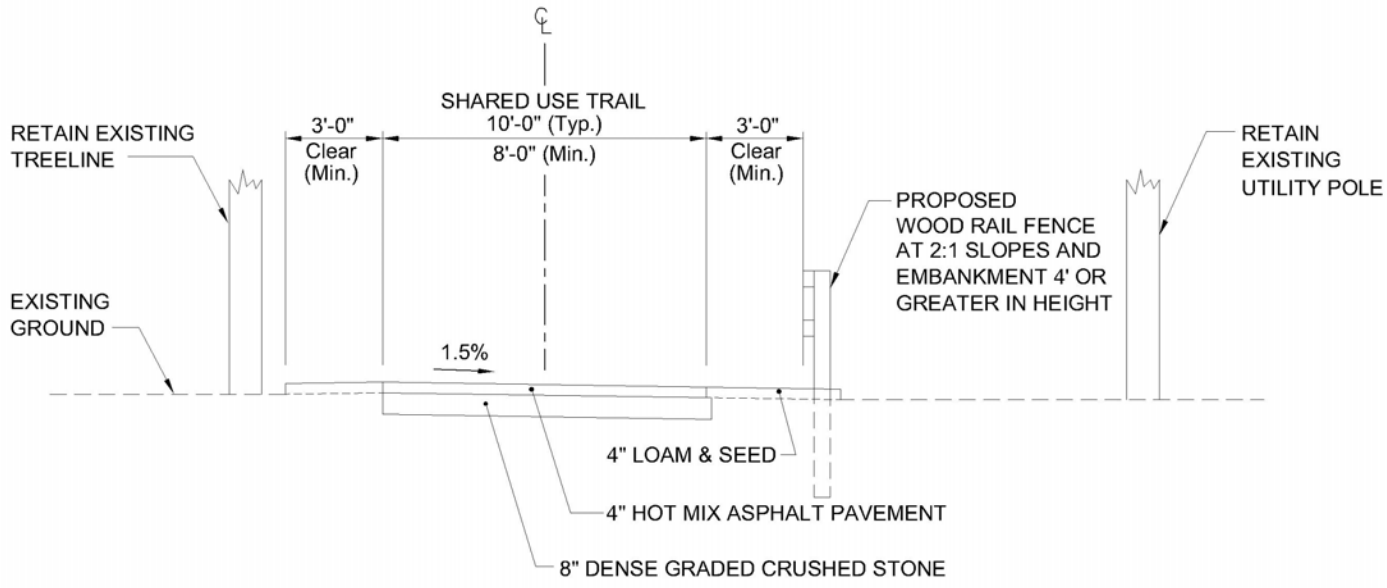
Figure 56: Steep Grades Along Power Line Corridor

Constructing a shared use trail along the power lines would require:

- Significant cuts and fills to accommodate the proposed cross section and be ADA compliant
- Consideration of the structural stability of the existing poles
- Installation of fencing and or to keep ATVs off the trail

The typical section shown on the following page illustrates the proposed design treatment for shared use trail construction within the power line corridor.

Existing Condition



Proposed Trail Cross Section

Figure 57: Alternative 1D – Trail Typical Section

Greenway Trail
A greenway trail could be formalized along the existing trail and/or access road that runs the entire length of the power line corridor. It is anticipated that significant land disturbance would be required to create an ADA compatible trail in this location.

Formalizing a greenway trail along the power lines would require:

- Limited vegetative disturbance
- Grading in select locations
- Provisions for existing corridor uses (NStar and ATV)

5.1.5 Alternative 1E: Windmill Trail

Alternative 1E is an alignment along what is referred to as the "Windmill Trail" through the watershed property. This alternative traverses the section of the watershed where the Town is proposing to install two wind turbines to provide electric power in support of watershed activities.

This alternative enters the watershed property through the southern service road. The trail alignment then heads north following:

- Existing unimproved fire road past the proposed wind turbine site
- Paved service road past Wells 1, 2 and 3
- Recently constructed Well 8 service road
- Proposed trail north of Well 8 in order to divert the trail outside of the Zone II wellhead buffer.

As previously discussed, routing a trail though the watershed property will require review and approval by the Town of Orleans Board of Water Commissioners and Board of Selectmen.

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

Shared Use Trail
An 8 to 10 foot shared use trail could be constructed along the windmill trail corridor. The trail segment following the existing paved service road and recently constructed Well 8 access road would require minimal improvements.

On the other hand, constructing a shared use trail along the existing unimproved access road and proposed trail segment north of Well 8 would require:

- Substantial grading to make the trail ADA compliant
- Tree clearing to accommodate the proposed cross section
- Installation of directional signage

This effort could be combined with future access improvements for the wind turbine project.

Greenway Trail
A greenway trail could be formalized along the existing windmill trail and would require:

- Limited vegetative disturbance
- Grading in select locations
- Installation of directional signage

Figure 58: Southern Watershed Service Road

Figure 59: Unimproved Fire Road to Proposed Wind Turbine Site

Figure 60: Unimproved Fire Road from Proposed Wind Turbine Site

Figure 61: Paved Watershed Service Road Looking Towards Well 1

Figure 62: Recently Constructed Service Road Looking Towards Well 8

Figure 63: Greenway Trail to Northern Fire Road

5.1.6 Alternative 1F: Pond Trail

Alternative 1F is an alignment along the northeast quadrant of the watershed property, near a number of existing ponds. The Bike and Walkways Committee, as part of their 2007 study, investigated this alternative as a potential route.

This alternative enters the watershed property from the northern access road accessible from Route 28 across from Carmen Lane. The trail alignment then heads north along an existing hiking trail around the perimeter of Gould Pond and a smaller unnamed pond before heading north to join the northern fire access road. As shown in Appendix D (Figure D-6), this trail is located in a sensitive environmental area characterized by:

- 100-foot wetland resource buffers of Gould Pond and the small unnamed pond
- Priority endangered species habitat polygon (PH1234) and estimated habitat polygon (EH 685)
- Pleasant Bay Area of Critical Environmental Concern (ACEC)

As previously discussed, routing a trail though the watershed property will require review and approval by the Town of Orleans Board of Water Commissioners and Board of Selectmen.

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

Shared Use Trail
An 8 to 10 foot shared use trail could be constructed along the existing pond trail.

Constructing a shared use trail along the pond trail would require:

- Significant grading to accommodate the proposed cross section and be ADA compliant
- Installation of directional signage

Greenway Trail
A greenway trail could be formalized along the existing pond trail. It is anticipated that significant land disturbance would be required to create an ADA compatible trail in this location.

Formalizing a greenway trail along the pond trail would require:

- Limited vegetative disturbance
- Grading in select locations
- Installation of directional signage

5.1.7 Alternative 1G: Northern Fire Road Trail

Alternative 1G is a trail alignment along the fire access road that runs along the northern section of the watershed property.

This alternative enters the watershed property using the existing northern fire road accessible from Route 28 across from Old Timers Lane. This access point is also used as a private driveway and is blocked with a chain link fence at the entrance to the watershed property. Other access points are located at the end of Giddiah Hill Road and O'Connor Way.

Figure 64: Northern Fire Access Road Access Point from Route 28

The existing fire access road is currently wide enough for truck access and has a rolling grade along the majority of its length.

As shown in the Appendix D (Figure D-7), this trail is located in a sensitive environmental area characterized by priority habitat of endangered species polygon (PH 729) and estimated habitat polygon (EH 665) associated with the New England Bluet Damselfly, a species of special concern. Based on the species data sheets, although the majority of their life cycle is spent in wetland habitats the New England Bluet Damselfly also relies upon natural upland habitat to mature for week or two. Therefore, it can be anticipated that the MA NHESP may impose time of year restrictions for work in this area.

Figure 65: Northern Fire Access Road Between Route 28 and Giddiah Hill Road

ATV access is also a concern in this area. Currently, ATVs illegally access this fire road from the Giddiah Hill entrance. Near the base of this hill, there is a large sand pit that is showing signs of increased ATV use. Design controls such as fencing will need to be implemented at key access points to keep ATVs off of the proposed shared use trail in order to preserve the long-term structural stability of the selected trail surface. Such controls will still need to accommodate use by watershed maintenance vehicles.

Figure 66: Northern Fire Access Road Access Point from Route 28

Based on the Town's GIS mapping and a field investigation, the suitability of two facility types were considered along this alternative.

Shared Use Trail
An 8 to 10 foot shared use trail could be constructed along the existing fire access road.

Constructing a shared use trail along the fire road would require:

- Limited vegetative clearing to provide minimum horizontal and vertical clearances
- Substantial grading of the steep slopes leading to/from Giddiah Hill Road and O'Connor Way to meet ADA guidelines
- Installation of directional signage

Greenway Trail
A greenway trail could be formalized along the fire access road. It is anticipated that significant land disturbance would be required to create an ADA compatible trail in this location.

Formalizing a greenway trail along the fire road would require the installation of directional signage.

Figure 67: Northern Fire Access Road Steep Trail From Giddiah Hill Road

Figure 68: Northern Fire Access Road Between Giddiah Hill Road and O'Connor Way

5.2 Section 2: Watershed Limits to Eldredge Park Way

The following text describes the design issues associated with the creation of a designated bicycle and pedestrian facility within Section 2. Section 2 begins at the northern limit of the watershed and heads north towards Eldredge Park Way along Route 28 or local roadways.

The alternatives that begin along O'Connor Way could potentially allow trail user parking at the Town owned parking area adjacent to the Charles Moore Arena.

Alignment alternatives considered in Section 2 are listed in Table 6 and graphically shown on Figure 69 on the following page.

Table 6: Section 2 Alignment Alternatives

Alternative	General Description	Appendix Figure	Map Color
2A	Route 28 Corridor	D-8	Red
2B	Giddiah Hill Road to Marston's Way	D-9	Maroon
2C	O'Connor Way to Lots Hollow Road	D-10	Magenta
2D	O'Connor Way to Nickerson Road	D-11	Yellow
2E	O'Connor Way to Marston's Way	D-12	Green

A graphic showing each individual alternative alignment is included in Appendix D.

Data Source: The *Office of Geographic and Environmental Information (MassGIS) Commonwealth of Massachusetts Executive Office of Environmental Affairs*, and *Town of Orleans.*

0 250 500 1,000 Feet

Legend

- Alignment Alternative 2A
- Alignment Alternative 2B
- Alignment Alternative 2C
- Alignment Alternative 2D
- Alignment Alternative 2E

SOUTH ORLEANS TO ORLEANS TRAIL STUDY

Orleans, Massachusetts

Figure 69: Section 2 Alignment Alternatives

5.2.1 Alternative 2A: Route 28 Corridor

Alternative 2A is an alignment along the western side of Route 28 from the end of the watershed property, near Crystal Lake, north to the intersection with Eldredge Park Way. The posted speed along this section is 40 to 45 MPH.

Route 28 is under the jurisdiction of MassHighway and therefore the design and/or construction of any new bicycle or pedestrian facility within the state highway right of way (layout) would be subject to MassHighway review and approval.

Based on the Town's GIS layers, the state highway layout is approximately:
80 feet wide from Old Timers Lane to just south of Finlay Road (near Crystal Lake)
60 feet wide and varying widths from just south of Finlay Road (near Crystal Lake) to Eldredge Park Way

Route 28 is not centered within the state highway layout. Therefore, the construction impacts upon abutting residential and Town properties will vary along the corridor based on the location of the proposed facility and the layout width.

Based on the Town's GIS mapping and a field investigation, the suitability of various facility types were considered along the Route 28 corridor.

Figure 70: Western Side of Route 28 North of Old Timers Lane

Figure 71: Western Side of Route 28 South of Finlay Road

Figure 72: Western Side of Route 28 North of Finlay Road

Shared Use Trail or Sidewalk

Based on conversations with MassHighway District 5, the agency was concerned that the construction of a shared use trail or sidewalk adjacent to Route 28 would preclude future roadway improvements along this section of corridor. Also, the agency does not typically build shared use trails or sidewalks within its layouts unless the facilities are part of a larger roadway improvement project. As the existing roadway width is substandard, MassHighway indicated that the roadway would need to be upgraded before any other amenities could be constructed.

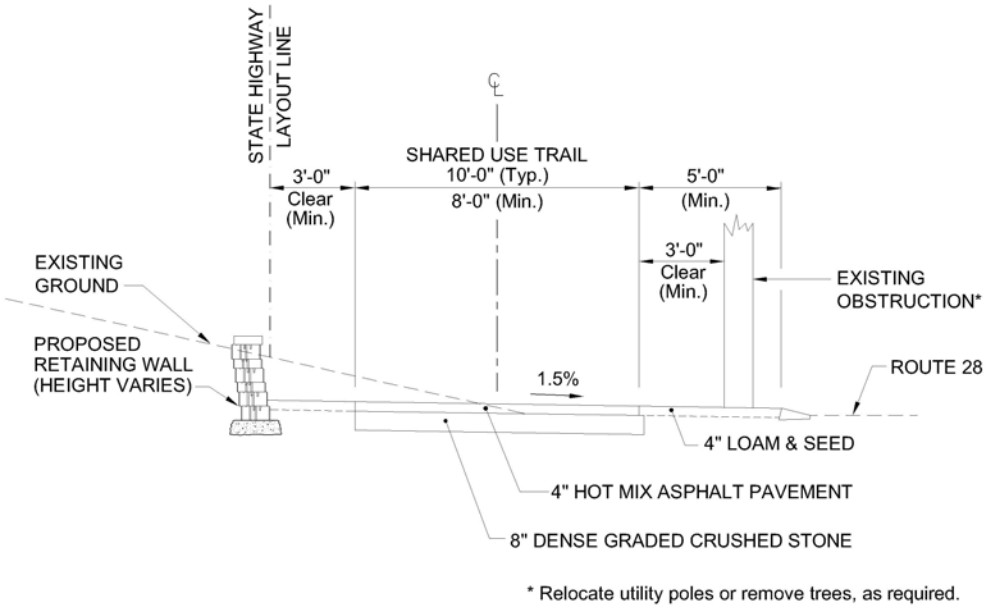
Similar to Alternative 1A, either facility types could be accommodated along the western side of the Route 28 corridor with varying levels of construction impacts including:

- Grading and tree clearing to accommodate the proposed cross section
- Temporary and permanent easements for construction
- Utility pole relocation

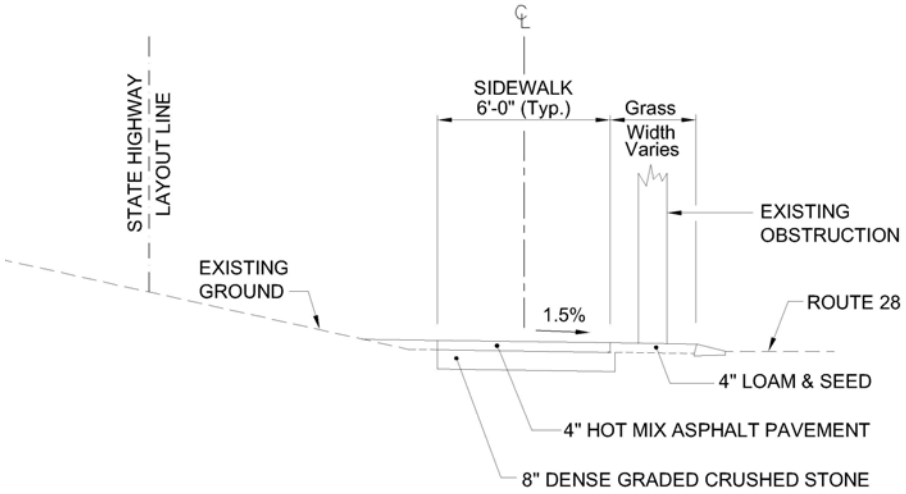
The typical sections shown on the following pages illustrate the roadside impacts and design details (i.e. grading, retaining walls, fencing) required to construct a shared use trail or sidewalk on the west side of Route 28 along the corridor. The approximate location of each section is shown on Figure D-8 in Appendix D.

Figure 73: Western Side of Route 28
Police Station Frontage at Eldredge Park Way

Existing Condition



Proposed Trail Cross Section

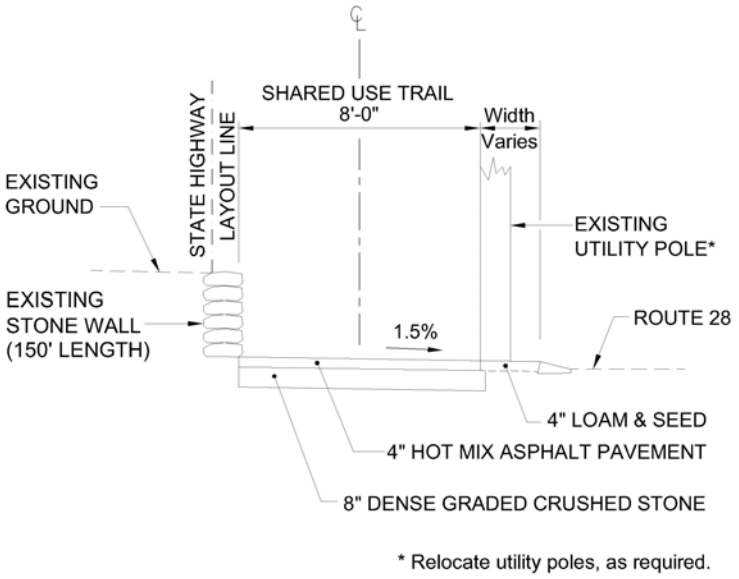


Proposed Sidewalk Cross Section

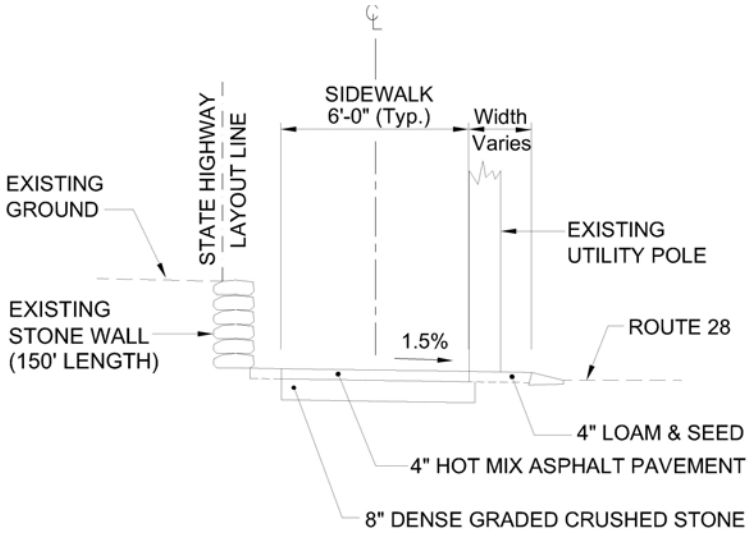
Figure 74: Alternative 2A – Typical Section

❖ **Alignment Alternatives**

Existing Condition



Proposed Trail Cross Section

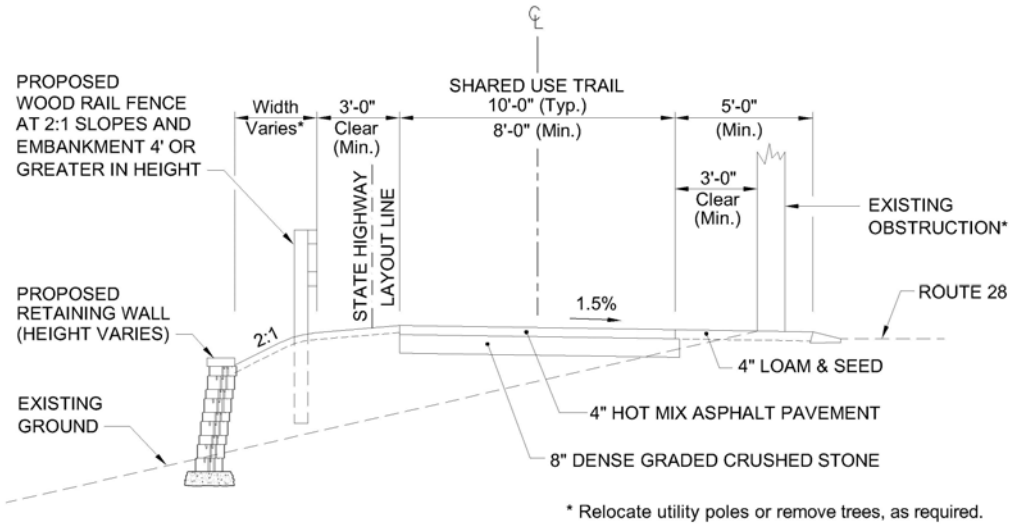


Proposed Sidewalk Cross Section

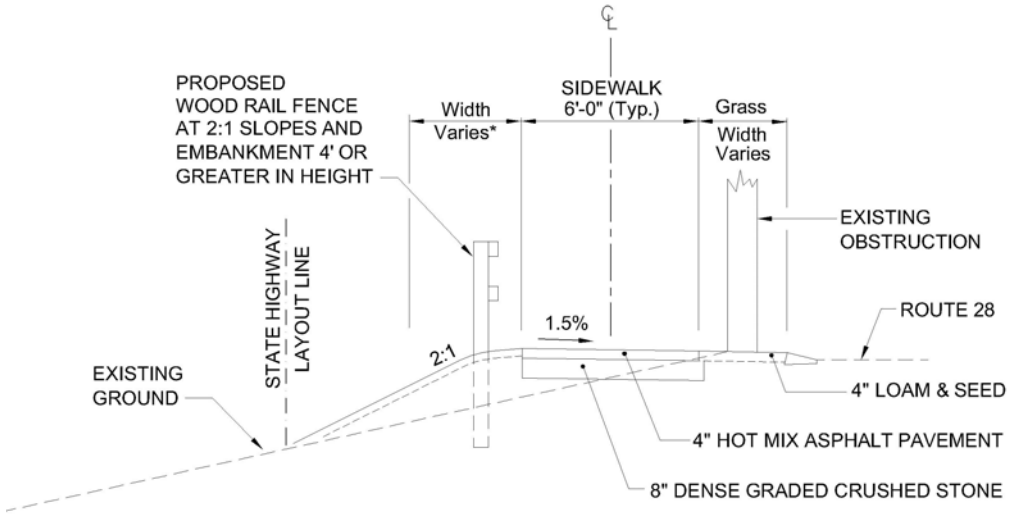
Figure 75: Alternative 2A – Typical Section

❖ **Alignment Alternatives**

Existing Condition



Proposed Trail Cross Section



Proposed Sidewalk Cross Section

Figure 76: Alternative 2A – Typical Section

Bicycle Lane

Route 28 would need to be widened to accommodate 4 to 5 foot bicycle lanes. The existing paved roadway width varies from 24 to 26 feet. This width is substandard based on the roadway classification. The lane width should be 11 to 12 feet wide with 4-foot minimum shoulders. Based on conversations with MassHighway District 5, the agency indicated that the roadway would need to be upgraded to current design standards before any other roadside bicycle/pedestrian facilities could be constructed. A Road Safety Audit (RSA) would need to be conducted as part of this effort to identify potential safety issues and possible opportunities for safety improvements considering all roadway users.

Widening Route 28 to accommodate bicycle lanes would require:

- Grading and tree clearing for construction
- Temporary and permanent easements for construction
- Utility pole relocation along the majority of the corridor
- Reconstruction and upgrades to the existing roadway drainage system
- Installation of new signs and pavement markings

5.2.2 Alternative 2B: Giddiah Hill Road to Marston's Way

Alternative 2B would begin at the Giddiah Hill Road connection to the watershed and continue north along Kettle Pond Way, Daley's Terrace and Marston's Way to reach Eldredge Park Way, a total distance of approximately 4,000 linear feet.

Bike Route

From the watershed high point overlooking the Giddiah Hill Road / Rayber Road industrial area, the trail would transition to a bike route along Giddiah Hill Road. Giddiah Hill Road descends down a steep 10% grade before leveling out near the Rayber Road intersection. Giddiah Hill Road is approximately 24 feet wide along its 2,000 linear foot length, with no pavement markings.

Figure 77: Giddiah Hill Road Looking North

Giddiah Hill Road intersects Finlay Road and just 100 feet east, Finlay Road intersects Kettle Pond Way. Bike route users would need to navigate through the two very closely spaced intersections in order to cross Finlay Road and continue along Kettle Pond Way. Kettle Pond Way is approximately 20 feet wide, within the 40-foot right of way, with no pavement markings. Users would travel up the 8% hill along Kettle Pond Way and turn north (left) to continue along Daley's Terrace and another left along Marston's Way, which intersects Eldredge Park Way across from the tennis courts. Both Daley's Terrace and Marstons Way are low speed, low volume local roadways which range from 20 to 24 feet in width, with no pavement markings. The total on-road distance from the end of Giddiah Hill Road to Eldredge Park Way is approximately 2,000 linear feet.

Figure 78: Giddiah Hill Road at Finlay Road Looking East Towards Kettle Pond Way

Figure 79: Kettle Pond Way Looking North

Sidewalk

Thought was also given to providing a pedestrian connection along this alternative. Based on the heavy truck use, truck turning paths, and spacing of driveways, it would be difficult to construct a sidewalk along Giddiah Hill Road. Once users cross Finlay Road, they are within a residential area characterized by low speed, low volume local roadways. Along this segment, it is recommended that pedestrians walk along the existing roadways rather than causing roadside impacts as a result of sidewalk construction.

Figure 80: Kettle Pond Way
Looking North Towards Daley's Terrace

Figure 81: Marston's Way
Looking North Towards Eldredge Park Way

Figure 82: Marston's Way
At Eldredge Park Way

5.2.3 Alternative 2C: O'Connor Way to Lots Hollow Road

Alternative 2C would begin at the O'Connor Way connection to the watershed and continue north along O'Connor Way and Lots Hollow Road to Eldredge Park Way, a total distance of approximately 2,700 linear feet.

Bike Route
From the watershed high point overlooking the ice rink parking lot, the trail would descend along a proposed gradual grade to bring users down to the elevation of O'Connor Way at which point the trail would transition to a designated on-road bicycle route along O'Connor Way. The bike route would travel past the rink and Toyota dealership to the intersection with Lots Hollow Road, a distance of approximately 1,200 feet. O' Connor Way is 20 feet wide, within the 40-foot right of way, with no existing pavement markings. Along the inside of the roadway curve (south side) across from the Toyota entrance, the existing trees should be trimmed back to improve sight distance for bicyclists and motorists.

The bike route would turn north (left) and continue along Lots Hollow Road to the unsignalized intersection with Eldredge Park Way, a distance of approximately 1,500 feet. Lots Hollow Road is approximately 22 feet wide within the 50-foot right of way, with one lane in each direction, separated by a double yellow centerline. The roadway width widens to accommodate a left and right turn lane at the Eldredge Park Way intersection.

Sidewalk
To facilitate a pedestrian connection through this area, a sidewalk could be constructed along one side of each roadway segment. Along O' Connor Way, it is recommended that a sidewalk be constructed along the north side of the roadway, on the same side as the Toyota dealership. The sidewalk could continue along this side along Lots Hollow Road (west side) to the Finlay Road intersection. At this intersection, it is recommended that a new crosswalk bring pedestrians across Lots Hollow Road and continue north along a new sidewalk on the east side of Lots Hollow Road to Eldredge Park Way.

An alternate alignment of the Lots Hollow Road sidewalk would be to maintain the sidewalk on the west side of the road, to the 'old' or dead-end portion of Lots Hollow Road where it would become an on-road bike route. To connect to Skaket Corners, it is likely that a retaining wall would be required parallel to Eldredge Park Way and adjacent to the Skaket Beach Motel. Previous investigations into this area when Lots Hollow Road was re-aligned and the Skaket Corners intersection was upgraded, indicated that the Eldredge Park Way right-of-way (layout) was limited. Therefore, it is anticipated that a property taking or permanent easement may be required. In addition, it is likely that the existing utilities would have to be relocated to accommodate a sidewalk at this intersection.

Figure 83: Lots Hollow Road Looking North

Figure 84: Old Lots Hollow Road

Figure 85: Old Lots Hollow Road

Figure 86: Eldredge Park Way at Skaket Beach Motel

5.2.4 Alternative 2D: O'Connor Way to Nickerson Road

Alternative 2D would begin at the O'Connor Way connection to the watershed and continue north along O'Connor Way, Lots Hollow Road, Finlay Road and Nickerson Road to reach Eldredge Park Way, a total distance of approximately 4,400 linear feet.

Figure 87: Western Side of Finlay Road Looking East

Bike Route

Similar to Alternative 2C, Alternative 2D would begin at the O'Connor Way connection to the watershed. However, rather than traveling the entire length of Lots Hollow Road, Alternative 2D would turn right (east) and travel along Finlay Road. The Finlay Road intersection is located approximately 400 feet north of the O'Connor Way intersection along Lots Hollow Road. Finlay Road is approximately 23 feet wide, within the 50-foot right of way, with one lane in each direction, separated by a double yellow centerline.

Figure 88: Nickerson Road Looking North

The next segment of this bike route is dependent upon whether the Town wants to retain Nickerson Road as a one-way outlet to Finlay Road. Where a bike route shares the travel lane with motorists, it would be unconventional and potentially dangerous to send bike route users counterflow to one-way street circulation. Therefore, if Nickerson Road is made into a two-way roadway at Finlay Road, then the bike route could direct users along this segment of Nickerson Road. The bike route could turn west (left) at the first turn and bring users up a 6.5% hill and loop around the neighborhood. Otherwise, the bike route could turn at the second left and bring users up a 7% hill. Although either option would bring users along Nickerson Road to connect to Eldredge Park Way, the second option is preferred because the route is less circuituitous.

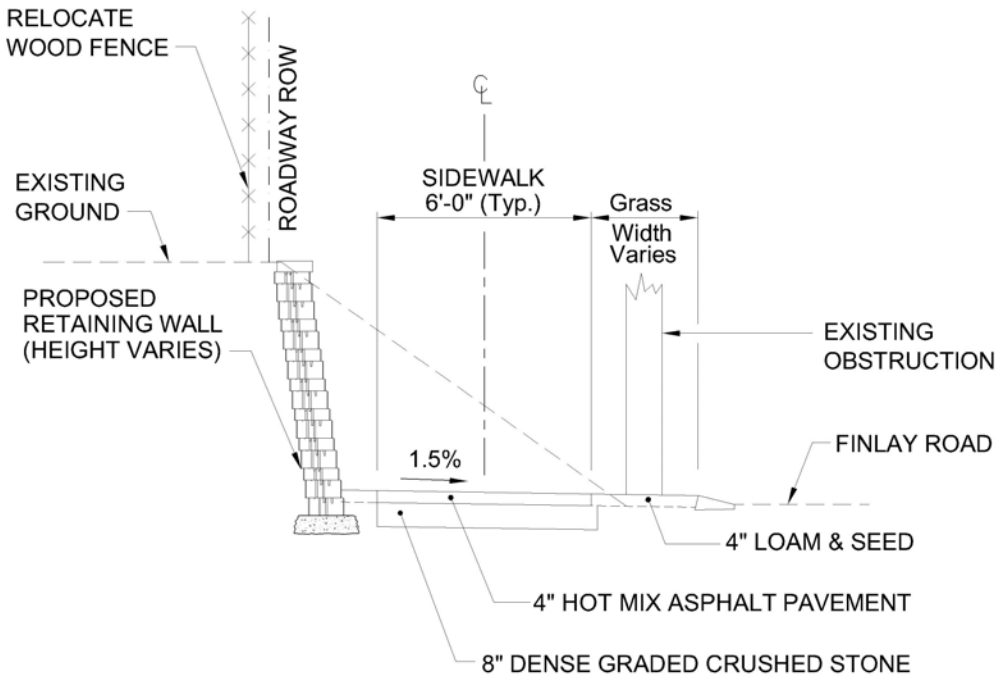
Figure 89: Nickerson Road at Eldredge Park Way Looking North

Sidewalk

To facilitate a pedestrian connection through this area, a sidewalk could be constructed along one side of each roadway segment. Similar to Alternative 2C, it is recommended that a sidewalk be constructed along the north side of O' Connor Road, on the same side as the Toyota dealership. The sidewalk could continue along this side (west) along Lots Hollow Road. A new crosswalk would bring pedestrians across Lots Hollow Road at the Finlay intersection. At this point, the sidewalk would continue along the north side of Finlay Road. The north side of Finlay Road has fewer driveway openings and eliminates the need for a new midblock crossing to bring users into the Nickerson Road neighborhood. The existing 6-foot high earth berm and 6 foot high stockade fence running in alternative section were designed to mitigate the visual and noise impacts of the industrial area upon the nearby residences. Therefore, the sidewalk design would need to minimize impacts to this berm. The sidewalk design would also need to consider the location of existing utility poles to ensure that a minimum 36" path of travel (excluding curb) is provided.

The typical section shown on the following page illustrates the roadside impacts of sidewalk construction proximate to the existing berm and stockade fence. The approximate location of this section is shown on Figure D-11 in Appendix D.

Existing Condition



Proposed Sidewalk Cross Section

Figure 90: Alternative 2D – Sidewalk Typical Section

5.2.5 Alternative 2E: O'Connor Way to Marston's Way

Figure 91: Finlay Road
Looking East From Nickerson Road

Figure 92: Finlay Road
Looking East Towards Giddiah Hill Road

Alternative 2E is the same as Alternative 2D except that in this alternative, Nickerson Road is retained as a one-way outlet to Finlay Road and users instead travel along Kettle Pond Way, Daley's Terrace and Marston's Way to reach Eldredge Parkway, a total distance of approximately 5,000 linear feet.

Bike Route
Under Alternative 2E, the bike route would continue along Finlay Road past Nickerson Road to join alterative Alternative 2B at Kettle Pond Road to Daley's Terrace to Marston's Way.

Sidewalk
As previously discussed, a sidewalk could be constructed along O'Connor Way, Lots Hollow Road and Finlay Road to facilitate a pedestrian connection through this area.

5.3 Section 3: Eldredge Park Way to Orleans Center

The following text describes the design issues associated with the creation of a designated bicycle and pedestrian facility within Section 3. Section 3 begins at Eldredge Park Way and heads north towards Orleans Center.

With the exception of Alternative 3D, the alternatives connect to Snow Library and the Village Green at the intersection of Route 28 and Main Street. This destination point was selected based on its convenient location and the fact that people currently gather in this area. There are existing picnic tables and benches around the Village Green and bike racks located at the library.

Also, during the summer time, when school is not in session, the public restrooms and parking lots at the school could be used by trail users pending approval from the Town.

Alternatives considered in Section 3 are listed in Table 7 and graphically shown on Figure 93 on the following page.

Table 7: Section 3 Alignment Alternatives

Alternative	General Description	Appendix Figure	Map Color
3A	Route 28 Corridor	D-13	Red
3B	Middle School Campus	D-14	Maroon
3C	Elementary to Middle School Campus	D-15	Magenta
3D	Eldredge Park Way to West Road	D-16	Yellow

A graphic showing each individual alternative alignment is included in Appendix D.

Data Source: The *Office of Geographic and Environmental Information (MassGIS) Commonwealth of Massachusetts Executive Office of Environmental Affairs*, and *Town of Orleans.*

0 250 500 1,000 Feet

Legend

- Alignment Alternative 3A
- Alignment Alternative 3B
- Alignment Alternative 3C
- Alignment Alternative 3D

SOUTH ORLEANS TO ORLEANS TRAIL STUDY

Orleans, Massachusetts

Figure 93: Section 3 Alignment Alternatives

5.3.1 Alternative 3A: Route 28 Corridor

Figure 94: Route 28 Adjacent to Eldredge Park Looking North

Alternative 3A begins along the Route 28 corridor at the intersection of Eldredge Park Way and heads north towards Main Street. Route 28 is bounded on its west side by Eldredge Park, and the Nauset Regional Middle School campus and on its east side by residential properties. The posted speed along this section is 40 MPH.

The signal at the intersection of Route 28/Eldredge Parkway does not have any provisions for pedestrians. If the proposed trail were to travel through this intersection, this signal would need to be upgraded to accommodate pedestrian movements, meet current Manual on Uniform Traffic Control Devices (MUTCD) standards, and provide for ADA compliance.

Figure 95: Finlay Road Looking East Towards Giddiah Hill Road

Route 28 is under the jurisdiction of MassHighway and therefore the design and/or construction of any new bicycle or pedestrian facility within the state highway right of way (layout) and/or signal upgrades would be subject to MassHighway review and approval.

Based on the Town's GIS mapping and a field investigation, the suitability of various facility types were considered along the Route 28 corridor.

Shared Use Trail

A shared use trail along this portion of Route 28 would be located along the west side for continuity with Alternative 2A, however, construction of an 8 to 10 foot wide shared use trail adjacent to and parallel to Route 28 in this location would result in significant roadside impacts.

Constructing a trail along the west side of Route 28 would require:

- Approval from MassHighway
- Relocation of the spectator seating, safety netting and chain link fence closer to the baseball field
- Loss of the upper tier seating area
- Construction of a retaining wall to support the proposed trail
- Land takings and temporary and permanent easements for construction
- Utility pole relocation to provide a clear offset to obstructions

Due to the anticipated impacts, construction of a shared use trail in this location is not recommended.

Sidewalk
There is an existing sidewalk along the west side of Route 28 in this section that could continue to accommodate pedestrian use. However, this sidewalk is narrow and likely noncompliant with ADA standards.

Widening the sidewalk along the west side of Route 28 would require:

- Approval from MassHighway
- Relocation of the spectator seating, safety netting and chain link fence closer to the baseball field
- Loss of the upper tier seating area
- Construction of a retaining wall to support the proposed trail
- Land takings and temporary and permanent easements for construction

Bicycle Lane
Route 28 would need to be widened to accommodate 4 to 5 foot bicycle lanes. The existing paved roadway width is approximately 26 feet. This width is substandard based on the roadway classification. The lane width should be 11 to 12 feet wide with 4-foot minimum shoulders. Based on conversations with MassHighway District 5, the agency indicated that the roadway would need to be upgraded to current design standards before any other roadside bicycle/pedestrian facilities could be constructed. A Road Safety Audit (RSA) would need to be conducted as part of this effort to identify potential safety issues and possible opportunities for safety improvements considering all roadway users.

Widening Route 28 to accommodate bicycle lanes would require:

- Approval from MassHighway
- Relocation of the spectator seating, safety netting and chain link fence closer to the baseball field
- Loss of the upper tier seating area
- Construction of a retaining wall to support the roadway
- Land takings and temporary and permanent easements for construction
- Utility pole relocation
- Reconstruction and upgrades to the existing roadway drainage system
- Installation of new signs and pavement markings

5.3.2 Alternative 3B: Middle School Campus

Alternative 3B begins at various points along Eldredge Park Way, depending upon which alternative is followed in Section 2. From the connection point, the alignment travels through the Middle School campus to connect to Main Street and the Village Green.

Alternative 3B utilizes the existing sidewalk along Eldredge Park Way. Although a sidewalk is typically intended for pedestrian use, according to the Committee, Town bylaws allow bicyclists to travel on sidewalks, except in the immediate Village Center. This low cost alternative would connect pedestrians and bicyclists to the new shared use trail segment through the Middle School campus.

From the sidewalk connection, this alternative would travel through the Middle School campus via the following alignment (see Figures 96 to 103).

- Travel in front or behind of the Nauset Public Schools Administration Office
- Continue along the western perimeter of the parking lot adjacent to the track
- Follow the existing dirt path behind the Middle School building
- Travel along the outer perimeter of the upper school parking lot
- Connect to a new ADA accessible path leading down to the Village Green or Main Street towards the rear of the Snow Library

Constructing a 6- foot wide sidewalk segment would require:

- Grading and the removal of selected trees near the administration office
- Loss of a few parking spaces in front of the bus trailer and in the upper school parking lot
- Installation of a two sided guardrail / wood rail fence between the trail and adjacent parking lots
- Grading and vegetative impacts around the upper parking lot perimeter

The typical sections shown on the following pages illustrate the impacts of sidewalk construction at critical locations along this alternative. The approximate location of each section is shown on Figure D-14 in Appendix D.

Figure 96: Middle School Driveway at Eldredge Park Way

Figure 97: Track/Field Access Driveway

Figure 98: Administration Office Parking Lot

Figure 99: Behind Administration Office

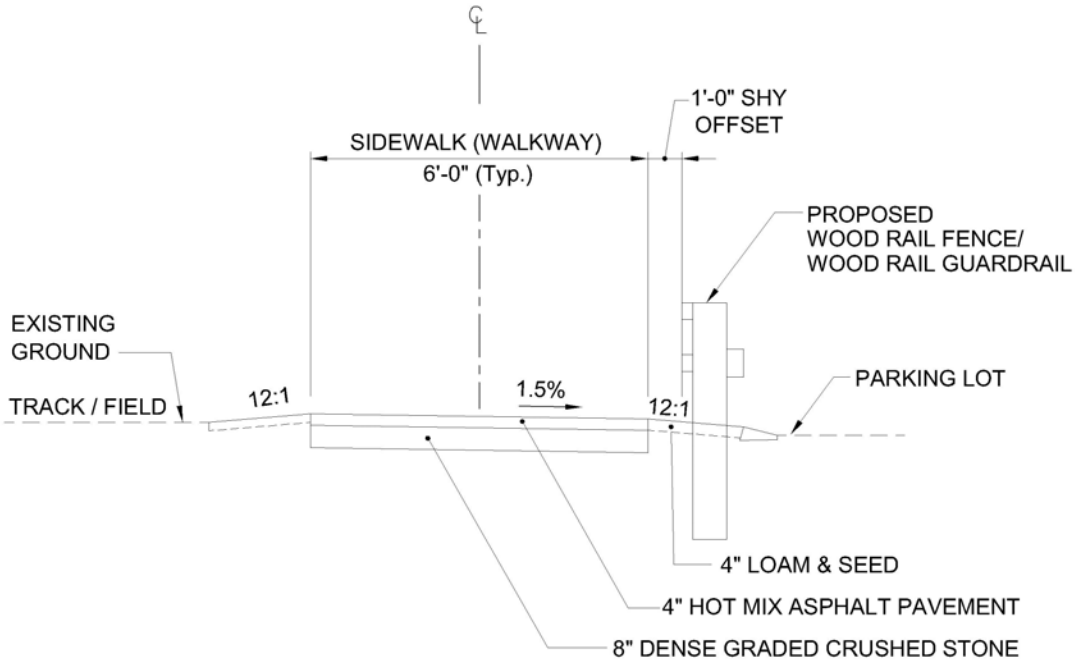
Figure 100: Adjacent to Track/Field Looking North

Figure 101: Existing Trail Behind Middle School Looking North

Figure 102: Upper Middle School Turnaround

Figure 103: Upper Middle School Parking Lot

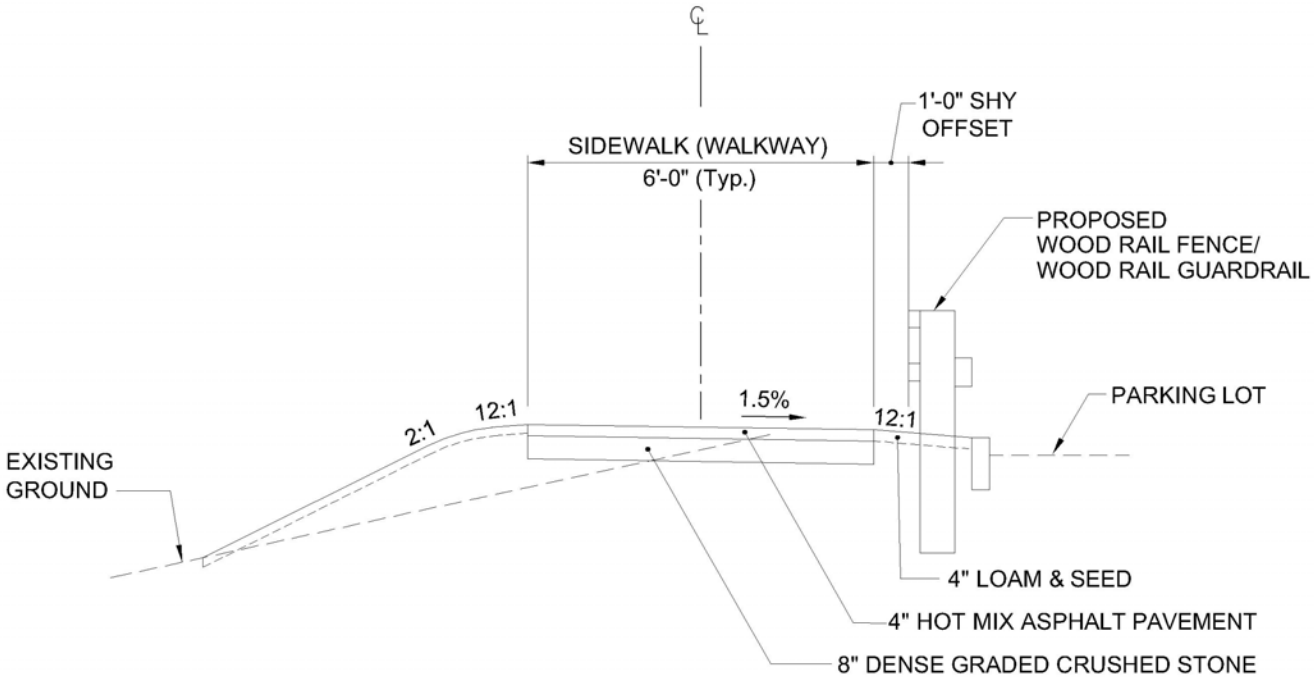
Existing Condition



Proposed Sidewalk (Walkway) Cross Section

Figure 104: Alternative 3B – Sidewalk Typical Section

Existing Condition



Proposed Sidewalk (Walkway) Cross Section

Figure 105: Alternative 3B – Sidewalk Typical Section

**Figure 106: Village Green
Looking North From Upper Middle School
Parking Lot**

**Figure 107: Snow Library
Looking North From Upper Middle School
Parking Lot**

After traveling along the perimeter of the upper parking lot, the sidewalk would require the construction of an ADA accessible connection either:

- Through the Village Green or
- Behind the Snow Library to connect to Main Street.

A sidewalk through the village green could meander and follow the natural topography. Conversely, a trail behind Snow Library would require retaining wall construction due to the steep drop off to the rear parking lot.

Due to cost considerations, it is recommended that a 6 foot wide ADA accessible sidewalk be constructed through the Village Green. This walk could be surfaced with a stabilized soil mix, as previously discussed under Alternative 1B. This design treatment would enable the walkway to complements its natural surroundings.

**Figure 108: Snow Library
Looking North Towards Main Street**

5.3.3 Alternative 3C: Elementary to Middle School Campus

Alternative 3C is the same as Alternative 3B, with the exception that Alternative 3C would bring users through the Elementary School campus to connect to Eldredge Park.

Users would travel by way of a bike route along the school driveway to the furthermost point of the parking area. The bike route would then transition to a shared use trail or sidewalk and travel adjacent to the tennis court access driveway or on the opposite side of the tennis court and follow the existing path through the wooded buffer to connect the middle school track / fields. The facility would then travel north along the perimeter of the fields, between the track and Boland Pond and connect to the dirt path behind the Nauset Regional Middle School building at which point the alignment would rejoin Alternative 3B.

Figure 109: Elementary School Driveway at Eldredge Park Way

Figure 110: Tennis Courts on Elementary School Campus

Figure 111: Existing Trail Between Elementary and Middle School Campuses

Figure 112: Middle School Fields Looking North Towards Track

5.3.4 Alternative 3D: Eldredge Park Way to West Road

Alternative 3D brings users west along Eldredge Park Way and West Road to connect to the Cape Cod Trail. The distance between Route 28 and the Cape Cod Rail Trail along Eldredge Park Way and West Road is approximately 5,500 linear feet.

Pedestrians would follow the existing sidewalk along Eldredge Park Way and bicyclists would travel on-road approximately 950 feet to the Route 6A intersection. The signals at the Route 6A/Eldredge Park Way/West Road intersection were recently upgraded and include provisions for both pedestrians and bicyclists.

After crossing Route 6A at the existing signal, users would continue along West Road to reach the Cape Cod Trail. Pedestrians would use the existing sidewalk along the west side of the road and bicyclists would follow a designated bike route. Between Route 6A and the Cape Cod Trail, West Road abuts a mix of both commercial and residential uses. Based on the Town's GIS layers, the existing paved roadway width is approximately 22 feet, except at the intersection. West Road will be resurfaced from the Skaket Corners Plaza north past the trail intersection.

Figure 113:
Bicycle and Pedestrian Accommodation
Route 6A /Eldredge Park Way/West Road
Intersection

Figure 114: West Road
Near Cape Cod Rail Trail