

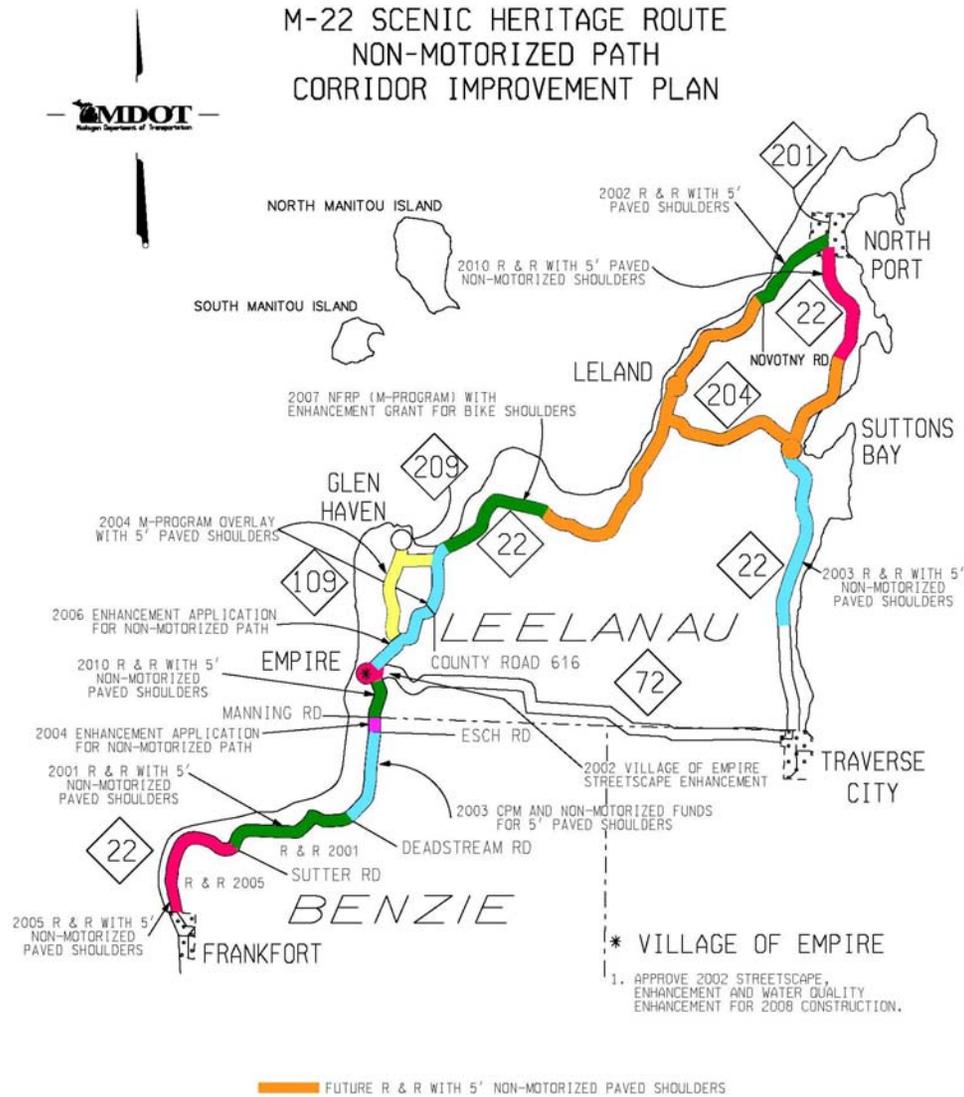


# APPENDIX

Leelanau Scenic Heritage Route Trailway Plan

**MAPS**  
**TRAIL PLANNING AND DESIGN GUIDELINES**  
**PRELIMINARY IMPACT TOPICS**  
**MATRICES**  
**OPTIONS MAPS**

**APPENDIX A**



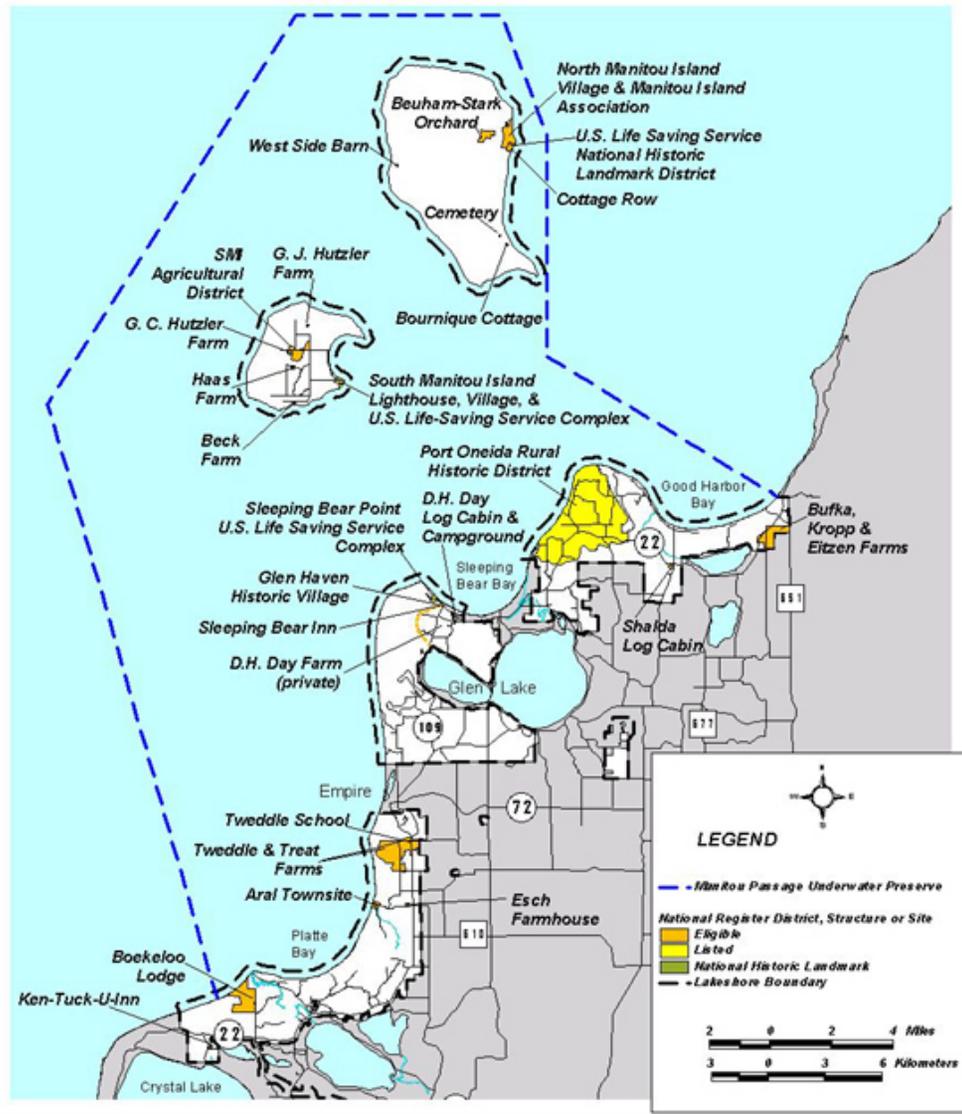
APPENDIX B



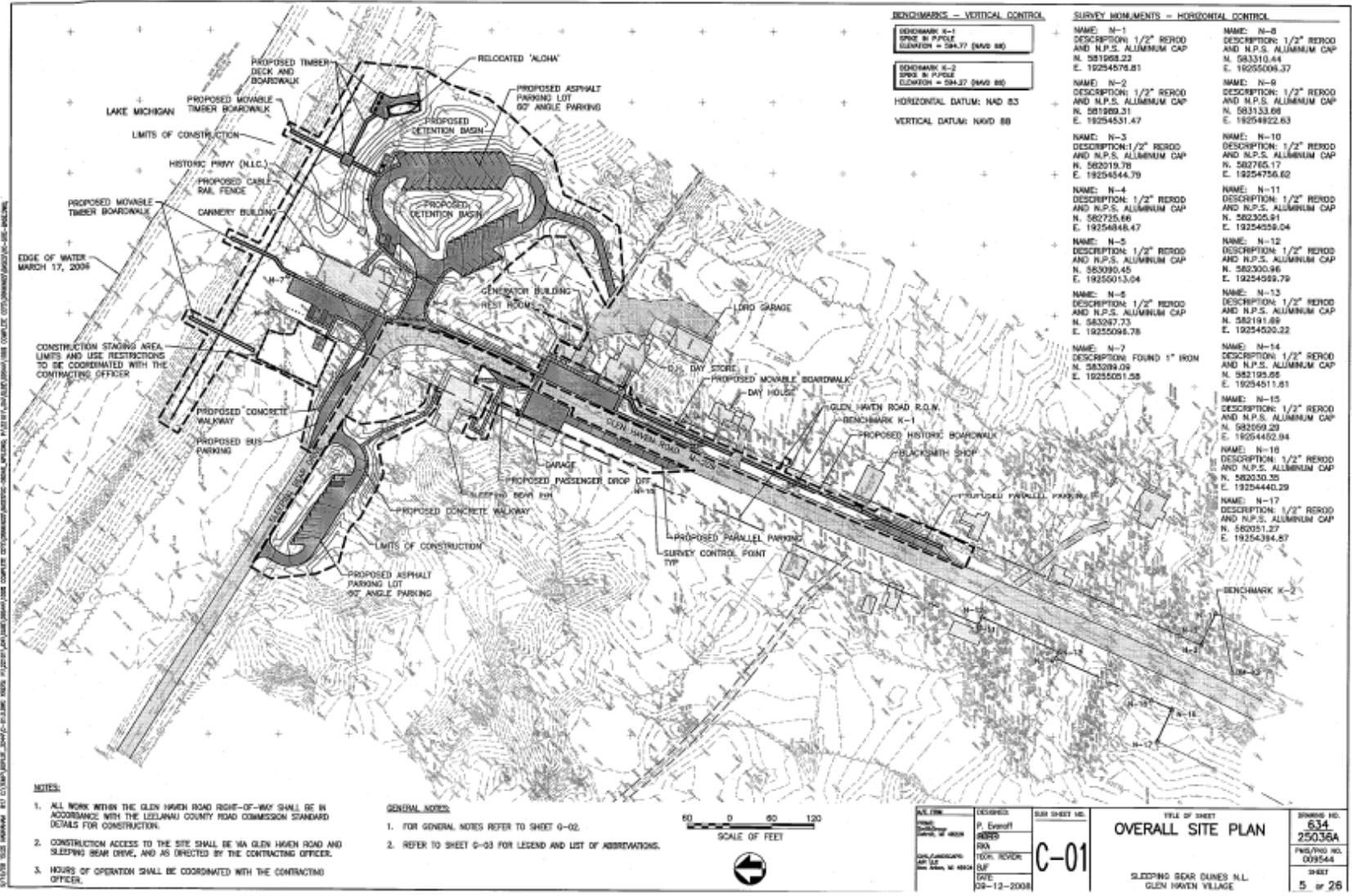
APPENDIX C

# CULTURAL HISTORY

## Sleeping Bear Dunes National Lakeshore



APPENDIX D



**BENCHMARKS - VERTICAL CONTROL**

**BENCHMARK K-1**  
SPOT IN PAVEMENT  
ELEVATION = 294.37 (NAVD 88)

**BENCHMARK K-2**  
SPOT IN PAVEMENT  
ELEVATION = 294.37 (NAVD 88)

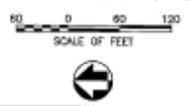
HORIZONTAL DATUM: NAD 83  
VERTICAL DATUM: NAVD 88

**SURVEY MONUMENTS - HORIZONTAL CONTROL**

NAME	DESCRIPTION	NAME	DESCRIPTION
N-1	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 581268.22 E. 19254578.81	N-8	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 583310.44 E. 19255008.37
N-2	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 581589.31 E. 19254531.47	N-9	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 583153.68 E. 19254822.63
N-3	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582319.79 E. 19254544.79	N-10	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582765.17 E. 19254756.02
N-4	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582725.69 E. 19254848.47	N-11	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582325.91 E. 19254558.04
N-5	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 583090.45 E. 19255013.04	N-12	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582320.94 E. 19254588.79
N-6	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 583287.73 E. 19255098.78	N-13	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582191.89 E. 19254520.22
N-7	DESCRIPTION FOUND 1" IRON N. 583289.09 E. 19255051.58	N-14	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 583198.88 E. 19254511.61
		N-15	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582569.29 E. 19254452.94
		N-16	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582030.35 E. 19254440.29
		N-17	1/2" REBAR AND N.P.S. ALUMINUM CAP N. 582051.27 E. 19254384.87

- NOTES:**
1. ALL WORK WITHIN THE GLEN HAVEN ROAD RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH THE LEELENAU COUNTY ROAD COMMISSION STANDARD DETAILS FOR CONSTRUCTION.
  2. CONSTRUCTION ACCESS TO THE SITE SHALL BE VIA GLEN HAVEN ROAD AND SLEEPING BEAR DRIVE, AND AS DIRECTED BY THE CONTRACTING OFFICER.
  3. HOURS OF OPERATION SHALL BE COORDINATED WITH THE CONTRACTING OFFICER.

- GENERAL NOTES:**
1. FOR GENERAL NOTES REFER TO SHEET 0-02.
  2. REFER TO SHEET 0-03 FOR LEGEND AND LIST OF ABBREVIATIONS.



<b>DATE</b> 09-12-2008	<b>DESIGNED</b> P. Everett	<b>SUB SHEET NO.</b> C-01	<b>TITLE OF SHEET</b> OVERALL SITE PLAN	<b>SHEET NO.</b> 634
<b>DATE</b> 09-12-2008	<b>DRAWN</b> P. Everett			<b>PROJECT NO.</b> 009544
<b>DATE</b> 09-12-2008	<b>CHECKED</b> P. Everett			<b>SHEET</b> 5 of 26
<b>DATE</b> 09-12-2008	<b>APPROVED</b> P. Everett			



## APPENDIX E: Trail Planning and Design Guidelines

### Grade (Slope)

*Grade* (slope) is defined as the slope parallel to the direction of travel and is calculated by dividing the vertical change in elevation by the horizontal distance covered. For example, a trail that gains 2 m in elevation over 40 m of horizontal distance has a grade of 5 percent. Some guidelines use the term "slope" to refer to grade. However, the term "grade" will be used in this plan to avoid confusion with cross-slope.

*Average grade* is defined as the average of many contiguous running grades. Running grade is usually measured over the maximum distance afforded by sight lines when grades are continuous. However, more detailed grade information can be obtained if measurement distances do not exceed 100 ft. Running grade is also measured on shorter trail segments between changes on grade.

*Maximum grade* is defined as a limited section of trail that exceeds the typical running grade. Maximum grade values can differ significantly from the running grade values. For example, a trail that gains 50 ft. in elevation gradually over 1 mile has the same running grade as a trail that is flat for 0.75 miles and then climbs 50 ft. over the last 0.25 mile; however, the two trails make very different strength and endurance demands of users.

### Federal Guidelines for Maximum Allowable Running Grade

Source	Path Type	Single Level	Multiple Levels		
			Easier	Moderate	Difficult
		%	%	%	%
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	H		n/a	n/a	n/a
Guide for the Dev. of Bicycle Facilities (AASHTO, 1997, Draft)	S	5			
Guide for the Dev. of Bicycle Facilities (AASHTO, 1991)	B	5			
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	E		n/a	n/a	n/a
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	X		7.5	12	17
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	SM		8	n/a	15
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	ATV		15	25	35

AR = Accessible Route      ORAR = Outdoor Recreation Access Route      RT = Recreational Trail  
H = Hiking Trail      S = Shared-Use Path      B = Bicycle Path  
MB = Mountain Biking Trail      E = Equestrian Trail      X = Cross-Country Ski Trail  
SM = Snow Machine Trail      ATV = All-Terrain Vehicle Trail  
OHV = Off-Highway Vehicle Trail      M = Motorcycle Trail

\* Source: U.S. Department of Transportation – Federal Highway Administration, website: ([www.fhwa.dot.gov](http://www.fhwa.dot.gov))

## **Cross Slope**

For trail design in hilly areas along with gradient, it is also important to consider its cross-slope.

*Cross-slope* is defined as the slope measured perpendicular to the direction of travel. Cross-slope must be measured at specific points. The average cross-slope is the average of cross-slopes measured at regular intervals along the trail.

*Running cross-slope* is defined as the average cross-slope of a contiguous section of trail. The running cross-slope can be determined by taking periodic measurements throughout a section of trail and then averaging the values.

*Maximum cross-slope* is defined as a limited section of the trail that exceeds the typical running cross-slope of the path.

*Rate of change of cross-slope* is defined as the change in cross-slope over a given distance. Typically rate of change of cross-slope is measured over 2 ft intervals, which is the approximate length of a single walking pace and the wheelbase of a wheelchair. Rate of change of cross-slope can be measured by placing a level 2 ft before and after a maximum cross-slope. It is important to note that rapidly changing cross-slopes can cause one wheel of a wheelchair or one leg of a walker to lose contact with the ground and also can cause walking pedestrians to stumble or fall.

Because some trail users and people in wheelchairs, may have difficulty negotiating extreme cross-slopes even for short distances, the following recommended parameters for the trail design should be considered:

- Maximum cross-slope of 5 percent for a distance of 3.050 m (10 ft) average trail difficulty
- Maximum cross-slope of 5 percent for 3.660 m (12 ft). for easier recreational trails

\* Source: Axelson, Chesney, and Longmuir (1995)

*AASHTO Green Book's* specifications for cross-slopes based on surface type. According to the *AASHTO Green Book*, a 1.5 percent cross-slope provides effective drainage in most weather conditions for surfaces with the highest pavement standards. Intermediate and low surface types, such as gravel, may require larger cross-slopes to enable adequate drainage (AASHTO, 1995, 1999).

### ***Cross-Slope Ranges by Surface Type (AASHTO, 1995)***

<b>Surface Type</b>	<b>Cross-Slope Range</b>
High(highest pavement standard)	1.5-2.0%
Intermediate(slightly below high)	1.5-3.0%
Low(loose surface; earth, gravel, etc.)	2.0-6.0%

Some studies indicate that adults with and without disabilities are unable to distinguish between 2 and 3 percent cross-slopes (Axelson, Chesney, and Longmuir, 1995).

Maintaining minimal cross-slope values can significantly increase the cost and environmental modifications required to build trails on steep terrain per the following chart:

**Federal Guidelines for Maximum Allowable Running Cross-Slope:**

Source	Path Type	Single Level	Multiple Levels		
			Easier	Moderate	Difficult
		%	%	%	%
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	H		n/a	n/a	n/a
Guide for the Dev. of Bicycle Facilities (AASHTO, 1997, Draft)	S	2			
Guide for the Dev. of Bicycle Facilities (AASHTO, 1991)	B	2			
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	E		n/a	n/a	n/a
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	X		n/a	n/a	n/a
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	SM		15	30	40
USDA FS Trails Mgt. Handbook (USDA FS, 1985)	ATV		20	30	40

- AR = Accessible Route      ORAR = Outdoor Recreation Access Route      RT = Recreational Trail
- H = Hiking Trail      S = Shared-Use Path      B = Bicycle Path
- MB = Mountain Biking Trail      E = Equestrian Trail      X = Cross-Country Ski Trail
- SM = Snow Machine Trail      ATV = All-Terrain Vehicle Trail
- OHV = Off-Highway Vehicle Trail      M = Motorcycle Trail

\* Source: U.S. Department of Transportation – Federal Highway Administration, website: ([www.fhwa.dot.gov](http://www.fhwa.dot.gov))

## APPENDIX F: Preliminary Impact Topics

### DERIVATION OF IMPACT TOPICS

Impact topics were used to focus the evaluation of the potential environmental consequences of the alternatives. The impact topics that were selected were identified based on guidance from the National Park Service, input from the LSHRC, public concerns, and resource information specific to the Lakeshore and outlying project area. Described below is a brief foundation for the selection of each impact topic, as well as rationale for dismissing specific topics from further consideration.

### IMPACT TOPICS SELECTED FOR ANALYSIS

The impact topics that were selected and retained had several concerns that warranted discussion. These impact topics were retained because they were identified either through the development of the project scope, or development of a planning program, or the alternative identified was anticipated to have an impact on at least one of the impact topics and the resources within the project area.

Impact topics that were considered when evaluating the Trailway routing options are represented in *Preliminary Matrices* developed to help measure and compare potential impact to the environment and feasibility, and *Trailway Option Maps 1.1 through 1.9b*, found in the Appendices. The Tables and Maps measure the opportunities and challenges of possible alternatives in relation to environmental consequences. A series of 9 Impact Topics were originally selected for analysis for *Impact to the Environment* while 5 Impact Topics were selected for analysis for *Impact to Feasibility*. Each topic was described in terms of impact ranging from negligible to major, and provided a standardized basis of comparison between options.

The retained impact topics discussed in detail in section 2.4 and 2.5 - “*Affected Environment and Environmental Consequences*,” only include those topics that posed a potential impact and may differ from the impact topics that were identified initially. The preliminary impact topics include the following:

**Topography** was retained due to the extensive relief of the Sleeping Bear Dunes National Lakeshore (Lakeshore). For universal accessibility as well as constructability of trail routes, topography is a key component for the feasibility assessment. In addition, many recreational features and park assets that visitors are encouraged to experience are related to the topographic land forms.

**Wetlands** was retained as an impact topic because of concerns with hydrology, local and state policies regulating wetlands, permitting, flora and fauna, and potential effects from the alternatives considered. Wetlands do exist within the project area, and some alternatives cross areas of wetlands.

**Streams & Creeks** was retained as an impact topic because the action alternatives would require crossings at some locations. Several streams and creeks (including the Crystal River) exist throughout the project area, and it was determined

the action alternatives would require a stream or creek crossing including boardwalk or bridge; furthermore, the same alternatives come within 100' of a stream or creek with the possibility of sediment entering nearby surface waters.

**Wildlife** was retained despite no threatened and endangered species' habitats were found within the vicinity of the proposed alternatives and effects on habitat would be below detectable levels of disturbance. Working together with NPS staff, "Proposed Trailway Routing" maps were overlaid with existing T&E Wildlife habitats in order to arrive at the conclusion that no T&E habitats would be affected. However, the criteria were included due to proposed Trailway activity in close proximity to wetland, woodland and stream, creek, wooded upland, and successive prairie habitat of species regularly occurring in the Lakeshore.

**Vegetation** was retained as an impact topic even after evaluation determined the impact to be short-term and negligible to minor primarily due to use of previously disturbed areas and existing right-of-way for proposed Trailway segments.

**Soils** were retained due to the importance of existing soil type and the relationship to trail constructability and susceptibility during and after construction. Soil surveys were gathered from the Michigan Resource Inventory System (MIRIS) database and the United States Department of Agriculture - (USDA) - Natural Resources Conservation Service for Leelanau County. Soil associations were considered for soil type (hydric, silty, sandy), permeability, gradient (slope) and erosion factors.

**Land Use** was retained as an impact topic due to the proposed alternatives potential introduction of increased human activity in proximity to other land uses, and the physical encroachment and/or potential easements needed to cross private and public land, utility and road right-of-way. The land use impact topic considers only non-SHPO and GMP related land uses (refer below to Cultural Landscapes and Historic Resources or Lakeshore Visitor Experience).

**Cultural Landscapes and Historic Resources** was retained because of existing designated historical buildings and cultural landscapes that have the potential to be affected by the alternatives considered. The cultural landscapes and historic resources impact topic deals specifically with state and federally designated sites.

**Viewsheds** was retained due to the importance of overlooks and natural landforms within the project area and the potential detriment to the scenic and rural character that potentially could be introduced if the proposed alternatives were implemented.

**Lakeshore Visitor Experience** was retained as a feasibility impact topic because the proposed alternatives have the potential to affect visitor experience in the park in terms of its proximity and relationship to cultural landscapes, wilderness and nature zones and roadway corridor and other scenic viewsheds. Although, a large percentage of the proposed Trailway would occur in the road right-of-way, Lakeshore visitor experience, both by the Trailway user and other lakeshore visitors could be affected.

**Safety** was retained as a feasibility impact topic due the importance of protecting the health and safety (including accessibility) of park visitors and Trailway users. Accessibility is also considered in the impact topic topography. The proposed alternatives have the potential to be affected by health and safety.

**Cost** was retained as a feasibility impact topic in order to compare the cost between differing cross-sections and to not exceed the current standards expected for the surface needed in comparison with the least expensive cross-section. Cost has the potential to affect which alternative is most feasible.

**Operation and Maintenance** was retained as a feasibility topic because it is expected the Trailway has the potential to affect park operations and management, MDOT, and local jurisdictions. For this topic, no numeric score was identified, but operations and maintenance is analyzed in the “Environmental Consequences” chapter.

## **IMPACT TOPICS ELIMINATED**

**Recreational Experience** was eliminated because no adverse effects were identified that would negatively impact the recreational experience of a Trailway user along the proposed Action Alternatives. Recreational experience was defined as *the user experience along the proposed Trailway not including the Lakeshore GMP management zones (Wilderness, Recreational, Cultural / Historical)* (refer to the preliminary impact topics in Chapter 1).

Although the potential for adverse affects exists, site specific placement, design detailing and BMP's would be utilized in all cases to mitigate any potential negative impact to other recreational activities that may be in the vicinity; moreover, the advent of the Trailway would provide better access for more users in terms of barrier-free gradient and surfaces, and connect various recreational opportunities more readily.

**APPENDIX G: Measuring the Impact to the Environment and Feasibility - Matrices**

<b>Table 1 – Segment 1 Impact to the Environment</b>										
	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 1</b>										
<b>Option 1.1</b>	0-1 M-22 R.O.W.; Existing; Minor long. slope	0	0	1-3	0	1 Trillium in R.O.W.	1 Private Farmstead on Manning Rd.	1-3	3 Moderate Impact to rural viewshed Tweddle / Treat Farm	7-12 (varies)
<b>Option 1.2</b>	2 Proposed; Switch backs needed	0	0	3 modified, surface mined	0	0 Nap weed introduced	0	0	0	5
<b>Option 1.3</b>	1 Proposed; Grading needed in Utility R.O.W.	0	0	1	0	0	1, Existing Utility Easement	3 Historic Farm	3 Moderate to major impact to rural viewshed Tweddle / Treat Farm	9
<b>Option 1.4</b>	2 Proposed; Moderate side slopes	0	0	2	0	0	0	0	0	4
<b>Option 1.5</b>	2 Proposed; Switch backs needed	0	0	2	0	0	0	0	0	4
<b>Option 1.6</b>	3 Proposed; Tight ravine; wet/organic soils	0	0	2	0	0	0 Close to SLBE Park Entrance sign	0 Logging route	0	5
<b>Segment 1:</b> Stormer Rd. (County Line) to Barracks Rd. (SLBE & Village of Empire Boundary - South)										

**Table 2 – Segment 1 Impact to Feasibility**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 1</b>							
<b>Option 1.1</b>	0	2 Moderate Impact to Visitor Experience Tweddle-Treat Farm;	3 Road crossing; Gradient; Sideslope in R.O.W.; Guardrail	2-3	Evaluation with assistance from SLBE Staff	7-8 (varies)	14-20 (varies)
<b>Option 1.2</b>	0	0	1 Gradient	2 Asphalt or Limestone	Evaluation with assistance from SLBE Staff	3	8
<b>Option 1.3</b>	0	3 Major Impact to Visitor Experience Tweddle-Treat Farm;	1 Road crossing	2 Limestone	Evaluation with assistance from SLBE Staff	6	15
<b>Option 1.4</b>	0	1	0	2 Asphalt or Limestone	Evaluation with assistance from SLBE Staff	3	7
<b>Option 1.5</b>	0	0	1 Gradient	3 Asphalt or Limestone	Evaluation with assistance from SLBE Staff	4	8
<b>Option 1.6</b>	0	1	1 Gradient	3 Asphalt or Limestone	Evaluation with assistance from SLBE Staff	5	10
<b>Segment 1: Stormer Rd.(County Line) to Barracks Rd.(SLBE &amp; Village of Empire Boundary - South)</b>							

**Table 3 – Segment 2 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Views/heds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 2</b>										
<b>Option 2.1</b>	0-1 M-22 R.O.W.; Proposed; Minor long. slope	1	1	1-3	0	0	2 Private land use; Village of Empire	0	0	5-8 (varies)
<b>Option 2.2</b>	2 Proposed; Berm along north end of New Neighborhood	0	0	0 modified	0	0	3 Private land use/New Neighborhood	0	0	5
<b>Option 2.3</b>	0	0	0	0 modified	0	0	0	0	0	0
<b>Option 2.4</b>	0	0	0	0 modified	0	0	2 Private housing development	0	0	2
<b>Option 2.5</b>	0	0	0	0 modified	0	0	2 Private housing development	0	0	2
<b>Option 2.6</b>	0	0	0	0 modified	0	0	3 Commercial business /trail easement needed	0	0	3
<b>Option 2.7</b>	1 Existing; Minor long. slopes on Voice Rd. Scenic Beauty Rd./Gravel	0	0	0 modified	0	0	3 Commercial business /trail easement required	0	0	4
<b>Segment 2:</b> Barracks Rd.(SLBE & Village of Empire Boundary - South) to Voice Rd.(SLBE & Village of Empire Boundary - North)										

**Table 4 – Segment 2 Impact to Feasibility**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 2</b>							
<b>Option 2.1</b>	0 Connection to Beach Park and Downtown	NA/ outside of Park	3 Road crossing, gradient, Trail access	2-3	Evaluation with assistance from SLBE Staff	5-6 (varies)	10-14 (varies)
<b>Option 2.2</b>	0	NA/ outside of Park	1 Road crossing	1 Use ex.road; limited trail for access to M-22 (need trail easement)	Evaluation with assistance from SLBE Staff	2	7
<b>Option 2.3</b>	0 Connection to Beach Park and Downtown	NA/ outside of Park	1 Road crossing	2 New Bituminous in R.O.W	Evaluation with assistance from SLBE Staff	3	3
<b>Option 2.4</b>	0	NA/ outside of Park	1 Road crossing	2 Use ex.road or new existing new bitumnous	Evaluation with assistance from SLBE Staff	3	5
<b>Option 2.5</b>	0	NA/ outside of Park	1 Road crossing	2 Use ex.road or new existing new bitumnous	Evaluation with assistance from SLBE Staff	3	5
<b>Option 2.6</b>	0	NA/ outside of Park	1 Road crossing	2 New Bituminous out of R.O.W (need trail easement)	Evaluation with assistance from SLBE Staff	3	6
<b>Option 2.7</b>	0 Connection to Village Recreation Park	1	1-2 Gradient; shoulder option	2 stiped bike lane or separated paved trail on La Core	Evaluation with assistance from SLBE Staff	4-5	8-9

Table 5 – Segment 3 Impact to the Environment										
	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 3</b>										
<b>Option 3.1</b>	0-2 M-109 R.O.W.; Minor long. Slope; Existing Moderate Sideslopes	0	0	1-3	0	0	0	0	0	1-5 (varies)
<b>Segment 3:</b> Voice Rd.(SLBE & Village of Empire Boundary - North) to Pierce Stocking Dr.										

Table 6 – Segment 3 Impact to Feasibility							TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance			
<b>SEGMENT 3</b>								
<b>Option 3.1</b>	0 Provides connection to Pierce Stocking Dr. & Windy Moraine Trail	0 Provides connection to Pierce Stocking Dr. & Windy Moraine Trail	2 gradient, Trail access	2 New Bituminous in R.O.W	Evaluation with assistance from SLBE Staff	4	5-9 (varies)	
<b>Segment 3:</b> Voice Rd.(SLBE & Village of Empire Boundary - North) to Pierce Stocking Dr.								

**Table 7 – Segment 4 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 4</b>										
<b>Option 4.1</b>	0-2 M-109 R.O.W.; Existing; Minor long. Slope; Moderate Sideslopes	0	0	1-3	0	0	2 Private land use; fences; shrubbery	0	1 Minor impact to Sleeping Bear Dune Climb Viewshed from M-22 and R.O.W.	4-8 (varies)
<b>Option 4.2</b>	1 Proposed; Minor long. slopes	0	0	2	0	0	1 SLBE Scenic Dr. Entrance/ Pierce Stocking Dr	0	0	4
<b>Option 4.3</b>	3 Proposed; Switch backs needed	0	0	3	0	0	0	0	0	6
<b>Option 4.4</b>	3 Proposed; Switch backs needed	0	0	3	0	0	0	0	0	6
<b>Option 4.5</b>	0	0	0	3	0	0	0 Utilize Greenan Rd.; Close to vehicular traffic	0	0	3
<b>Segment 4:</b> Pierce Stocking Dr. to Hunter Rd. (Sleeping Bear Dune Climb Visitor Entrance)										

**Table 8 – Segment 4 Impact to Feasibility**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 4</b>							
<b>Option 4.1</b>	0 Provides connection to Pierce Stocking Dr.; Sleeping Bear Dune Climb; picnic areas; & Windy Moraine Trail hiking	1 Provides connection to Pierce Stocking Dr.; Sleeping Bear Dune Climb; picnic areas; & Windy Moraine Trail hiking	2 Multiple private driveway crossings; Road crossing, gradient	2-3	Evaluation with assistance from SLBE Staff	5-6 (varies)	9-14 (varies)
<b>Option 4.2</b>	0 Provides connection to Pierce Stocking Dr.; picnic areas; & Windy Moraine Trail hiking	0 Provides connection to Pierce Stocking Dr.; & Windy Moraine Trail hiking	0	3 Asphalt; Clear and grubbing if separate trail	Evaluation with assistance from SLBE Staff	3	7
<b>Option 4.3</b>	0 Nature experience	0 Nature experience	1 Gradient	3 Asphalt; Clear and grubbing if separate trail	Evaluation with assistance from SLBE Staff	4	10
<b>Option 4.4</b>	0 Nature experience	0 Nature experience	1 Gradient	3 Asphalt; Clear and grubbing if separate trail	Evaluation with assistance from SLBE Staff	4	10
<b>Option 4.5</b>	0 Nature experience	0 Nature experience	0	2 New Asphalt; or Paved pathway on the edge of Greenan Rd.; or close to vehicular traffic	Evaluation with assistance from SLBE Staff	2	5
<b>Segment 4: Pierce Stocking Dr. to Hunter Rd. (Sleeping Bear Dune Climb Visitor Entrance)</b>							

**Table 9 – Segment 5 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 5</b>										
<b>Option 5.1</b>	0-2 M-109 R.O.W.; Existing; Moderate long slope	3 Boardwalk needed	0	1-3	0	0	2 Private land use; Glen Arbor	0	0	6-10 (varies)
<b>Option 5.2</b>	0	0	0	0 modified	0	0	1 SLBE Dune Climb Entrance/ Pierce Stocking Dr	0	0	1
<b>Option 5.3</b>	0	0	0	1	0	2 T&E in vicinity	0	0	0	3
<b>Option 5.4</b>	0	3 Boardwalk needed	0	3 Muck soils	1 Former narrow gauge ralline; wetland	1 Former narrow gauge ralline; wetland	3	0	1 Minor impact to Sleeping Bear Dune Climb Viewshed from M- 22 and R.O.W.	12
<b>Option 5.5</b>	0	0	0	0 Modified; existing road gravel	0	0	1 County Road Gravel Improved	0	0	1
<b>Option 5.6</b>	0	0	0	0 Modified; Former narrow gauge ralline	0	0	0	0	0	0
<b>Option 5.7</b>	2	0	0	0 Modified; existing road gravel	0	0	1 County Road Gravel Improved	0	0	3
<b>Option 5.8</b>	0	0	0	0 Modified; Former narrow gauge ralline	0	0	0	3 Historic telegraph pole line; Glen Haven	0	3

**Table 9 – Segment 5 Impact to the Environment (Continued)**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>Option 5.9</b>	0	0	0	0 Modified; Former narrow gauge ralline	0	0	0	3 Glen Haven; Cannery Bldg.	0	3
<b>Option 5.10</b>	2 Existing; Moderate long. slope	0	0	0 Modified; Former narrow gauge ralline	0	0	0	3 Glen Haven/ Sleeping Bear Inn & Garage	0	5
<b>Option 5.11</b>	1 Existing; Minor long. slope	0	0	0 Modified; existing road gravel	0	0	0	3 Glen Haven/ DH Day Store & Restroom Bldg; DH Day Campground/ Historic Cabin	0	4
<b>Option 5.12</b>	0	0	0	0	0	0	2 Private land use; Glen Arbor	0	0	2
<b>Option 5.13</b>	0	0	0	0 Modified; existing road gravel	0	0	1 SLBE Road Gravel Improved	0	0	1
<b>Option 5.14</b>	0	0	0	0 Modified; existing road gravel	0	0	1 Private land use; County Road Gravel Improved	0	0	1
<b>Option 5.15</b>	1 Proposed; Minor long. slope	0	0	3	0	0	2 Private land use	0	0	6
<b>Segment 5:</b> Hunter Rd.(Sleeping Bear Dune Climb Visitor Entrance) to Sylvan St./S.Forest Haven Dr. NE										

**Table 10 – Segment 5 Impact to Feasibility**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 5</b>							
<b>Option 5.1</b>	0 Provides connection to D.H. Day Campgrounds; Picnicing; Dune Climb; Glen Haven Historic District; Beach Access; Glen Arbor;	1 Provides connection to D.H. Day Campgrounds; Picnicing; Dune Climb; Glen Haven Historic District; Beach Access; Glen Arbor;	3 Multiple private driveway crossings; Multiple road crossing; gradient; Trail access	2-3 Existing R.O.W./ Boardwalk needed in sections	Evaluation with assistance from SLBE Staff	6-7 (varies)	12-17 (varies)
<b>Option 5.2</b>	0 Provides connection to Dune Climb picnic areas; ADA Interpretive Trail	1 Provides connection to Dune Climb; ADA Interpretive Trail	0	1 Modify existing limestone; Some clear and grubbing	Evaluation with assistance from SLBE Staff	2	3
<b>Option 5.3</b>	0 Provides connection to D.H. Day Group Campground; picnic areas; ADA Interpretive Trail; Dune Ecosystem interpretive	1 Provides connection to D.H. Day Group Campground; picnic areas; ADA Interpretive Trail; Dune Ecosystem interpretive	0	3 Asphalt; Clear and grubbing if separate trail	Evaluation with assistance from SLBE Staff	4	7
<b>Option 5.4</b>	0 Provides connection to Wetland ecosystem experience; D.H. Day Group Campground; picnic areas; Historic Narrow gauge Rail bed	2 Boardwalk necessary would be highly visible	1 Remoteness to public view	3 Boardwalk; Some clear and grubbing; some grade modifications	Evaluation with assistance from SLBE Staff	6	18
<b>Option 5.5</b>	0 Provides connection to D.H. Day Group Campground; picnic areas	0	0	0	Evaluation with assistance from SLBE Staff	0	1
<b>Option 5.6</b>	0 Provides connection to D.H. Day Group Campground; picnic areas; Dune Ecosystem interpretive; Historic Narrow gauge Rail bed	0	1 Remoteness to public view	2 Limestone	Evaluation with assistance from SLBE Staff	3	3
<b>Option 5.7</b>	0	0	3 Road crossings; gradient; trail access	0	Evaluation with assistance from SLBE Staff	3	6
<b>Option 5.8</b>	0 Provides connection to picnic areas; Dune Ecosystem; Historic Narrow gauge Rail bed; Glen Haven Historic District; Beach Access	0	1 Remoteness to public view	2 Limestone	Evaluation with assistance from SLBE Staff	3	6

**Table 10 – Segment 5 Impact to Feasibility (Continued)**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>Option 5.9</b>	0 Provides connection to picnic areas; Historic Narrow gauge rail bed; Glen Haven Historic District; Beach Access	3 Glen Haven	0	2 Limestone	Evaluation with assistance from SLBE Staff	5	8
<b>Option 5.10</b>	0 Provides connection to picnic areas; Historic Narrow gauge rail bed; Glen Haven Historic District; Beach Access	3 Glen Haven	0	2 Limestone	Evaluation with assistance from SLBE Staff	5	10
<b>Option 5.11</b>	0 Provides connection to D.H. Day Campground; picnic areas; Historic Narrow gauge rail bed; Glen Haven Historic District; Beach Access	1	1 Road crossing	2 Limestone	Evaluation with assistance from SLBE Staff	4	8
<b>Option 5.12</b>	0 Provides connection to picnic areas; Historic Narrow gauge rail bed; Glen Haven Historic	1 Glen Haven	0	2 Limestone	Evaluation with assistance from SLBE Staff	3	5
<b>Option 5.13</b>	0 Provides connection to D.H. Day Campground; Beach Access	0	2 Utilize campground access road	0	Evaluation with assistance from SLBE Staff	2	3
<b>Option 5.14</b>	0 Provides connection to D.H. Day Campground; Beach Access	0	0	2 Limestone	Evaluation with assistance from SLBE Staff	2	3
<b>Option 5.15</b>	0 Provides connection to Glacial escarpment; Glen Arbor	0	1 Road crossing	3 New Asphalt	Evaluation with assistance from SLBE Staff	4	10
<b>Segment 5:</b> Hunter Rd. (Sleeping Bear Dune Climb Visitor Entrance) to Sylvan St./S.Forest Haven Dr. NE							

**Table 11 – Segment 6 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 6</b>										
<b>Option 6.1</b>	0-1 M-22 R.O.W.; Existing; Minor Long. slope	2	0 Existing bridge at Crystal River w/ pedestrian crossings	1-3	0	0	2 Private land use; commercial land use; Glen Arbor	0	0	5-8 (varies)
<b>Option 6.2</b>	0	0	0	0 modified	0	0	2 Private land use; commercial land use; Glen Arbor	0	0	2
<b>Option 6.3</b>	2	2	3 Boardwalk needed	3 Modified; existing two track	1 Wetland	1 Wetland	3 Private land use; trail easement needed	0	0	15
<b>Option 6.4</b>	0	0	0	0 modified	0	0	2 Private & Commercial land use; Glen Arbor	0	0	2
<b>Option 6.5</b>	2 Proposed; Moderate sideslope	0	0	0 Modified; irrigated turf lawn	0	0	2 Private land use/ Homestead Resort	0	0	4
<b>Option 6.6</b>	0 Westman Rd. R.O.W.; Existing	0	0	0 Modified	0	0	0	0	0	0
<b>Option 6.7</b>	0 Hyland Rd. R.O.W.; Existing	0	0	0 Modified	0	0	0	0	0	0
<b>Segment 6:</b> Sylvan St./S.Forest Haven Dr. NE to Westman Rd.										

Table 12 – Segment 6 Impact to Feasibility							
	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 6</b>							
<b>Option 6.1</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	3 Multiple private driveway crossings; Multiple road crossings; Bike Lanes; High traffic; Trail access	1 Existing R.O.W./ Striped Bike lanes or walking on ex. Sidewalks	Evaluation with assistance from SLBE Staff	4	9-12 (varies)
<b>Option 6.2</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	2 Multiple private driveway crossings; Multiple road crossings; Bike Lanes; Lesser traffic; Trail access	1 Existing R.O.W./ Striped Bike lanes or walking on ex. Sidewalks	Evaluation with assistance from SLBE Staff	3	5
<b>Option 6.3</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	3 Private driveway crossings; Road crossings; Bike Lanes; Lesser traffic; Trail access	2 Limestone or asphalt	Evaluation with assistance from SLBE Staff	5	20
<b>Option 6.4</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	2 Multiple private driveway crossings; Multiple road crossings; Bike Lanes; Lesser traffic; Trail access	1 Existing R.O.W./ Striped Bike lanes or walking on ex. Sidewalks	Evaluation with assistance from SLBE Staff	3	5
<b>Option 6.5</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	1 Homestead driveway crossing	2 New asphalt across lawns	Evaluation with assistance from SLBE Staff	3	7
<b>Option 6.6</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	1 Road crossing	2 New asphalt across lawns	Evaluation with assistance from SLBE Staff	3	3
<b>Option 6.7</b>	0 Glen Arbor Downtown; Crystal River Access; Lake MI Beach Access; Glen Arbor Park	0	1 Road crossing	2 New asphalt across lawns	Evaluation with assistance from SLBE Staff	3	3
<b>Segment 6:</b> Sylvan St./S.Forest Haven Dr. NE to Westman Rd.							

**Table 13 – Segment 7 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 7</b>										
<b>Option 7.1</b>	<b>1</b> M-22 R.O.W.; Existing; Minor long. slope	0	0	1-2	0	0	<b>2</b> Private land use	<b>3</b> Port Oneida Rural District; Olsen Farm;	<b>3</b> Port Oneida Rural District; Olsen Farm;	<b>10-11</b> (varies)
<b>Option 7.2</b>	<b>2</b> Thoreson Rd.; Existing; Moderate long. slope	0	0	0 modified	0	0	<b>0</b> County Road Gravel Improved	<b>1</b> Thoreson Farm;	0	<b>3</b>
<b>Option 7.3</b>	0	0	0	1	0	0	0	<b>3</b> Port Oneida Rural District; Olsen Farm;	<b>3</b> Port Oneida Rural District; Olsen Farm;	<b>7</b>
<b>Segment 7:</b> Westman Rd. to Port Oneida Rd.										

**Table 14 – Segment 7 Impact to Feasibility**

SEGMENT	Recreational Experience	SLBE Visitor Experience	Safety			Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
			Safety	Cost				
<b>SEGMENT 7</b>								
<b>Option 7.1</b>	<b>0</b> Provides access to existing hiking, cross country ski trails and camping	<b>2</b> Provides access to Port Oneida Rural Historic District;	<b>2</b> Two Road crossings on Thoreson Rd.	<b>2-3</b> Existing R.O.W./ New Asphalt		Evaluation with assistance from SLBE Staff	<b>6-7</b> (varies)	<b>16-18</b> (varies)
<b>Option 7.2</b>	<b>0</b> Provides access to existing hiking, cross country ski trails and camping	<b>1</b> Provides access to Thorson Farmsted (Port Oneida; Trail on existing road; Introduces potential for more people in the area	<b>2</b> Gradient (Thoreson Rd.)	<b>0</b> Utilize existing gravel road		Evaluation with assistance from SLBE Staff	<b>3</b>	<b>6</b>
<b>Option 7.3</b>	<b>0</b> Provides access to existing hiking, cross country ski trails and camping	<b>2</b> Provides access to Port Oneida Rural Historic District; Olsen Farm; Utilizes existing park trail	<b>1</b> Road crossings on Thoreson Rd.	<b>0</b> Limestone on existing mown trail		Evaluation with assistance from SLBE Staff	<b>3</b>	<b>10</b>
<b>Segment 7: Westman Rd. to Port Oneida Rd.</b>								

**Table 15 – Segment 8 Impact to the Environment**

	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Views/heds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 8</b>										
<b>Option 8.1</b>	0-1 M-22 R.O.W.; Existing; Negligible long. slope; Moderate sideslope	0	0	1	0	0	2 Private land use;	3 Shielding Tree; Historic Schoolhouse	2 Port Oneida Rural District	8-9 (varies)
<b>Option 8.2</b>	0	0	0	0 modified	0	0	0 County Road Gravel Improved	3 Port Oneida Rural District	0	3
<b>Option 8.3</b>	2 Proposed; Moderate long. slope	3 Narada Lake; Boardwalk needed	0	3 Muck soil	1 Wetland; Loon nesting	1 Wetland	0	0	0	10
<b>Option 8.4</b>	0	0	0	0 modified	0	0	2 Private land use; commercial land use; Glen Arbor	3 Historic Schoolhouse	0	5
Segment 8: Port Oneida Rd. to Bohemian Rd.										

<b>Table 16 – Segment 8 Impact to Feasibility</b>							
	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 8</b>							
<b>Option 8.1</b>	0	2 Adds trail to existing R.O.W.; past Cultural sites in Port Oneida	2 Road crossings at Basch; Trail access tight to ex. guardrail	2-3 Existing R.O.W./ New Asphalt	Evaluation with assistance from SLBE Staff	6-7 (varies)	14-16 (varies)
<b>Option 8.2</b>	0	0 Provides access to Pyramid Point overlook	1 Trail access on ex. Gravel road	0 Trail access on ex. Gravel road	Evaluation with assistance from SLBE Staff	1	4
<b>Option 8.3</b>	0 Wetland ecosystem interpretation (loon nesting)	1 Proximity to Cultural site school site	1 Gradient	3 New Asphalt; Boardwalk	Evaluation with assistance from SLBE Staff	5	15
<b>Option 8.4</b>	0 Boat launch; Beach access Bohemian Rd; Picnicking	0 Good Harbor Bay Access	1 Trail access along ex. Paved road - striped bike lane	0 Trail access along ex. Paved road - striped bike lane	Evaluation with assistance from SLBE Staff	1	6
<b>Segment 8:</b> Port Oneida Rd. to Bohemian Rd.							

**Table 17 – Segment 9 Impact to the Environment**

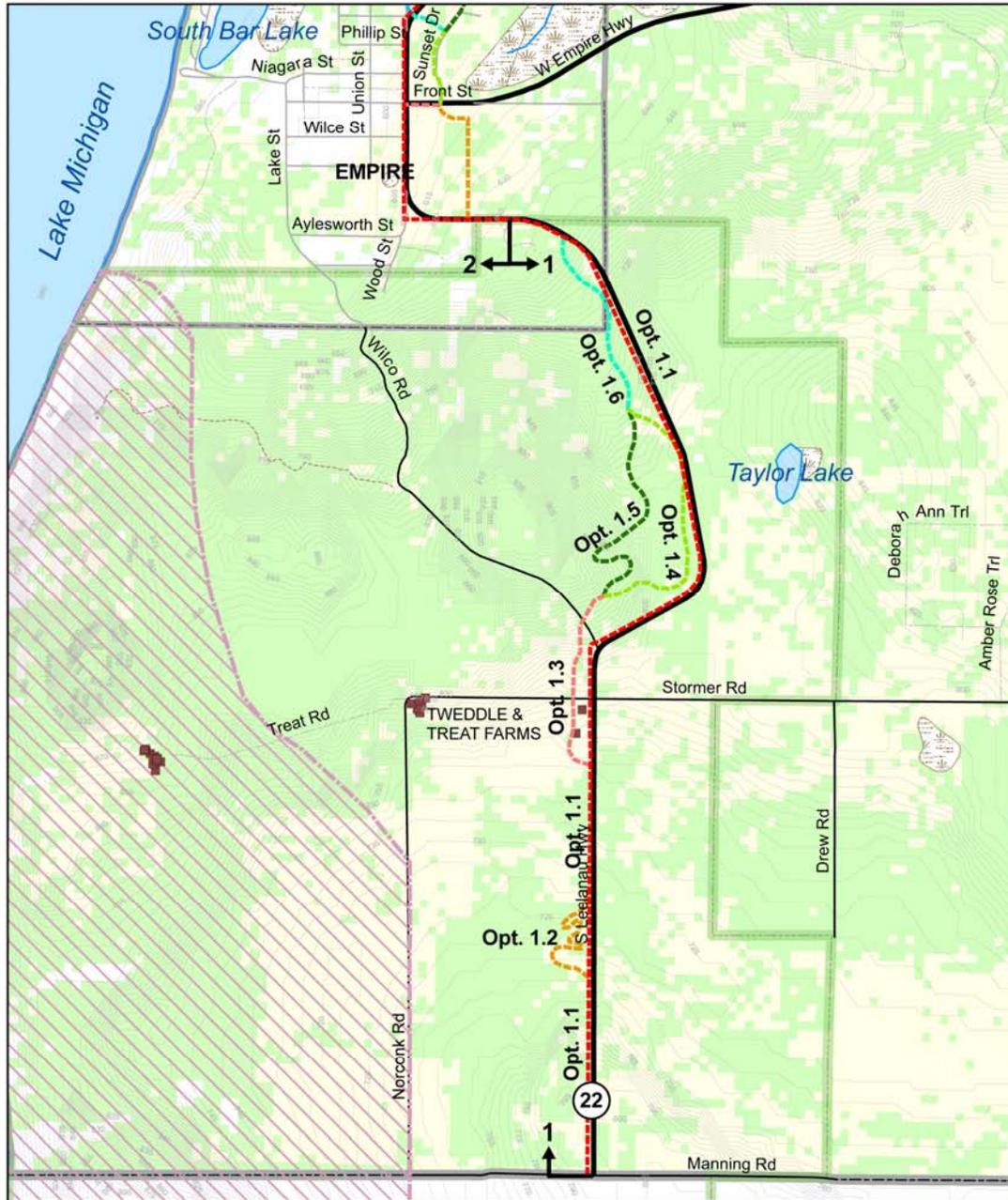
	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
<b>SEGMENT 9</b>										
<b>Option 9.1</b>	0-1 M-22 R.O.W.; Ex. Minor long. slope; Mod. sideslope	0	1 Stream Name?	1-3 Muck soils along L.Traverse Lake	0	0	2 Private land use	0	2 Bufka Farm rural viewshed	6-9 (varies)
<b>Option 9.2</b>	0 Existing; Negligible slope	0	0	0 modified	0	0	2 Private land use/ Lake Assoc.; Co. Rd Chip Seal	2 Trail borders recommended Wilderness Boundary	0	4
<b>Option 9.3</b>	1 Proposed; Minor long. slope	3 Limited brdwalk	0	3 Wetland	1 Wetland	1 Wetland	0	3 Trail borders recommended Wilderness Boundary	0	12
<b>Option 9.4</b>	1 Proposed; Minor long. slope	0	1 Bridge less than 15'	3 Limited muck soils	0	0	0	0	2 Bufka Farm rural viewshed	7
<b>Option 9.5</b>	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
<b>Option 9.6</b>	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
<b>Option 9.7</b>	2 Proposed; Moderate long. slope	3 Wetland Deliniation needed	1	3 Limited muck soil	0	0	0	0	0	9
<b>Option 9.8</b>	0	0	0	0 modified	0	0	0 County Road Gravel Improved	0	0	0
<b>Option 9.9</b>	1 Existing; Minor long. slope	0	0	0 modified	0	0	0 County Road Gravel Improved	0	0	0

Segment 9: Bohemian Rd. to Good Harbor Trail

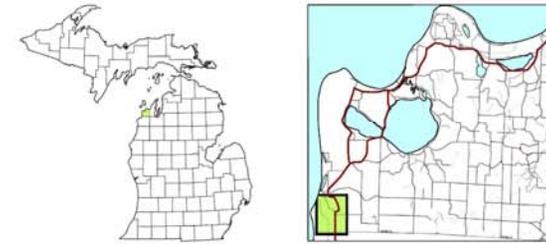
**Table 18 – Segment 9 Impact to Feasibility**

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
<b>SEGMENT 9</b>							
<b>Option 9.1</b>	0	2 Proximity to Bufka Farm; Trail within R.O.W.	2 Road crossings; Trail access	2-3 Existing R.O.W./ New Asphalt	Evaluation with assistance from SLBE Staff	6-7 (varies)	12-16 (varies)
<b>Option 9.2</b>	0 Hiking access; Twp Park Access; picnicking; beach access to Little Traverse Lake	0	1 Utilizes existing chip seal road (22')	0 Utilize existing road no modification	Evaluation with assistance from SLBE Staff	1	5
<b>Option 9.3</b>	0 Wilderness ecosystem interpretation	2 Proximity to proposed Wilderness boundary	1 Remoteness	3 New asphalt; small boardwalk section possible	Evaluation with assistance from SLBE Staff	6	18
<b>Option 9.4</b>	0	2 Proximity to proposed Wilderness boundary and Bufka Farm	0	2 Limestone	Evaluation with assistance from SLBE Staff	4	11
<b>Option 9.5</b>	0 Wilderness ecosystem interpretation; Forested dune ecosystem	3 Goes through proposed Wilderness boundary	1 Gradient	2 Limestone	Evaluation with assistance from SLBE Staff	6	11
<b>Option 9.6</b>	0	3 Goes through proposed Wilderness boundary	0	2 Limestone	Evaluation with assistance from SLBE Staff	5	10
<b>Option 9.7</b>	0 Ridge and swale ecosystem interpretation;	0	1 Remoteness; Gradient	3 Limestone, Clearing and grubbing	Evaluation with assistance from SLBE Staff	4	13
<b>Option 9.8</b>	0 Good Harbor Beach Access; Swimming, Picnicking	0	1 Utilizes existing gravel road	0 Utilize existing road no modification - Good Harbor Rd.	Evaluation with assistance from SLBE Staff	1	1
<b>Option 9.9</b>	0	0	2 Gradient; Trail access	0 Utilize existing road no modification - Good Harbor Rd.	Evaluation with assistance from SLBE Staff	2	2
<b>Segment 9: Bohemian Rd. to Good Harbor Trail</b>							

# APPENDIX H: Trailway Options Maps



**MAP 1.1 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

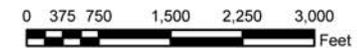


SEGMENT 1: OPTIONS 1-6

**Opt. 1.1** PROPOSED TRAIL ROUTE OPTIONS

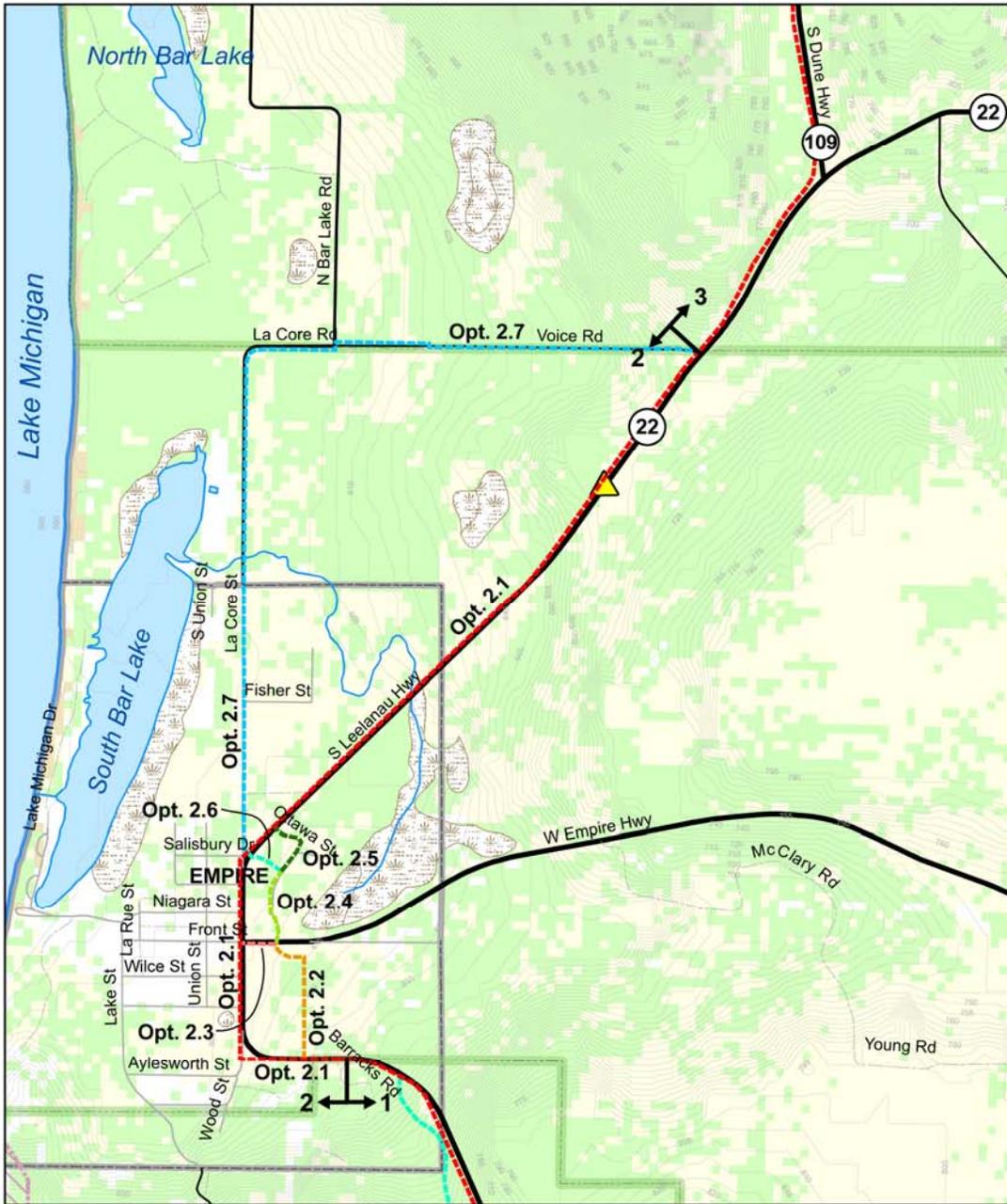
### GENERAL LEGEND

- |                                      |                     |
|--------------------------------------|---------------------|
| State Trunkline                      | Rivers              |
| County Primary Roads                 | Lakes               |
| County Local Roads                   | Village Boundaries  |
| Village Roads                        | Township Boundaries |
| Other Roads                          | Aquatic Bed         |
| Existing Hiking & Skiing Trails      | Forested            |
| Historic Buildings & Structures      | Agricultural        |
| Rest Areas/Scenic Turnouts           |                     |
| Recommended SLBE Wilderness Boundary |                     |
| SLBE Boundary                        |                     |

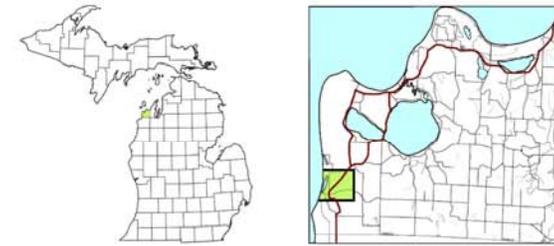


Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.2 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN



SEGMENT 2: OPTIONS 1-7

**Opt. 2.1** PROPOSED TRAIL ROUTE OPTIONS

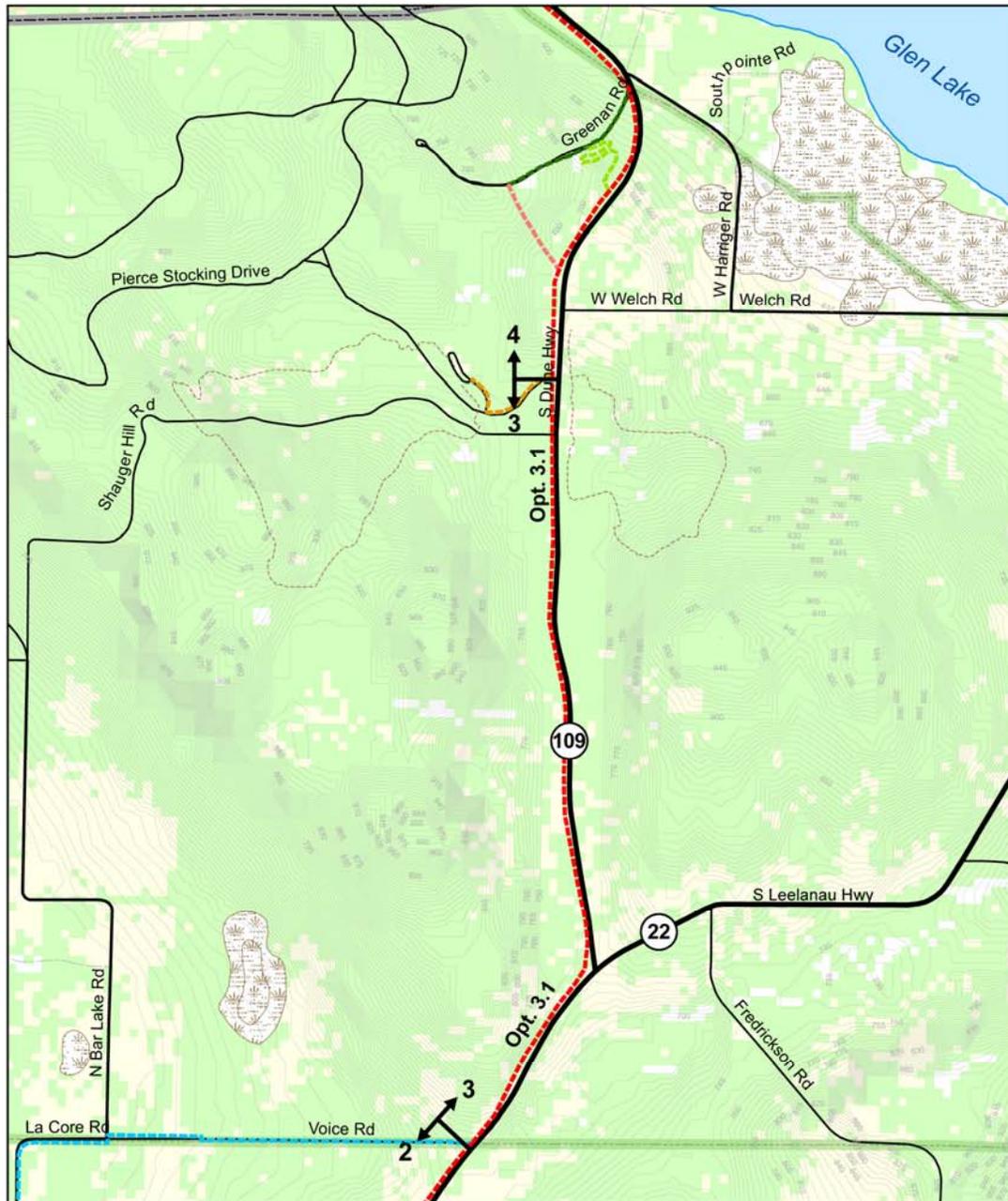
**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- Rest Areas/Scenic Turnouts
- Recommended SLBE Wilderness Boundary
- SLBE Boundary
- Rivers
- Lakes
- Village Boundaries
- Township Boundaries
- Aquatic Bed
- Forested
- Agricultural



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.3 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

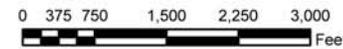


SEGMENT 3: OPTION 1

**Opt. 3.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- Rest Areas/Scenic Turnouts
- Recommended SLBE Wilderness Boundary
- SLBE Boundary
- Rivers
- Lakes
- Village Boundaries
- Township Boundaries
- Aquatic Bed
- Forested
- Agricultural

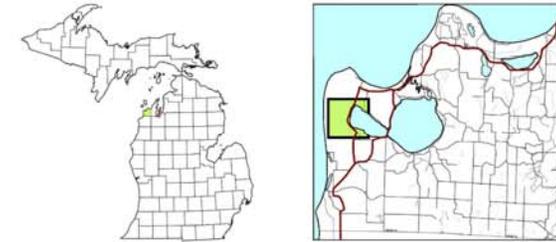


Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.4 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

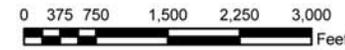


SEGMENT 4: OPTIONS 1-5

**Opt. 4.1** PROPOSED TRAIL ROUTE OPTIONS

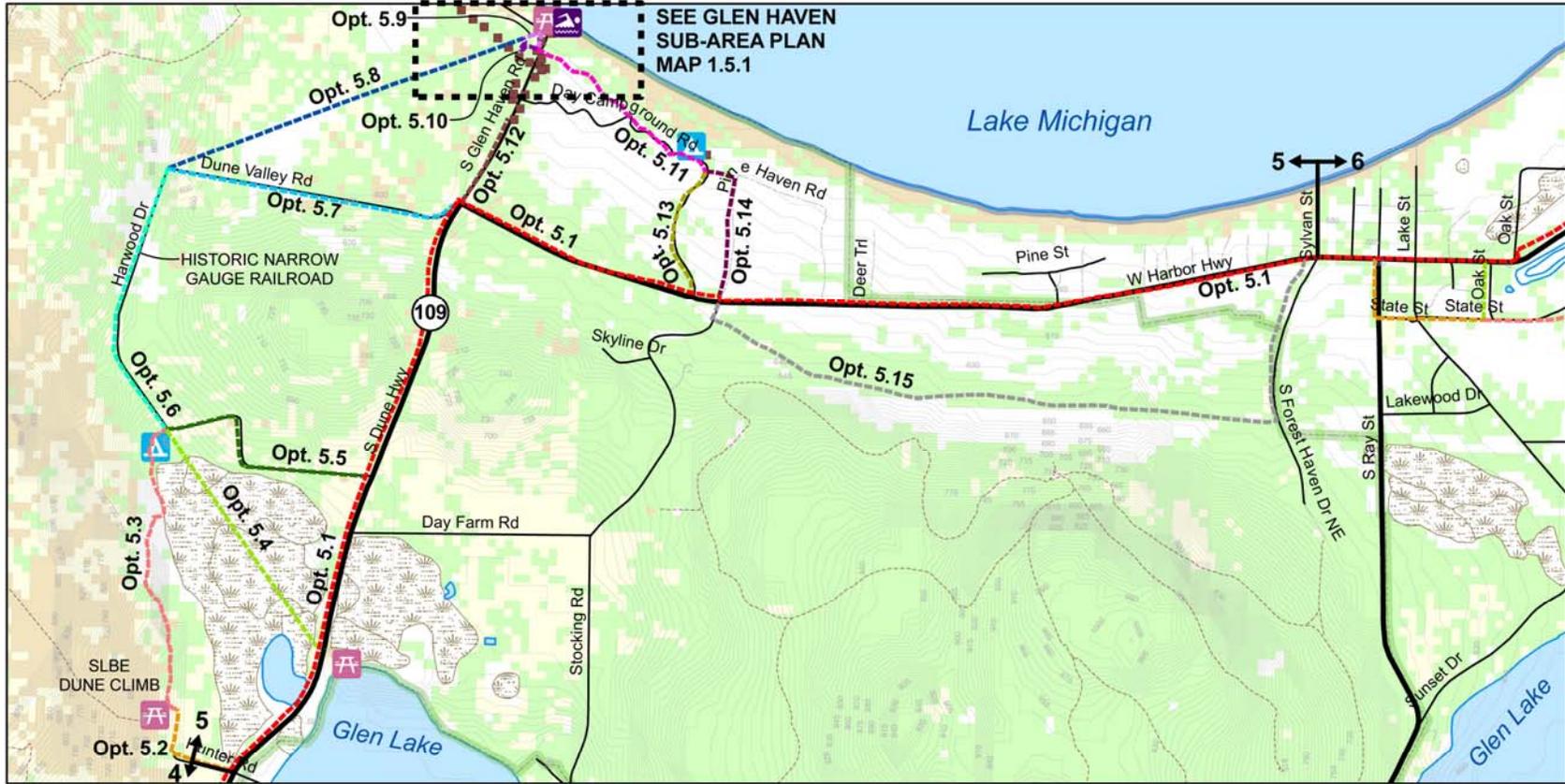
**GENERAL LEGEND**

- |                                      |                     |
|--------------------------------------|---------------------|
| State Trunkline                      | Rivers              |
| County Primary Roads                 | Lakes               |
| County Local Roads                   | Village Boundaries  |
| Village Roads                        | Township Boundaries |
| Other Roads                          | Aquatic Bed         |
| Existing Hiking & Skiing Trails      | Forested            |
| Historic Buildings & Structures      | Agricultural        |
| Rest Areas/Scenic Turnouts           |                     |
| Recommended SLBE Wilderness Boundary |                     |
| SLBE Boundary                        |                     |



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.5 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN



SEGMENT 5: OPTIONS 1-15

**Opt. 5.1** PROPOSED TRAIL ROUTE OPTIONS

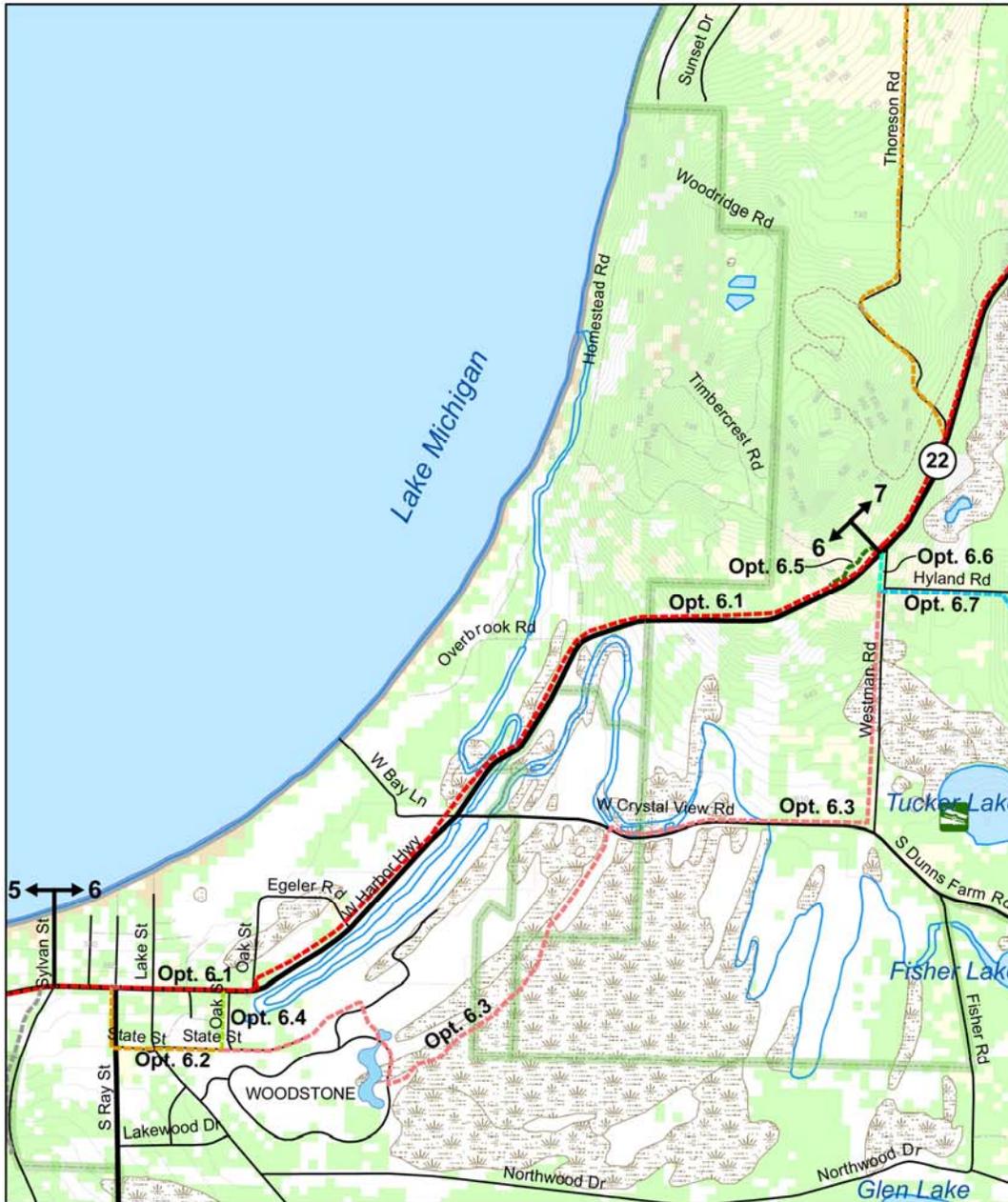
**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- - - Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- ▲ Rest Areas/Scenic Turnouts
- ▭ Recommended SLBE Wilderness Boundary
- ▭ SLBE Boundary
- ~ Rivers
- ~ Lakes
- ⊕ Village Boundaries
- ⊕ Township Boundaries
- ⊕ Aquatic Bed
- Forested
- Agricultural



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 18N





**MAP 1.6 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

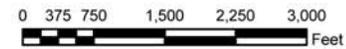


SEGMENT 6: OPTIONS 1-7

**Opt. 6.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- |                                      |                     |
|--------------------------------------|---------------------|
| State Trunkline                      | Rivers              |
| County Primary Roads                 | Lakes               |
| County Local Roads                   | Village Boundaries  |
| Village Roads                        | Township Boundaries |
| Other Roads                          | Aquatic Bed         |
| Existing Hiking & Skiing Trails      | Forested            |
| Historic Buildings & Structures      | Agricultural        |
| Rest Areas/Scenic Turnouts           |                     |
| Recommended SLBE Wilderness Boundary |                     |
| SLBE Boundary                        |                     |



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.7 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

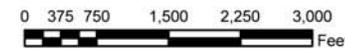


SEGMENT 7: OPTIONS 1-3

**Opt. 7.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- Rest Areas/Scenic Turnouts
- Recommended SLBE Wilderness Boundary
- SLBE Boundary
- Rivers
- Lakes
- Village Boundaries
- Township Boundaries
- Aquatic Bed
- Forested
- Agricultural



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.8 - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

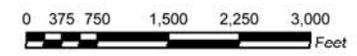


SEGMENT 8: OPTIONS 1-4

**Opt. 8.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- Rest Areas/Scenic Turnouts
- Recommended SLBE Wilderness Boundary
- SLBE Boundary
- Rivers
- Lakes
- Village Boundaries
- Township Boundaries
- Aquatic Bed
- Forested
- Agricultural



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N





**MAP 1.9a - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

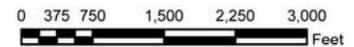


SEGMENT 9: OPTIONS 1-9

**Opt. 9.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- State Trunkline
- County Primary Roads
- County Local Roads
- Village Roads
- Other Roads
- Existing Hiking & Skiing Trails
- Historic Buildings & Structures
- Rest Areas/Scenic Turnouts
- Recommended SLBE Wilderness Boundary
- SLBE Boundary
- Rivers
- Lakes
- Village Boundaries
- Township Boundaries
- Aquatic Bed
- Forested
- Agricultural



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 18N





**MAP 1.9b - PROPOSED TRAILWAY ROUTING**  
LEELANAU SCENIC HERITAGE ROUTE TRAILWAY MASTER PLAN

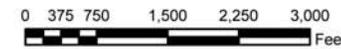


SEGMENT 9: OPTIONS 1-9

**Opt. 9.1** PROPOSED TRAIL ROUTE OPTIONS

**GENERAL LEGEND**

- |                                        |                       |
|----------------------------------------|-----------------------|
| — State Trunkline                      | ~ Rivers              |
| — County Primary Roads                 | ~ Lakes               |
| — County Local Roads                   | ⊕ Village Boundaries  |
| — Village Roads                        | ⊕ Township Boundaries |
| — Other Roads                          | ⊕ Aquatic Bed         |
| ~ Existing Hiking & Skiing Trails      | ~ Forested            |
| ■ Historic Buildings & Structures      | ~ Agricultural        |
| ▲ Rest Areas/Scenic Turnouts           |                       |
| ⊕ Recommended SLBE Wilderness Boundary |                       |
| ⊕ SLBE Boundary                        |                       |



Base GIS Data: Michigan Framework Data  
1992 National Land Cover Dataset  
1992 National Wetlands Cover Dataset  
National Park Service  
NAD 1983 UTM ZONE 16N

