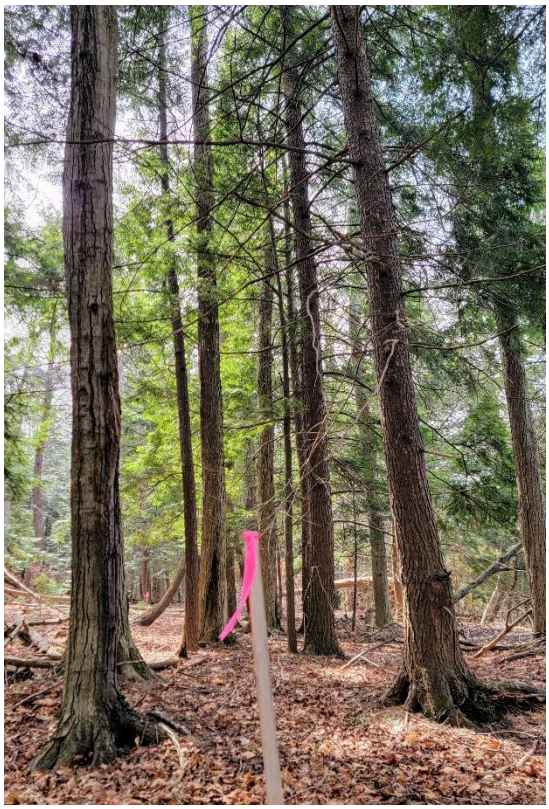
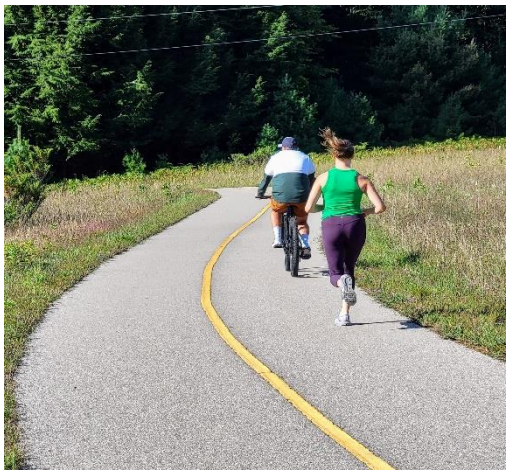
Engineering Design Analysis of Recreational Opportunities in the Good Harbor Region





- ***Recreational opportunities***
- ***Environmental stewardship***
- ***Design flexibility***
- ***Financial feasibility***

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April 26, 2024

FORWARD AND INTRODUCTION

Mansfield Land Use Consultants (MLUC), an engineering and design firm in Traverse City, Michigan, has been retained by Leelanau County residents and Sleeping Bear Naturally to independently consider, review and opine on the latest discussions and the now field staked horizontal alignment of Segment 9 of the Heritage Trail (Trail). There is also a desire for a deeper understanding of the "how's, what's and why's" regarding the Trail going to be developed as now staked in the field and how the utilization of practical design standards and construction methods might translate into reality of building the Trail.

Our staff has also been requested to provide thoughts, concepts, and schematic design for alternative methods of achieving the same or better recreational experiences, while reducing cost, conserving the natural character and resources, and creating less impact to the community in the area. These alternatives have been previously proposed by various stakeholders are not a matter of rehashing old woes, but rather edifications and analysis of new developments in trail use and implementation, new legal provisions as it pertains to roadway planning, and nearly 10 years of experience with the Trail network.

It needs to be stated that MLUC staff reviewed the initial NPS 2009 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment in 2011-12. As observed and reported in our "Review of the Scenic Heritage Route Trailway Plan and Environmental Assessment" for Little Traverse Lake Association (copy available at https://littletraverselake.org/heritage-trail), we found the work, process and conclusions extremely disappointing to say the least.

The resources, even to this date and after another 12 years since we last reviewed this proposed Segment 9, made available to the public for this study are truly limited, even as a 30% percent design review was verbally outlined last year to the public. It is our understanding that the Trail design team provided no new schematic design exhibits, details, specifications. calculations, or other such hard data. The lack of such data, even after 15 years since the 2009 Trailway Plan and Environmental Assessment was presented, makes what we desire to be a very objective and constructive critique extremely difficult. In such, MLUC was allowed by our client to collect, create, and utilize our own field data along the proposed Segment 9 route, including Traverse Lake Road, and as well as for analysis of alternatives. The rest of this initiative is to be contemplated using practical and standard methods and materials for similar construction on similar landscapes in the region. We apologize to those involved if we have missed information or interpreted design intent suggested by the design team and look forward to further understanding how the design, permitting and construction is to be undertaken on and over the extremely complex landscape of Segment 9 and the alignment of the heritage Trail as staked and envisioned thus far.

In addition to collecting field data and utilizing standard design practices that comply with the various requirements of overseeing agencies, we also conducted our analysis consistent with the goals and principles outlined for the Heritage Trail. According to the NPS 2009 Trailway

Plan and Environmental Assessment, the goal of the Sleeping Bear Heritage Trail is to: "Create a non-motorized linear trailway system that is connected to historical, cultural, recreational, and environmental points of interest throughout the Lakeshore and surrounding communities; a Trailway that promotes health, environmental, social, and economic benefits and provides a safe alternative for walking, biking, running, and cross-country skiing; and is universally accessible wherever possible."

The 2009 NPS Trailway Plan laid out Guiding Principles to steer the planning process:

1. Promote and encourage people to engage in healthy lifestyles benefiting from non-motorized trails.
2. Strengthen trail connections to existing trailheads, communities, and points of interest within the project boundary.
3. Enhance the recreational experience within the Sleeping Bear Dunes National Lakeshore (Lakeshore) and project area.
4. Incorporate universal design principles with regard to trail alignment, cross-sectional design, and trailhead development.
5. Consider the impacts that could occur to the environment and existing ecosystems.
6. Consider the impacts that could occur to historic properties and archeological resources.
7. Design a trail cross-section and trail alignment that is sustainable with regard to materials.
8. Provide a safe non-motorized trail facility.

It is important to look at a broader planning view of recreational opportunities within the Good Harbor area, taking into account all features of the Lakeshore and communities within this region. An important destination at this northeastern end of the Lakeshore having access to Good Harbor Bay and for visitors to enjoy Lake Michigan. Perhaps Good Harbor Bay is really the northern end of the Lakeshore, not just a property line boundary.

The purpose of this analysis is to review proposed options for recreational opportunities within the Good Harbor region. As part of the analysis, field visits were made, routes were walked, measurements and data were collected, and the analysis is based on those field observations and evaluated using standard engineering practices and construction requirements. The centerline of the proposed Heritage Trail route was staked and flagged by OHM consultants on behalf of NPS in May 2023 and those stakes were present during field observations. Potential trail designs were based on this staking and on design requirements of various agencies that regulate construction standards. This analysis is not intended to substitute for actual engineering designs. The alternatives were also evaluated on the basis of recreational opportunities meeting the purpose and principles identified in the NPS Trailway Plan.

ANALYSIS OF ENGINEERING DESIGNS FOR PROPOSED SEGMENT 9 ROUTE

NPS presented the proposed Segment 9 route in the 2009 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment. The current Heritage Trail extends 22 miles from Empire to east of the Port Oneida Historical District and ends at the intersection of M-22 and Bohemian Road / CR 669. The proposed Segment 9 extends the tail another 4.25 miles to the intersection of M-22 and Good Harbor Trail / CR 651. The route starts along the north side of M-22 until it reaches Traverse Lake Road (TLR) and then continues along TLR until it reaches the east end where the trail turns north through the Buka Farm area.

The Trail ends near the intersection of Good Harbor Trail / CR 651 and M-22. Users would need to utilize Good Harbor Trail / CR 651 to access the Good Harbor Beach parking area. This beach is a high-use area in the summer and lacks ample parking. There is currently no plan to address parking at this end of the trail and likely cars will be parking along the roadside.

The proposed Segment 9 was staked by OHM consultants May 2023 so the route can be walked and observed. The trail is located within the road right-of-way where the route crosses private property or topography requires it to be located closer to the road. Thus, Trail construction would take place within the right-of-way of M-22 and TLR and also on Lakeshore property outside of the right-of-way. The boundary area of the federally protected Wilderness Area begins 100' from the centerline of a county road (TLR) and 300' from the centerline of a state highway (M-22). No activity or trail construction is permitted within this Wilderness Area.

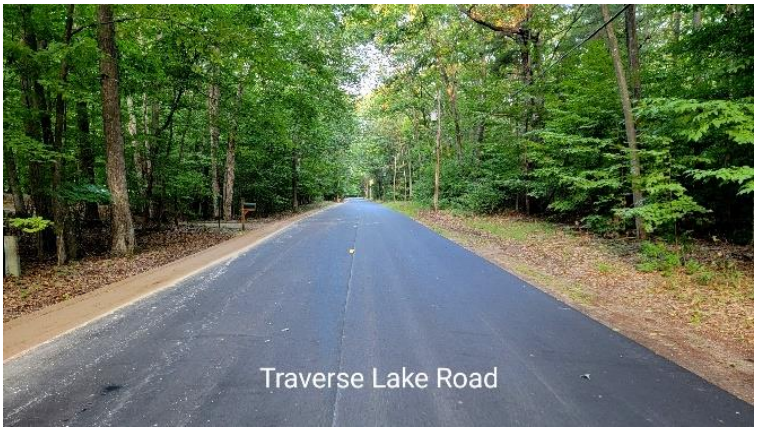
The plan is for a 10'wide asphalt path with 2' shoulders on each side along the entire route, unless elevated boardwalks are required across wetlands. MDOT at public meetings has

indicated typical construction process clears up to a 25’ wide swath to allow for construction. Proposed engineering design details are still not available to the public.

Preliminary information, based on 30% design stage, was presented at the August 2023 annual meeting of the Little Traverse Lake Association. Based on the update at Cleveland Township Annual Meeting on March 23, 2024, MDOT, the agency overseeing trail engineering for NPS as the trail owner, is expected to move beyond the 60% design stage in the upcoming weeks so as to apply for permits Spring 2024, receive construction bids late Summer 2024, and start tree clearing late Fall 2024 to allow for trail construction in 2025. That tight schedule is doubtful with design work still to be done. TART Trails is responsible for all fund raising and, as of March 2024, has secured $5 million of the projected $14.5 million cost. NPS has recently postponed a spring public meeting and indicated the intent to hold a public informational meeting during the summer as designs are finalized and made available to the public at that time.

Existing Conditions

Since the Trail generally follows the existing TLR, our first step was to outline the general horizontal alignment of the roadway, that relationship to design speed, stopping site distance, vehicular traffic and general context as it particularly relates to the character of the neighborhood and the park itself. This being said one can follow this discussion utilizing the physical survey of TLR that is included in the Appendix.



Traverse Lake Road is considered a “Local” road in regards to the State’s Act 51 and the County Road Commission funding, rights, and responsibilities. The road is generally posted for a 40 MPH speed limit with two 11’ vehicle travel lanes. The middle section of the physical road was recently repaved in 2023 by the Leelanau County Road Commission (LCRC). The east section of the physical road is scheduled to be reconstructed in 2024 by LCRC with work on the west section scheduled for 2025. The shoulders off the pavement vary in width from less than three feet, due to existing trees, to 5 feet. There are little to no drainage ditches or other storm water considerations. While no geotechnical work was done, the road’s substructure is suspect due to the adjacent wetlands, depth to the lake level, and hydraulic impacts in its relationship to the steep dunes. The road in context to others in the county has little variation in its vertical alignment.

While the right of way on the last ¼ to ½ mile on East and West ends are fairly devoid of larger trees, the rest of the road length has a considerable number of larger and mixed trees that

create very much a “tunnel effect” shading the experience and aid in traffic calming. There are approximately 8-10 trees that in fact should be removed as they impede the horizontal site distances and frankly are in such proximity to the drive surface that they may have ill effects on the substructure of the physical roadway.

At either end of the road there are curves marked for safe 25 MPH turning speed. Those tight turns would have a calculated speed rating of 20 MPH with some points on the curves having less than that 20 MPH value in stopping site distance. Conversely, the interior of the road moves gracefully in gentle curvature that create such a beautiful tree canopied driving experience. Traverse Lake Road is featured on many websites catering to those looking for a great motorized and bicycle tour of Leelanau County.

Beyond the recent paving, little to no other improvements have been made to the road in the last decade or after our initial study of the trail route. It needs to also be stated, that nothing has been done to the road’s Shalda Creek stream crossing on the west end or the sloughing of the dunes on the east end. There are also many areas, though maybe not significant in size, that need to have a method of out letting the storm water.

The lack of alterations over the years is also true as to it relates to additional residential or commercial impacts on the route. Specifically, it needs to be stated that the character of the landscape and neighborhood has genuinely remained the same in a region of the State that has literally exploded with development concerns, particularly since the Lakeshore and entire area was named “the most beautiful place in the nation.” The Lakeshore’s Wilderness Area extends along the north side. The tree lined canopy and adjoining Wilderness Area of the Lakeshore makes TLR truly a unique scenic beauty road with a wilderness feel.

A vehicular count was conducted by LCRC in 2018 and only 88 vehicles were counted on a September Saturday in the 16 daylight hours with a maximum of 18 vehicle trips in one hour. Traverse Lake Road is a low volume road servicing predominantly the local community of approximately 80 residents along the north shore of Little Traverse Lake and does not serve as a connecting or thorough fare road for the general public. The road is currently used by area cyclists and local residents for walking and biking due to its scenic beauty. Our staff was onsite several times over the last 6 months found the road almost devoid of any traffic vehicles, bicycles and pedestrians. Pretty hard to find just an equal in this region anymore. Based on 2016 data, the eastern Port Oneida portion of the Heritage Trail has an average of 97 users per day with a maximum of 12 users in one hour. Also pretty hard to understand why one would suggest so much impact, so much cost with so little need and so little conflict.

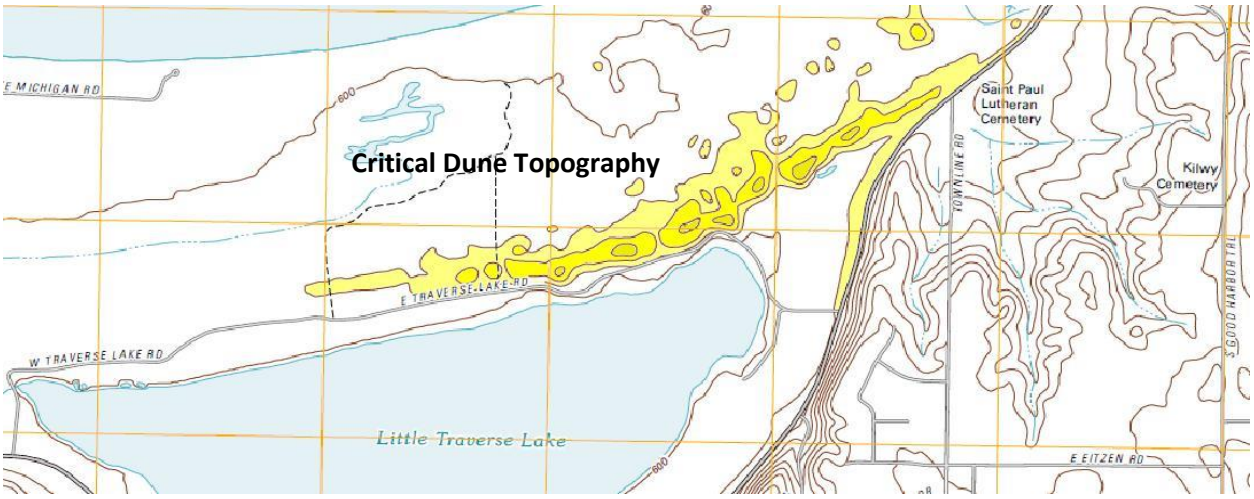
1. RETAINING WALLS THROUGH CRITICAL DUNE AREA

Critical Dune Area

Mansfield Land Use Consultants was asked to review the Trail route in regards to user experience, impact on the natural environment and character of the neighborhood, constructability, safety, and cost. An independent botanical survey along the Segment 9 staked route, "Pathway to Good Habor: Heritage Trail Segment 9 Tree Survey," was recently completed by Borealis Consulting for Little Traverse Lake Association. According to field survey, 85% of the trail route is located within the State regulated Critical Dune Area. The Michigan Legislature enacted Part 353 Sand Dunes Protection and Management as part of the Natural Resources and Environmental Protection Act 451 of 1994 to provide protection of Michigan's critical dune areas. As part of the state law, "The legislature finds that: (a) The critical dune areas of this state are a unique, irreplaceable, and fragile resource that provide significant recreational, economic, scientific, geological, scenic, botanical, educational, agricultural, and ecological benefits to the people of this state and to people from other states and countries who visit this resource" 324.35302 Legislative findings. Sec. 35302. There is an extensive permitting process through the Michigan Department of Environment, Great Lakes and Energy with opportunity for public input and comment into the granting of permits to excavate any critical dunes.

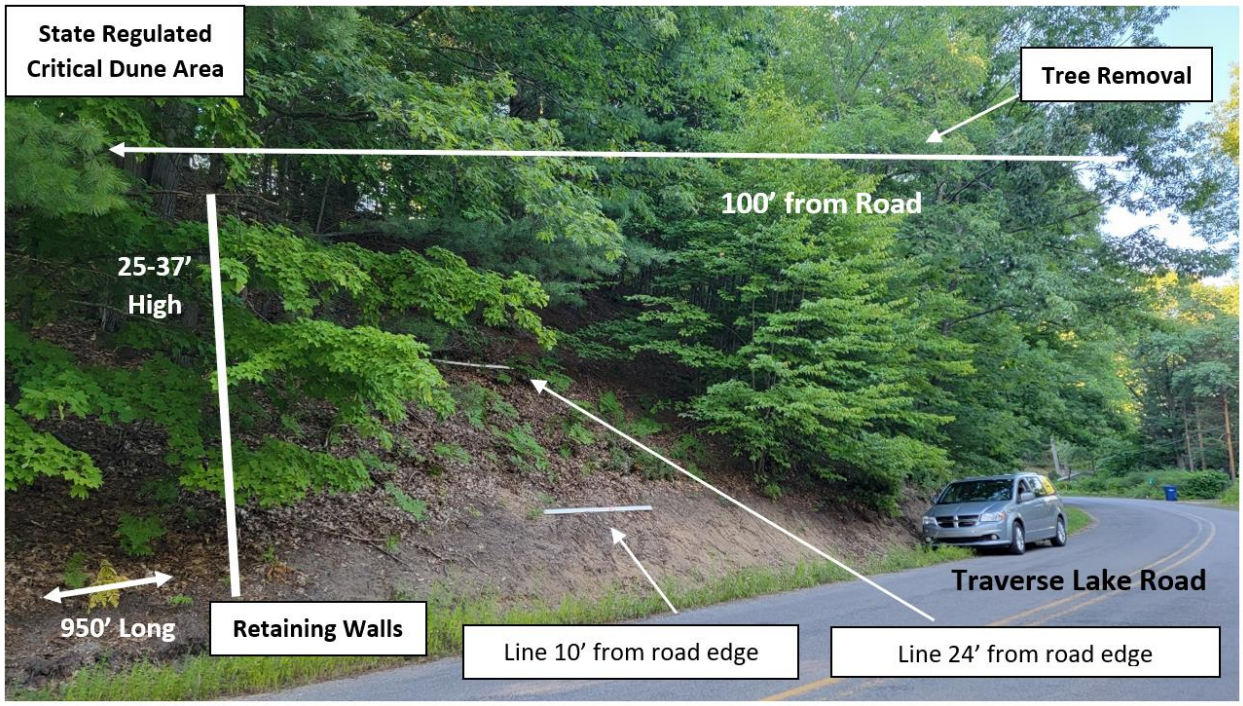
Large and steep Critical Dunes are located along TLR on the east end and end at road edge. Several site visits were made to gather survey data on the State regulated Critical Dune Area along the east end of TLR, including topography measurements. The predominate Critical Dune Area of study in this report is approximately 950', beginning across from 1382 East TLR and ending across from 1292 East TLR. There is another shorter segment of State regulated Critical Dune Area across from 1244 - 1136 East TLR that will also require excavation and/or construction of retaining walls. The large Critical Dune Area has dunes that are as high as 50' in elevation above the roadway.

The current Critical Dune Area is covered by numerous established trees, many significant in size and maturity, that provide stability to the dune slope but also provide scenic beauty along TLR and provide a shade canopy that extends over and alongside the road.



Trail construction considerations

Construction of the Trail would take place within the LCRC road right-of-way (ROW), requiring a permit from LCRC, but would necessitate extending beyond the road ROW for excavation and construction purposes. The boundary area of the federally protected Wilderness Area begins 100 ft from the roadway and no activity is permitted within this area. In order for the Trail to traverse this State regulated Critical Dune Area, trees would need to be cleared towards the top



of the slope, a significant portion of dune material would be removed and transported off site to a land fill area, retaining walls would be built to help back the remaining dune hill, and then the 14' wide trail (10' asphalt path with 2' safety shoulders) could be built.

In analyzing the route, the only tool available in the last several months were the centerline trail stakes that were generally observed at approximately 100 ft. intervals. The stakes were generally located 15-30' off the edge of pavement. In such, much of the trail is proposed to be located within the ROW of TLR. This encroachment is generally accepted – but the rights and needs of LCRC are generally incorporated into the cross section before any other priorities. LCRC has established requirements for building roads and these standards were incorporated into the designs. This means that LCRC should ensure that all drainage and or safety measures are met – then any remaining width of the right of way may be encumbered. As stated previously, most of the road does not meet the standard cross section, particularly in terms of ditching. To meet the LCRC standards, the suggested distance of the preliminary Trail staking as found in the field truly needs to move further north another 10' at least. We have incorporated LCRC drainage requirements into all of our design cross section.

Normally 10' would not sound like a lot, but the challenge is dealing with loose sand dunes whose slopes extend to within 4-6' at most from the edge of pavement and have a slope ratio of approximately 1.3:1. To put the slope into perspective, when working on a construction project, OSHA requires slopes to be no steeper than 1:1 for safety purposes. That means the dune slope needs to be cut back to a 1:1 slope in order to safely complete construction work at the bottom and then backfilled after construction. The 1:1 slope requirement by OSHA for construction is referenced in our design cross sections as well as the resulting cut and fill area.

Tree clearing takes place above the dune wall to prevent root interference with wall structure and to eliminate the hazard of any trees falling down slope on the wall or trail path below. We have indicated in our design cross sections the additional tree clearing that is required upslope.

The design cure for dunes that exceed the slope criteria is the implementation of a "Retaining Wall." Retaining walls are usually made out of manufactured blocks and can be single tier by design (a single solid wall to cover height needs) or a multiple tier design staggering multiple walls to meet height needs. We have explored the application of both designs. We consulted with Manthei Supply in Charlevoix, who represents Redi-Rock International headquartered in Petoskey, on the single tier design. A site visit was part of the consultation.

A retaining wall is common place along Michigan and Federal roadways, particularly those in hilly or mountainous areas. But engineers are not generally encroaching into protected and fragile elements such as State regulated Critical Dune Area. Openly, it is for much of this reason that the road does not even meet their own standards due to the difficulty often encountered in trying to significantly alter Critical Dune formations. We at this office opine that LCRC itself would have a tough time permitting the illustrated encroachment into the Critical Dune Area. We would not even counsel a private citizen to propose a fraction of this work. It just isn't

done. There are two potential areas along TLR that would need this magnitude of construction to maintain the proposed alignment and to meet all the construction regulations. The impact could easily exceed the 100' "Wilderness" setback limitation so staking of this boundary is important.

In an attempt to illustrate the existing situation, the standard of care required to meet design standards, and the incorporation of general practices of dealing with this type of encroachment and restoration, we have provided five independent cross sections as they would meet the standard of care and the scale of invasion into the dunes (See Appendix for full sized cross sections):

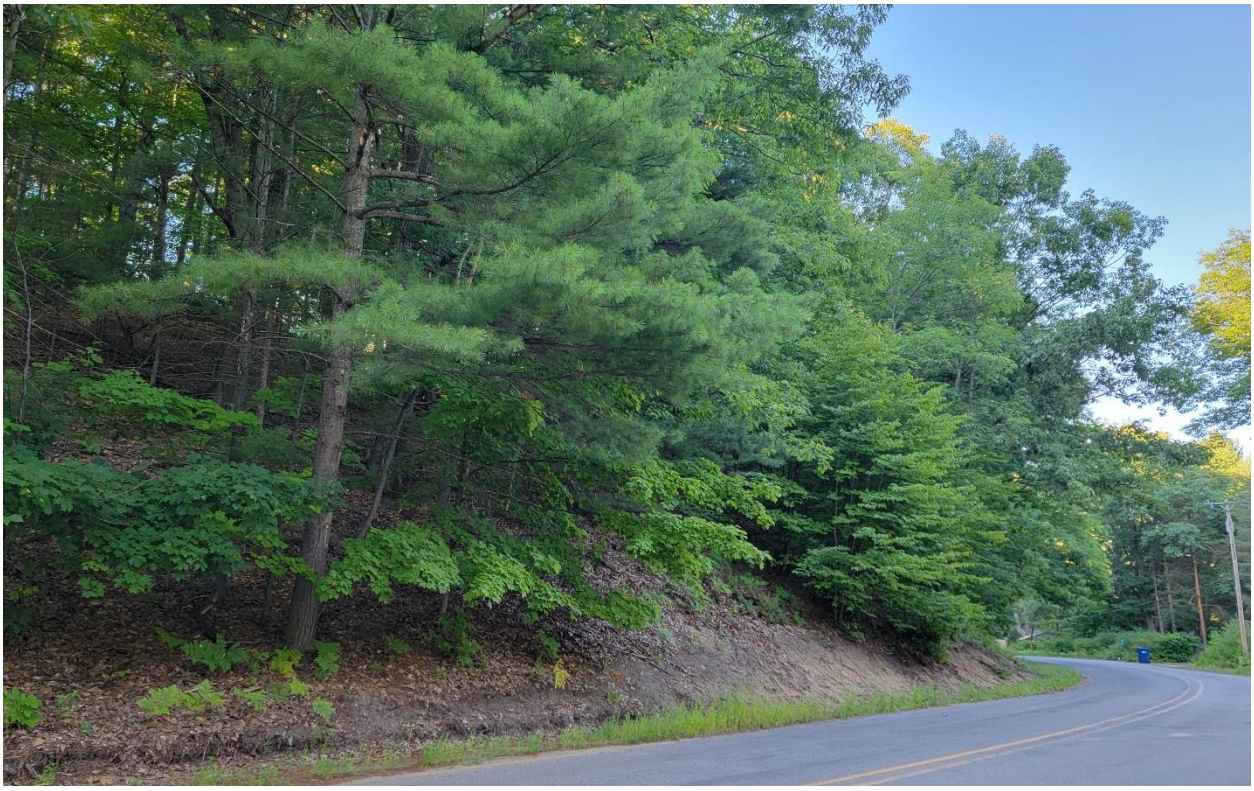
- Cross section of existing dunes,
- Cross section meeting LCRC drainage requirements with existing road width (11' lane width),
- Cross section meeting LCRC drainage requirements with LCRC requirements for new road construction (15' lane width),
- Cross section for proposed Trail construction using a multi-tiered retaining wall design,
- Cross section for proposed Trail construction using a single-tiered retaining wall design.

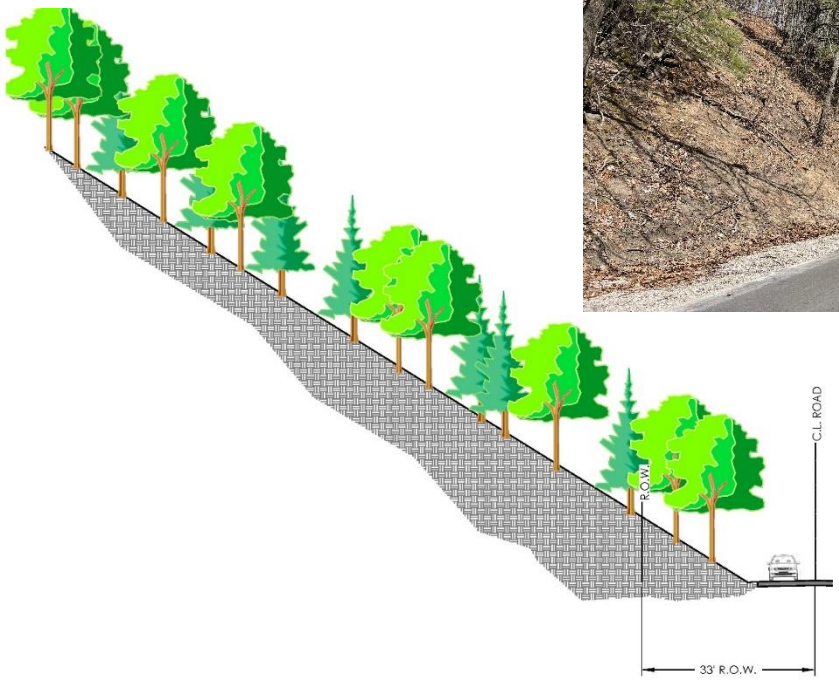
> *Based on our field measurements, LCRC design requirements, OSHA safety requirements, and generally accepted design practices, our staff concludes that construction of the trail through the State regulated Critical Dune Area along east Traverse Lake Road requires building retaining walls for 950' (nearly 1/5 mile) that can be 25' or more in height. A multi-tiered design for the retaining walls would extend the height up to 37' in height. This height is greater than a 2.5 story house.*

Final engineering designs may discover ways to lessen impact or find ways to reduce the design requirements, but these facts will remain: a significant portion of the tree canopy in this section along TLR will be cleared, a significant portion of the State regulated Critical Dune Area will need to be removed and hauled away to a land fill area, extensive retaining walls will need to be built for 950' along TLR, costs will be significant, and the result will be a significant character change in this scenic wilderness road. These aspects cannot be overlooked despite discussions about the type of retaining wall material or how the retaining wall can be designed more aesthetically. The bigger question is why this significant alteration is even necessary or deemed acceptable in Trail planning, especially when alternatives for creating recreational opportunities exist.

Cross sections of various retaining wall designs follow with full page versions included in the Appendix. These cross sections are based on our field measurements, LCRC design requirements for roads and drainage, OSHA safety requirements, and generally accept design practices.

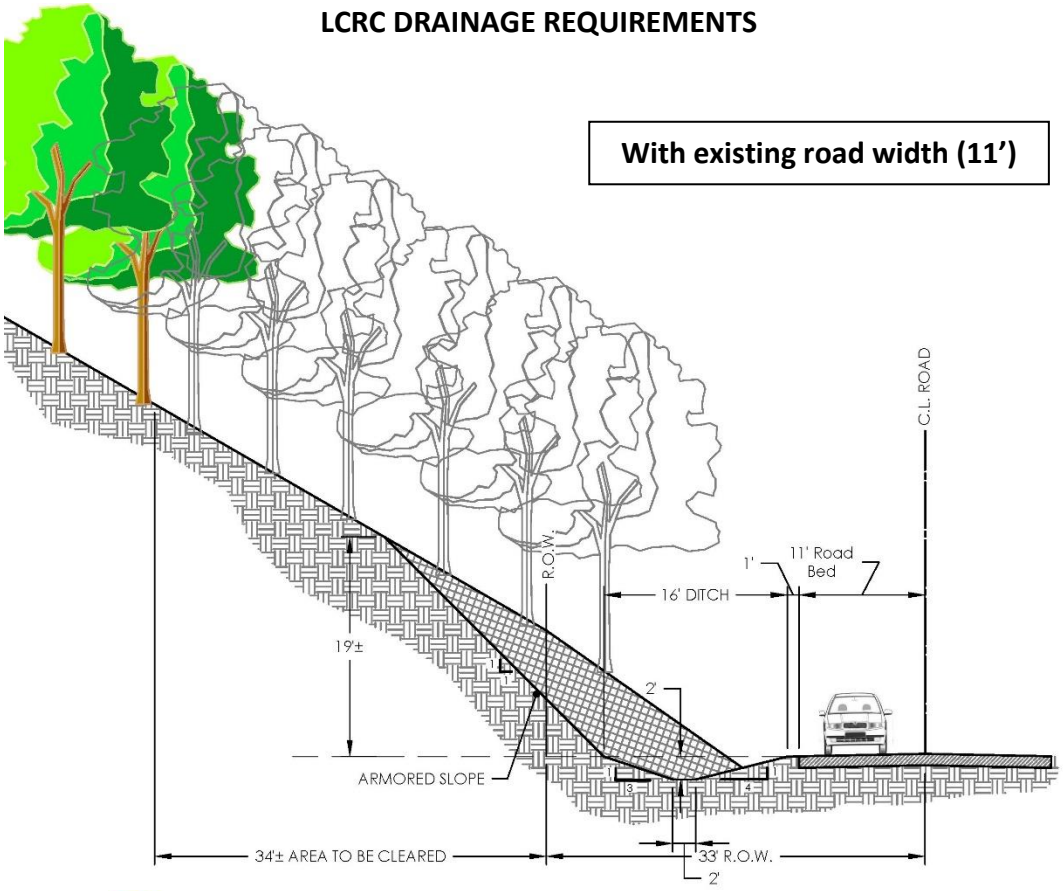
EXISTING CONDITIONS



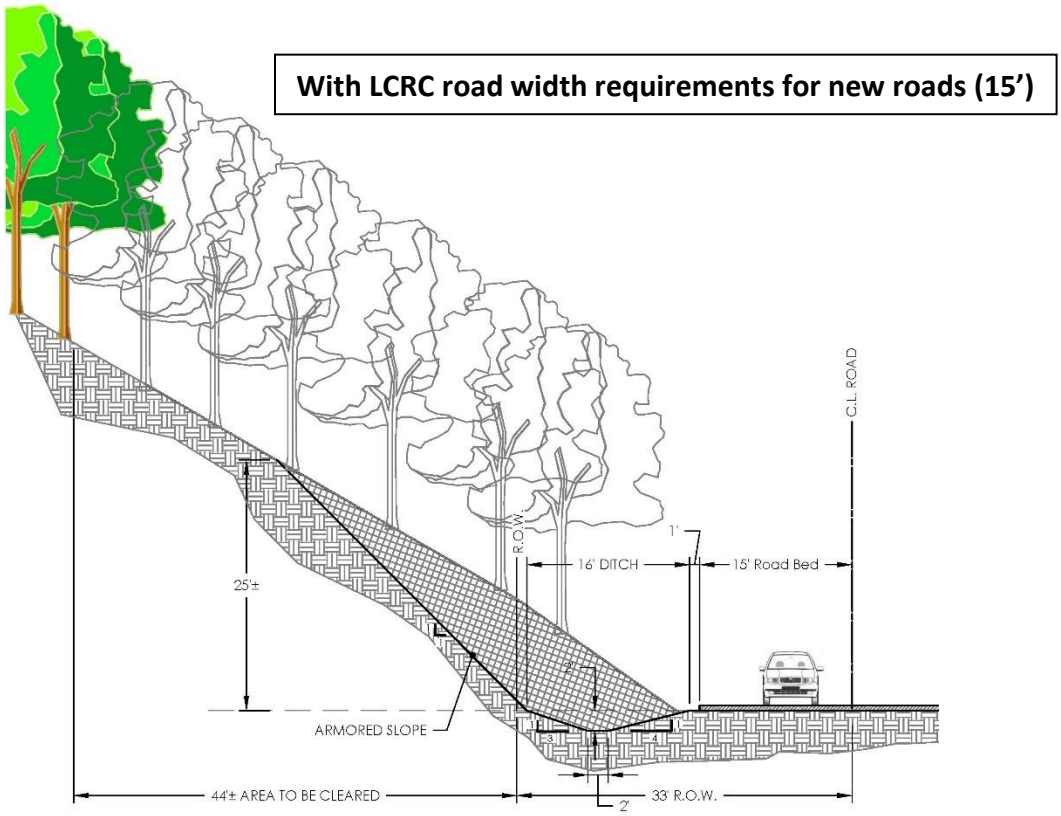


LCRC DRAINAGE REQUIREMENTS

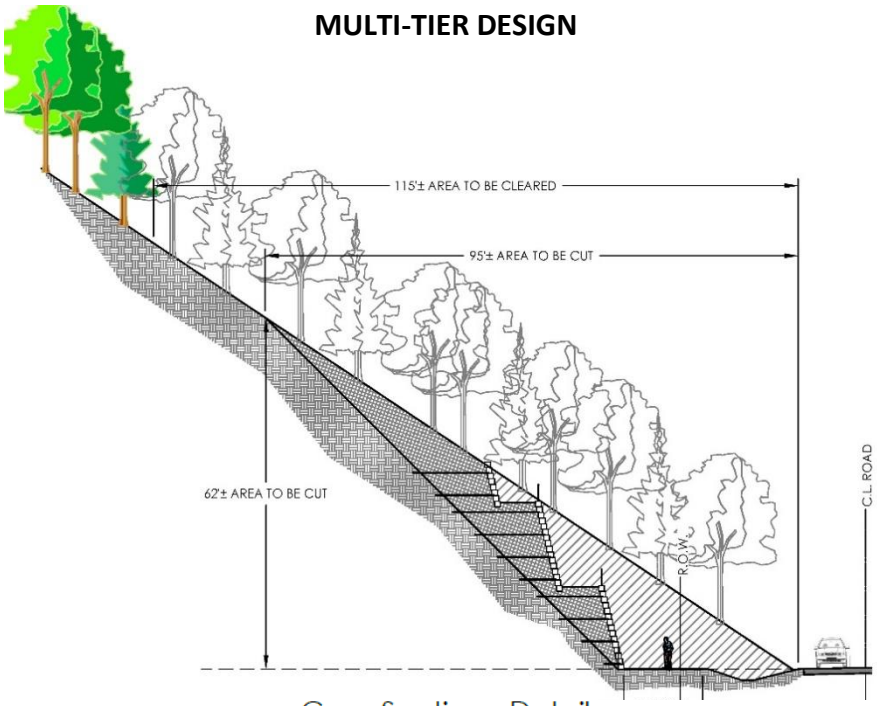
With existing road width (11')



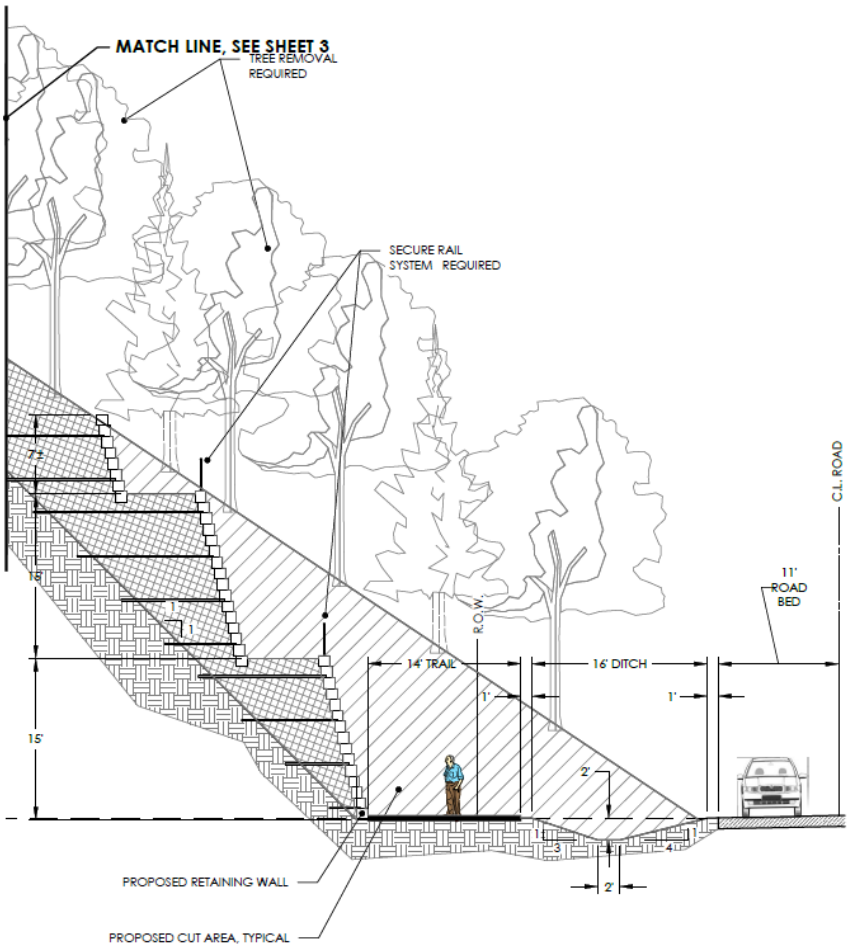
With LCRC road width requirements for new roads (15')



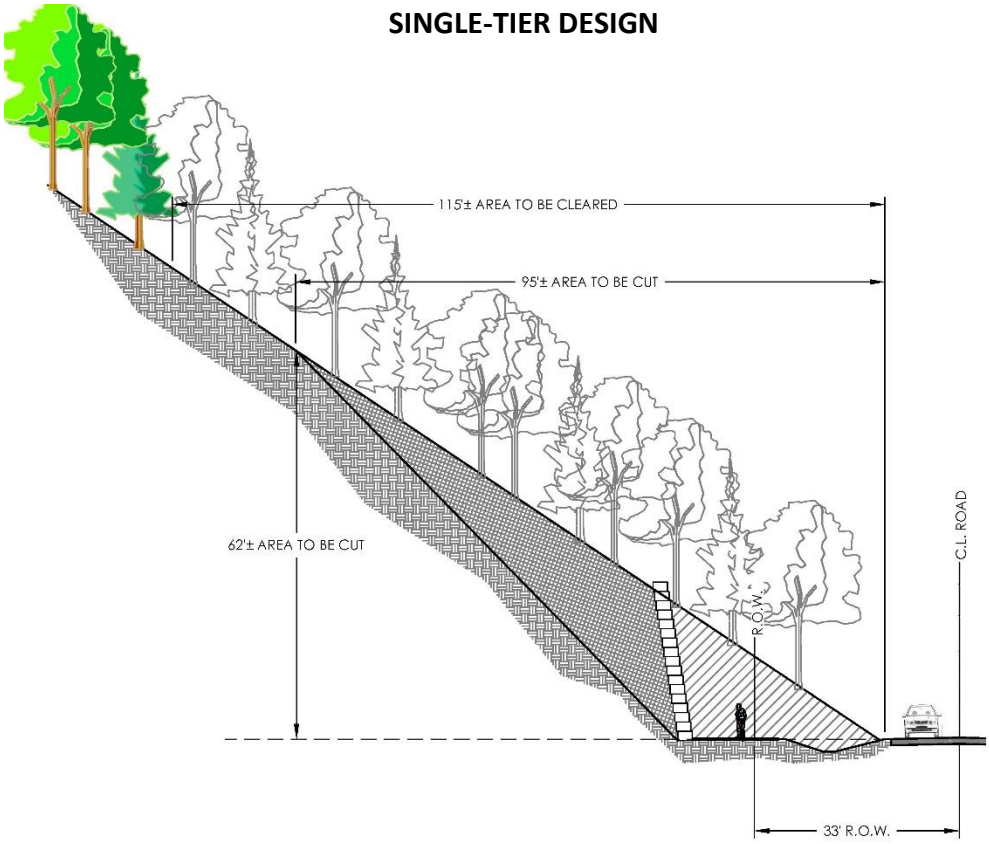
MULTI-TIER DESIGN

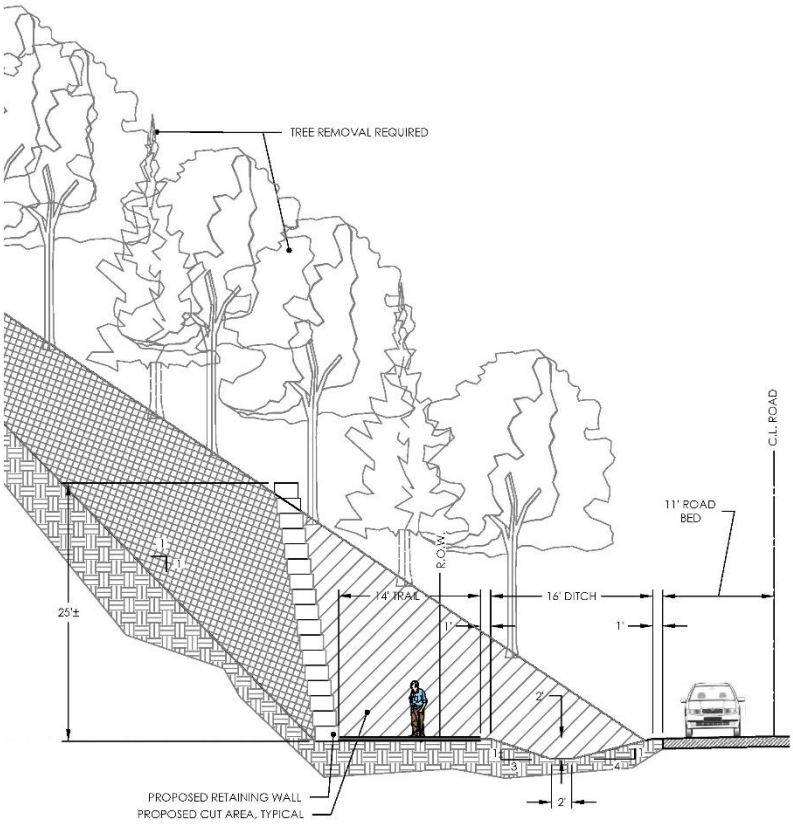


Cross Section - Detail

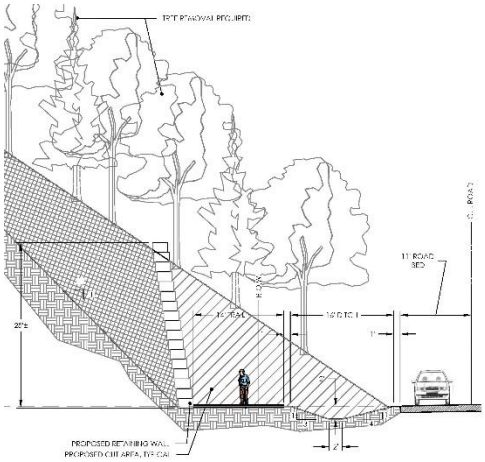


SINGLE-TIER DESIGN



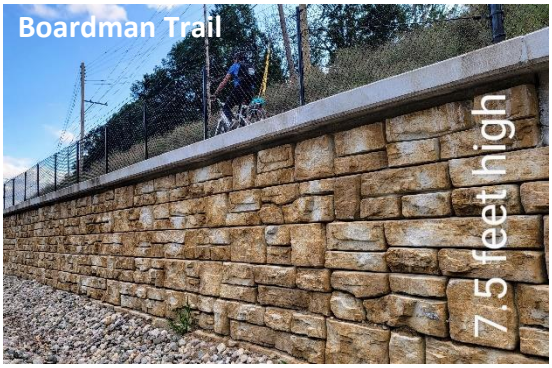


THIS EXHIBIT ILLUSTRATES MAINTAINING THE EXISTING PAVED ROAD BED WITH DEVELOPING THE STANDARD DRAINAGE DITCH, INCORPORATING THE TRAIL SECTION AND A SINGLE 25 FOOT HIGH RETAINING WALL.



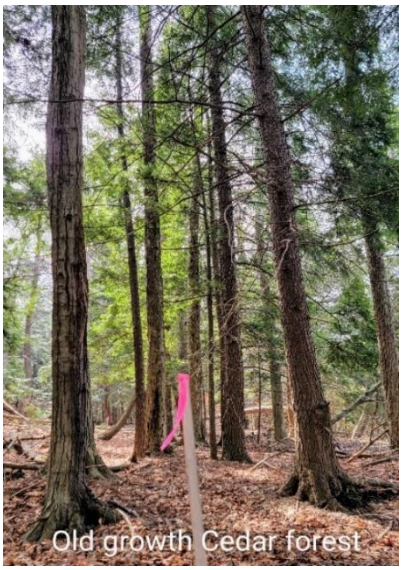
Rendering of retaining wall design along Traverse Lake Road

Local Traverse City examples of retaining wall construction



2. BOARDWALK CONSTRUCTION THROUGH WOODED DUNE AND SWALE COMPLEX

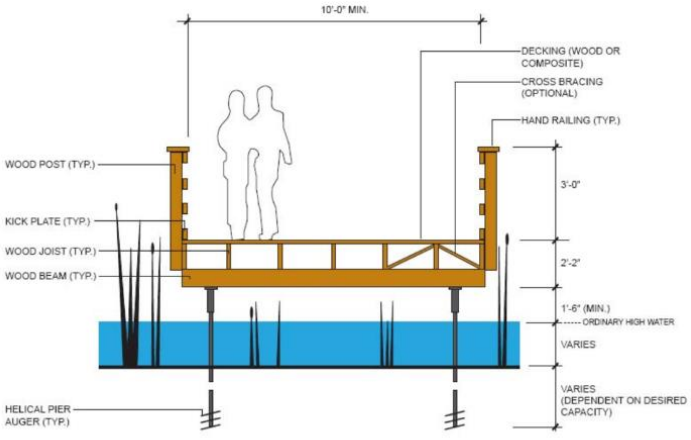
The botanical field survey completed by Borealis Consulting noted the existence of globally rare and State Concern wooded dune and swale complexes in the Bufka Farm area between Traverse Lake Road and Good Harbor Trail. The field survey discovered that the staked Trail route runs through the wooded dune and swale complex even though the Segment 9 maps shows the trail outside of this ecosystem. These complexes have steep upland dunes immediately adjacent to pristine wetlands, unimpacted yet by invasive species. Much of the wetlands are wooded, populated by cedars and hemlocks. There are many large mature cedars and hemlocks in this area creating a unique and sensitive ecosystem. These wetlands within wooded dune and swale complexes are highly regulated due to their rare occurrences and are difficult to permit.


Old growth Cedar forest

Michigan State University, which manages Michigan's Natural Features Database, recommends the following biodiversity management principles when describing the significance of wooded dune and swale complex:

> "Residential and recreational development and accompanying road building in and around wooded dune and swale complexes has resulted in disrupted hydrological conditions, wetland destruction, nutrient loading, and the introduction of invasive species. Conservation efforts should focus on protecting wooded dune and swale complexes from development and fragmentation, preserving natural hydrology, and controlling invasive species. Because of the wide diversity of habitats provided by wooded dune and swale complexes, invasive species that threaten the diversity and community structure include species from all ends of the moisture and light continuums."

MDOT has publicly stated that 18% of the proposed 4.25 mile Segment 9 trail length requires the construction of elevated boardwalks. Boardwalk construction requires clearing of all vegetation and trees above the surface but without disturbing the root structure. Construction then requires drilling piers using drilling equipment into wet soil for many feet. The process can be complicated if there is not easy access for the construction equipment and transportation of materials. There will be impacts to the wetlands during construction and



2009 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment

often projects require mitigation of wetland credits elsewhere, even despite efforts to restore the disturbed wetlands. Other impacts are more long-term, including the opening of the tree canopy along the trail and facilitating the spread of invasive species as they are transported to the area.

The wooded dune and swale complexes along the proposed route present a construction challenge. One has to first decide if the trail is routed through the wetlands requiring elevated boardwalk construction or cuts into the upland dunes which can require retaining walls. Then the wetlands need to be cleared of trees and all trees removed off site, including fallen dead trees. Heavy equipment needs to access the site and trail materials transported in.

This construction process is complicated in the Bufka area due to the remoteness of the proposed route. The steep ravines along M-22 prevent easy access from the road. The only construction access points are Traverse Lake Road, Bufka Farmstead, and Good Harbor Trail / CR 651. There are wetlands interspersed with upland dune areas along the route making the process of bringing in paving equipment equally challenging. There is a large and steep dune approximately halfway between Bufka Farm and Good Harbor Trail / CR 651 that has wetlands on either side. It appears that the existing transition from wetland to peak of dune rises over 20' of vertical within 100' of trail length, then drops the same amount on the other side of dune. This large dune hill needs to be excavated to meet accessibility grade requirements but construction access is challenging.

While the boardwalk design will be standard engineering, the construction process in the Bufka wooded dune and swale complexes will not be routine, thus adding extra costs and expense due to challenges with accessibility. Due to the remote

wilderness location and lack of easy access from any existing roads, the trail and all boardwalks in this area will need to be built for utilization by emergency vehicles, designed to carry 10 tons in weight. The extra weight requirement will add to construction requirements and thus additional cost.

TART Trails is proposing a 4,700' trail along east 3 Mile Road between South Airport and Vanderlip Road in Traverse City which requires elevated boardwalk for over 90% of the length due to significant wetland formations. As a result, the projected cost for that trail is $13 million ($3,000 per foot). In comparison, nearly 20% of the 4.25 mile proposed Segment 9 requires boardwalk construction for over 4,000 feet. If the costs were similar for building Truck Weight Rated elevated boardwalk sections in the remote Bufka Farm area with limited construction access, construction of the proposed Segment 9 Trail could exceed the current $14.5 million budget (e.g. 4,000' boardwalk needed for Segment 9 x $3,000 per foot cost = $12 million).

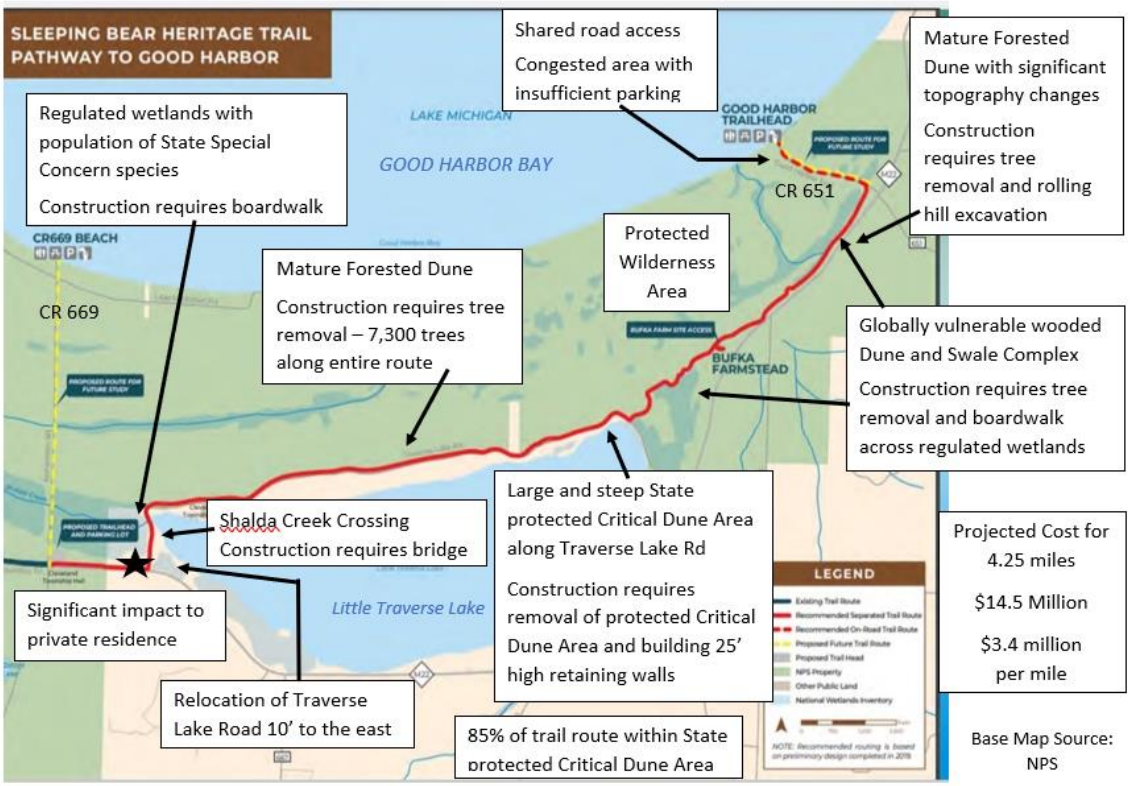
Construction bids will likely be higher than expected in the Bufka Farm area due to the added challenge of trail construction in a remote wilderness as well as additional engineering design features to traverse the wooded dune and swale complexes. Construction methods in wilderness areas are not always straightforward and can be challenging. Examples of 2012 Heritage Trail construction between Forest Haven Drive and Glen Haven Drive:

ENVIRONMENTAL ASSESSMENT CONSIDERATIONS

According to our analysis, removal of significant portions of State regulated Critical Dunes will be needed to route the trail off-road along the east end of Traverse Lake Road. After substantial tree clearing and extensive earthwork, the trail design will require the construction of large retaining walls that can be 25' or more in height for 950' through this State regulated Critical Dune Area. The proposed Segment 9 also will require the extensive construction of elevated boardwalk through sensitive and vulnerable wooded dune and swale complexes that are globally rare. It is important to investigate whether these construction designs were identified in the original Trailway Plan, taken into account in the original cost projections, and whether it was identified in the Environmental Assessment. From the review of the 2009 Trailway plan, it appears that neither the construction of retaining walls through State regulated Critical Dune Area or extensive boardwalk construction were identified or evaluated, especially through vulnerable wooded dune and swale complexes.

It's been 15 years since the Heritage Trailway Plan and Environmental Assessment was presented to the public in February 2009. There is so much more information now available to the public, including a botanical survey along the staked and flagged Segment 9 route. The independent survey, commissioned by Little Traverse Lake Association, identified various environmental features and ecosystems that are present, which has relevancy to proposed construction designs that are required and their associated costs.

PROPOSED AND STAKED SEGMENT 9 SUMMARY



The National Park Service issued in 2009 a "finding of no significant impact" (FONSI) for the Heritage Trail and has stated that finding applies to Segment 9. Segment 9 has unique environmental features and engineering requirements that are not representative of the other 22 miles of the Heritage Trail. Segment 9 cannot just be lumped together and assume the "no significant impacts" of other trail segments applies to Segment 9.

Mansfield Land Use Consultants completed an independent analysis and review of the Trailway Plan & Environmental Assessment in our 2012 report "Review of the Scenic Heritage Route Trailway Plan and Environmental Assessment" for Little Traverse Lake Association (copy available at https://littletraverselake.org/heritage-trail). As part of our field study for that review, we identified many of the same features as documented in the recently completed botanical survey. As we described in depth in our review, those environmental features and engineering requirements were not identified or represented in the NPS 2009 EA, either in tables assessing the impact of proposed route or in the projected cost estimates.

The NPS 2009 Environmental Assessment, which is intended to be the basis for a "Finding of No Significant Impact" (FONSI), did not identify in Table 17 "Impact to the Environment" (see appendix) the following environmental features, which the Borealis botanical survey identified and documented to be present:

- Rich conifer wetlands along west Traverse Lake Road (TLR) with State Special Concern species within 15 of proposed Trail,
- Shalda Creek and the need for a bridge crossing across Shalda Creek,
- Wooded dune forest along TLR,
- State regulated Critical Dune Area which exists for 85% of trail length,
- Steep critical dunes along TLR and the need to build large and extensive retaining walls,
- Globally rare and State concern wooded dune and swale complexes, and
- The 2008 Lakeshore's General Management Plan, which includes management priorities for recreational use and protection of wilderness areas.

In Table 17 "Impacts to the Environment," found in the Appendix of the 2009 Trailway Plan and Environmental Assessment, NPS assigned a score of "0" impact to the proposed off-road trail along Traverse Lake Road (Opt. 9.2) in regards to Topography, Wetlands, Streams & Creeks, Soils, Wildlife, Vegetation, and Viewsheds, despite the existence and significance of the various ecosystems present along the proposed route.

In Segment 9 Cost Projections, found on page 131 of Chapter 5 in the 2009 Trailway Plan and Environmental Assessment, NPS did not identify any costs for:

(1) building boardwalks (nearly 20% of trail length),
(2) constructing a bridge to cross Shalda Creek,
(3) extensive tree clearing and excavation along Traverse Lake Road,
(4) the significant removal of portions State regulated Critical Dune Area to building large retaining walls that can be 25' or more in height, for 950 feet, or

(5) moving west TLR intersection over 10’ as proposed by MDOT and mitigating a flowing artesian spring.

> We determined in our 2012 analysis that if Segment 9 environmental assessment accurately identified the various features and evaluated the impacts properly for Segment 9, “the Impacts to the Environment would combine to make this segment one of, if not the highest, scoring segments along the entire route,” not one of the lowest as suggested by the scoring in the NPS Environmental Assessment.

NPS completed an environmental assessment in their “2008 Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment” based on the proposed Segment 9 route using Traverse Lake Road as a shared ***on-road*** design. The proposed route was revised to a completely ***off-road*** design in the “2009 Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment” but the environmental assessment was not changed. If one compares the 2008 ***on-road*** documents of Table 17 “Impacts to the Environment”, Table 18 “Impacts to Feasibility” and “Segment 9 Projection Costs” to the 2009 ***off-road*** documents, they are identical, word for word. For example, both reference on-road design within the tables.

NPS – 2008 Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment
Opt. 9.2 – On-road Trail

Table 17 – Segment 9 Impact to the Environment

	SEGMENT 9	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
M-22 R.O.W.	Option 9.1	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)
TLR ON-Road	Option 9.2	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

NPS - 2009 Leelanau Scenic Heritage Trailway Plan & Environmental Assessment
Opt. 9.2 - Off-road trail

Table 17 – Segment 9 Impact to the Environment

	SEGMENT 9	Topography	Wetlands	Streams & Creeks	Soils	Wildlife	Vegetation	Land Use	Cultural Resource	Viewsheds	TOTAL IMPACT TO THE ENVIRO.
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TLR OFF-Road	Option 9.2	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

How can the impacts to environment, feasibility and costs be the same and identical for both an <u>on-road</u> trail and an <u>off-road</u> trail? Perhaps an environmental assessment for the proposed 2009 *off-road* trail was never done. Regardless, it still makes the 2009 Environmental Assessment flawed with errors and omissions. A copy of the tables relevant to Segment 9 from NPS 2008 EA and 2009 EA are both included in the appendix of this report. One will find that they are word for word the same information. A copy of the full 2008 & 2009 NPS Trailway Plan & Environmental Assessment can be found on the NPS Park Planning website.

The public is more aware of information that was not available previously or made publicly available. Here is what is available today that was not available in 2009:

- An independent botanical survey has now been completed based on actual staking of the proposed route.
- Engineering analysis is now publicly available on the potential design and impacts through State regulated Critical Dune Area and wooded dune and swale complexes.
- Costs are being updated to reflect actual design requirements that were previously omitted.
- Greater understanding of feasible alternatives in the Good Harbor area that have fewer known environmental impacts while still creating diverse recreational opportunities.
- There is a better understanding of user demand than was projected 15 years ago.

The National Environmental Protection Act (NEPA) requires the EA/EIS document, through scientific analysis, potential impacts to the human environment as well as identify alternatives that might lessen that impact. NEPA requires an EA to be revisited if there are significant new circumstances or information relevant to the environmental concerns that have bearing on the proposed action or its impacts. That is certainly the case. Environmental assessments are not timeless, due to nature's constantly changing conditions.

Borealis Consulting LLC concluded in their 2024 botanical survey report ""Three and half miles (85%) of the trail is within protected Critical Dune Area, including barrier dune and wooded dune and swale complex, vulnerable communities in the State of Michigan. The trail also crosses regulated wetlands near rare, threatened, or endangered species habitat. Because of this, *it is recommended that an Environmental Assessment (EA) is done on the impact of the route that this trail takes and in comparison to other potential routes.*"

> We recommended a new EA in our 2012 report. We concur with those recommendations still today. ***A new EA should be done for Segment 9 because of the errors and omissions in the 2009 EA and new information that is available 15 years later.*** *A full and documented EA should be based on scientific studies that also take into account proposed engineering designs and include all alternatives available in this Good Harbor area for evaluation in comparison. Based on all the available information, a more detailed Environmental Impact Statement (EIS), which was never completed, is warranted as well.*

3. COST PERSPECTIVES

The National Park Service provided cost information in the 2009 Trailway Plan and Environmental Assessment as a way to inform the public and help the public make informed decisions in evaluating the routes. Cost estimates for Segment 9 were included on page 131, Chapter 5. The total cost for Segment 9 was $477,776 for all 4.25 miles, making it one of the lowest costs per mile of any segment. The estimated cost to build a separate *off-road* trail along 2.43 miles of Traverse Lake Road was $18,225.

TART Trails has indicated the cost for the proposed Segment 9 is $14.5 million, with $5 million raised as of March 2024. This is 30x the original project cost. The increasing cost is not simply due to inflation but the additional engineering features that were not identified in the 2009 Trailway Plan and Environmental Assessment, such as:

- Significant tree clearing,
- Extensive retaining walls in the Critical Dune Area along TLR,
- Elevated boardwalks for nearly 20% of trail length,
- Moving west TLR over to the east 10',
- Shalda Creek crossing, and
- A separate off-road 10' asphalt path.

The projected cost is currently $3.4 million per mile. The existing 22 miles of the Heritage Trail was built for less than $10.5 million, or $477,000 per mile. For comparison, Leelanau County Road Commission is reconstructing and rebuilding, with a new subbase, this year the east 0.5 mi of Traverse Lake Road for a cost of $314,000 (equivalent to $628,000 per mile), according to Cleveland Township.

> *The cost of building the proposed Segment 9 Trail with a 10' wide asphalt path is 3.4x more per mile than the cost for a complete re-construction of a 22'ft wide load bearing road, assuming a $1.0 million cost per mile. That's 3.4x the cost per mile for a path half the width.*

The annual budget of LCRC to maintain 170 miles of primary roads and 425 miles of local roads in the entire county is $9 million. The projected $14.5 million cost is an average of $641 per person for the entire Leelanau County (population 22,000) and is approaching the annual budget for all of Leelanau County government services ($18 million, excluding LCRC).

Evaluation of engineering design costs, financial stewardship and cost accountability should be an important part of the trail planning process and the community decision making process. One of the challenges with Segment 9 is the various environmental features that require specific engineering design solutions and premium construction considerations. As a result, final costs after receiving construction bids may be higher than the projected cost. Consideration of alternative routes can be an important step in determining the best use of available funds.

Summary of environmental and engineering considerations

	Environmental Considerations	Engineering Considerations
Topography	Steep State regulated Critical Dune Area along east Traverse Lake Road Wooded Dune and Swale Complex with steep dune slopes	Large retaining walls, 950' in length and can be 25+' in height to traverse Possible retaining walls
Wetlands	Rich Conifer Wetlands on west Traverse Lake Road with nearby State Special Concern Species Wooded Dune and Swale Complex – globally rare and of State Concern	Boardwalk construction for nearly 20% of trail length
Streams & Creeks	Shalda Creek	Build new trail bridge or replace road culvert as part of road improvements
Vegetation	Extensive mature dune forest State special concern species within 15' of proposed trail through wetlands Habitat area for State threatened pine drops	7,300 trees to be removed
Land Use	Close proximity to private property along M-22 west of TLR – crosses 5 private properties	Construction within right-of-way
Trail Design		Off-road asphalt trail Ends at intersection of Good Harbor Trail / CR 651 and M-22 with inadequate plan for parking

Special construction considerations

As one can now envision, the routing of the Trail as drawn with a broad marker on a small map some 15 years ago is finding itself extremely complex when analyzed in more detail. The design phase has been and to some extent is still conceptual to schematic at best with only the most general and acceptable means and methods are being applied. But all this being said there are many special considerations coming to light and frankly to the forefront of this route that, at a minimum, have to be at the top of the of the "yet to be determined" column. Impact to the scenic landscape and natural character, the exposing and fragmentation of pristine wetlands

with the real possibility of introducing invasive species to the perfect complex, the dilemma of choosing between wetland boardwalk or dune retaining walls in the globally rare wooded dune and swale complex, the undercutting and removal of regulated Critical Dune Area, the loss of thousands of trees, and the complete dismissal of character of a lakeside community with its revered wilderness road, are just a few to highlight.

Other special considerations are yet unknown as to special elements being employed and their inclusive cost which may include: (1) Retaining Walls, some being 25' high or more and undercutting State regulated Critical Dunes may reach cost of $1,500 - $2,000 per square foot; and (2) Truck Weight Rated Board Walks on helical pilings with unknown soil types and over pristine, untouched and unfragmented wetlands, could run as much as $2,500 - $3,000 a linear foot. These are expensive construction designs and applications due to the environmental features that are present.

All this too on and over a very human scale neighborhood, serviced by narrow Local Road corridor on a suspect and fragile substrate. What will be left of this road after literally hundreds of trains of sand, gravel, cast boulders and other materials and appurtenances, are delivered on a road with minimal drainage and high ground water? Construction includes the removal of thousands of trees that need to be hauled off-site as well as ton upon ton of excess debris and cut material that has to be removed and hauled to a land fill area. What impact will cranes embedding their stanchions, payloaders loading trucks, and excavators twisting their steel treads have on the existing road? Construction activity will shut down this narrow local road while construction workers park their pickup trucks along the roadside. Is there a budget cost to deal with this impact in the plan? In the opinion of probable cost?

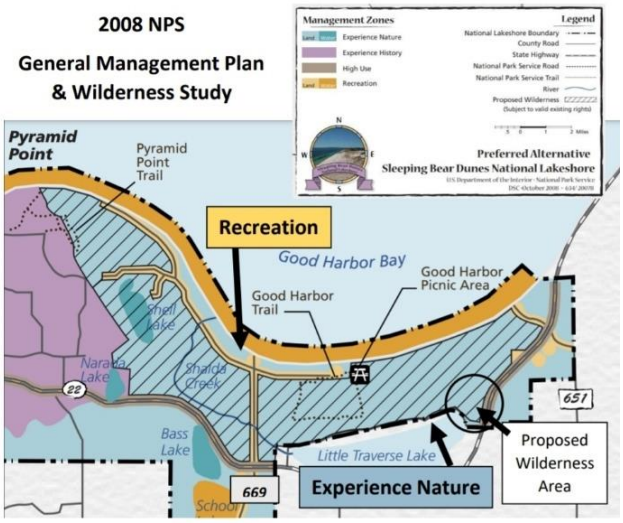
> *These environmental alterations and special considerations need to be added to the list of reasons why it would be beneficial to pause and reevaluate, to explore broader ideas, to listen to the community, and consider alternatives that could accomplish similar recreational goals in this Good Harbor region with less impact and less cost. There has been new field information, changes in policy, and expression of community values since a group drew that broad conceptual line on a small map over 15 years ago.*

With all of this information that is available today, and the expressed concerns by many in the community, it is highly unlikely that the same line would be drawn on a map today or even considered the best alternative. So why are decision makers trying so hard to make a square peg, that was conceptually conceived 15 years ago, fit in a round hole of today's reality that exists in the field? It would seem that the Lakeshore was designated as "America's Most Beautiful Place" not because of large urban-like retaining walls or extensive boardwalks.

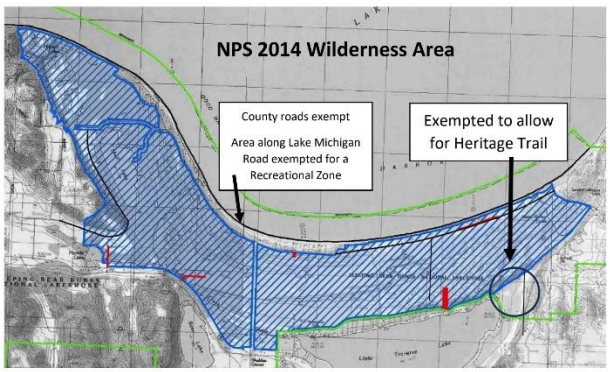
In the next part of this analysis, we explore alternatives that have been proposed by various stakeholders over the years and evaluate their feasibility in more detail.

ANALYSIS OF PROPOSED ALTERNATIVES

The proposed Segment 9 trail requires significant engineering design features due to the vulnerable ecosystems and various environmental features that are present along the route. This Segment 9 has the greatest environmental impact of any segment along the Heritage Trail route, requires extensive design solutions to allow the construction of the trail, and as result, has the highest cost per mile of the existing 22 miles of the Heritage Trail. During the last 15 years, community members have expressed concerns about the impacts of the proposed Segment 9 route, presented various alternatives to provide recreational opportunities in the greater Good Harbor region, and suggested these alternatives have less impact and less cost.



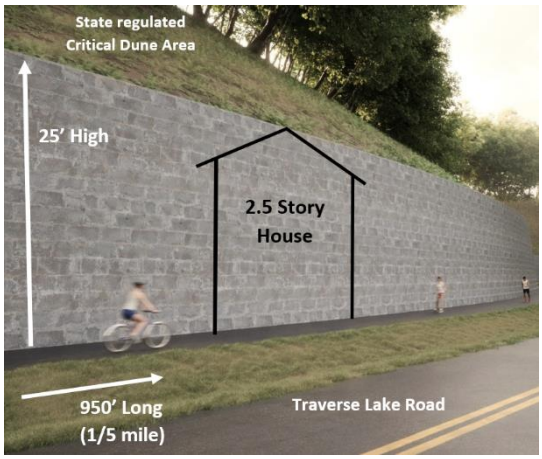
It is important to look at the larger Good Harbor area in planning recreational opportunities. In October 2008, the National Park Service adopted a General Management Plan (GMP) for the Sleeping Bear Dunes National Lakeshore. The Lakeshore's GMP identified the Bohemian Road / CR 669 and the Lake Michigan corridors to be the recreational zone in this greater Segment 9 Good Harbor region. The area along Traverse Lake Road and in the Bufka farm area were identified as wilderness areas and a low impact use to experience of nature. The M-22 corridor was identified as a high use area within the Lakeshore's GMP. This 2008 General Management Plan was not referenced in the 2009 Trailway Plan and Environmental Assessment.



In 2014, the Wilderness Area was established in the Sleeping Bear Dunes National Lakeshore through federal legislation. The Wilderness Area begins 100' from the center line of county roads (e.g. Traverse Lake Road) and 300' from the center line of a State highway (M-22). It is interesting to note the Wilderness Area in the Bufka Farm area was altered so that the boundary now matched the proposed Segment 9 route. This area was proposed in the preferred General Management Plan as part of the Wilderness Area. It would seem like the line for the proposed Segment 9 should be drawn around the proposed wilderness area identified in the General Management Plan rather than the Wilderness Area boundary being drawn around the proposed Segment 9 trail which still has not been built. To our knowledge, the Wilderness Area boundary has not been surveyed and staked in the Bufka Farm area. Nonetheless, the proposed Segment 9 borders the Wilderness Area established in

2014 and is important to take into consideration when looking at recreational opportunities with the Good Harbor region.

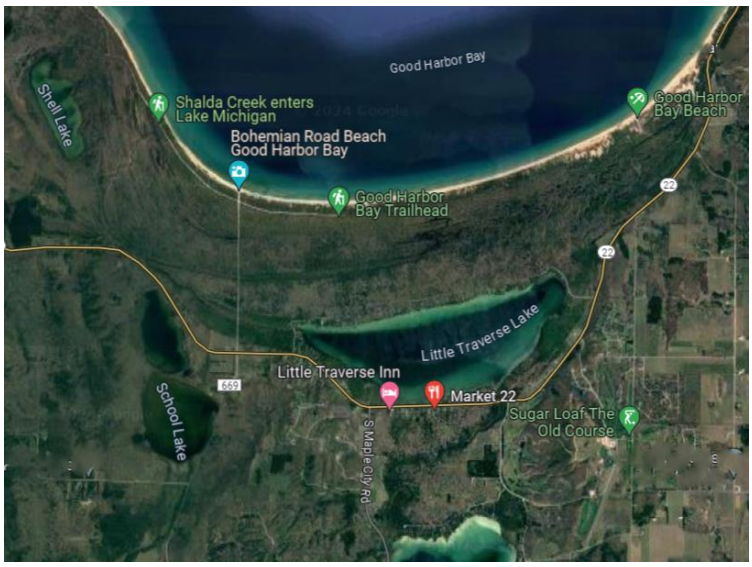
In 2008, NPS proposed two alternatives for the Heritage Trail extension in the Segment 9 Good Harbor region; one option being an off-road trail along the north side of M-22 and the other option being an on-road trail along TLR as a shared road. The on-road TLR option was preferred as it seemed to be less impactful and lower cost being a shared road trail.



In 2009 NPS proposed shifting the trail off-road along TLR without redoing the analysis. If they had rescored the environmental assessment correctly and identified all the environmental features and engineering designs needed, M22 might have been the preferred option as a lower impact alternative without the requirement of building boardwalks across extensive wetlands and extensive retaining walls in State regulated Critical Dune Areas.

Little Traverse Lake Association and Cleveland Township have both previously expressed concerns over the proposed Segment 9 route and proposed routing the trail down Bohemian Road / CR 669 and along Lake Michigan Road, even back in 2008. They believe that routing is more consistent with the General Management Plan and identification of recreational zones. Other groups, such as Sleeping Bear Naturally, have advocated for a more natural, low impact approach to creating recreational opportunities that allow for visitors to experience the park more naturally in its current condition.

The purpose of this report is to provide additional analysis of those alternatives from an engineering and design perspective. All of these alternatives are consistent with the purpose and principles outlined in the Leelanau Heritage Scenic Route Trailway Plan and Environmental Assessment. This is intended to provide more information than is currently available and thus allow a more informed discussion in the community.



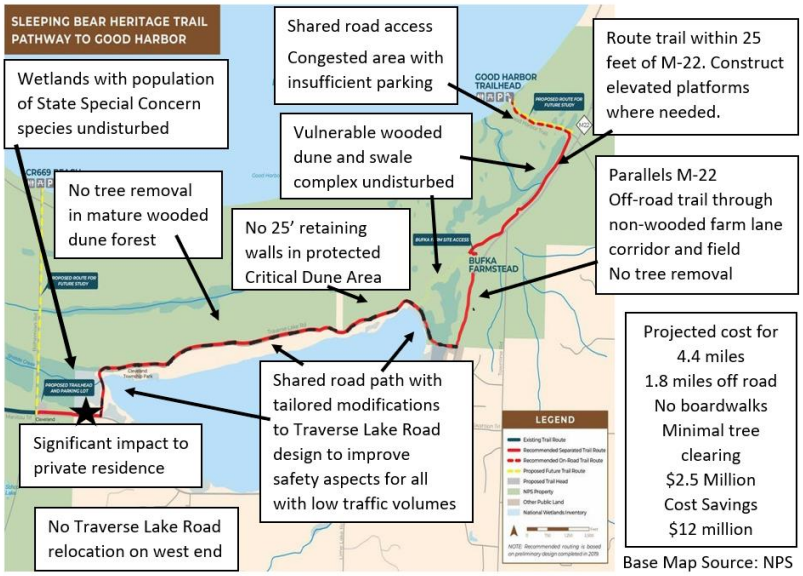
What recreational opportunities could be created in the Good Harbor region and are they feasible from an engineering perspective, cost effective and have low environmental impact?

1. LOWER IMPACT ALTERNATIVE TO PROPOSED SEGMENT 9 ROUTE

Description of alternative

This alternative would include an 0.5 mile off-road trail along the north side of M-22 from Bohemian Road/ CR 669 to west Traverse Lake Road (TLR) as currently proposed. This routing does have significant private property impacts with trail being constructed within feet of a residential structure and loss of parking in front of garage. In addition, the row of large existing evergreen trees, which serves as a highway screen for their side yard and firepit area, would be removed. This has a significant impact to the property owner and is the case with the proposed Segment 9 trail as well, even though located with the State Highway right-of-way.

LOWER ENVIROMENTAL IMPACT ALTERNATIVE CR 669 – CR 651 ROUTE



Base Map Source: NPS

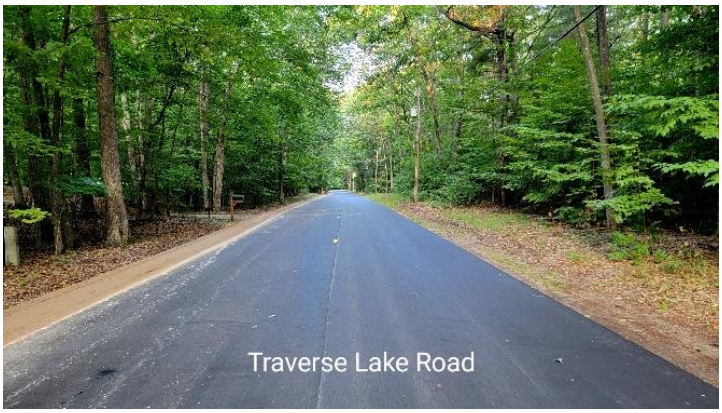
The route would then utilize the 2.4 mile TLR as a shared road, not as-is, but with modifications. An off-road trail would be routed north from the intersection of east TLR and M-22 through the open corridor and farm field to Bufka farmstead and then north to Good Harbor Trail / CR 651 along the west side of M-22 within 30 feet of the road edge. Users would still need to use Good Harbor Trail / CR 651 to access parking and facilities at the beach.

This lower impact alternative would avoid the rich conifer wetlands and required boardwalk along west TLR in which populations of State Special Concern Cut-leaf water parsnip have been located within 15 feet of right-of-way. An extra bridge crossing over Shalda Creek would not be required even though the existing culvert could still be replaced. Tree clearing of a 25' swath for construction would not be required in the dune forest along TLR. No large

retaining walls would need to be constructed through the State regulated Critical Dune Area along the east end of TLR. The route also avoids the globally rare and State Concern wooded dune and swale complexes north and south of Bufka Farm and thus no boardwalks or additional retaining walls are needed to be constructed. This route also avoids the State regulated Critical Dune Area through which 85% of trail length is routed. Thus, this is a lower impact alternative with significant cost savings. In evaluation of using TLR as a shared road in 2008, NPS determined (Table 17 Impact to Environment) there is "0" impact to topography, wetlands, streams & creeks, soils, wildlife, vegetation, and viewsheds with an on-road trail.

This lower impact alternative revisits the use of TLR as a shared road path as proposed by NPS in the 2008 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment, but *not* used *as-is*, but with road modifications. Leelanau County Road Commission has expressed safety and liability concerns using the road as-is to accommodate the Heritage Trail due to traffic speeds and curves along the roadway. This analysis suggests how TLR could be enhanced and modified to increase the safety as a multi-use road, including the incorporation of safety designs such as lowering the speed limit, widening the paved surface, incorporating traffic calming measures, increasing sight distance, exploring innovative shared use designs, and tailoring the designs to address specific characteristics of TLR.

Current conditions



Traverse Lake Road is a 21' wide paved county road within Cleveland Township maintained by Leelanau County Road Commission (LCRC). Traffic counts from a 2018 LCRC study found that TLR is a low-volume, non-connector, residential road with an average of 85 cars per day and an 85th percentile speed of 37 MPH. The highest number of vehicular trips in one hour was 18. Over the course of the four day traffic count, 8 hourly periods had 10-18 vehicle trips per hour, 18 hourly periods had 6-9 vehicular trips per hour and the remaining hourly periods had 5 vehicle trips per hour or less. Rarely do two oncoming cars meet at the same time on this local county road due to its low volume use.

The north side of TLR borders the National Wilderness Area and the south side has approximately 80 residences. Due to limited land availability, with almost all parcels developed, the number of local residences will not increase in the future. Road cyclists currently use it as part of their ride during the summer and local residents use the road currently for walking, running and biking. Currently one family walks across the road on a regular basis going from their house on the north side to the lake front on the south side. If the proposed off-road trail along TLR were constructed, there would be a new reason for 80 families to cross TLR from the south side to access the trail on the north side. Some residents

would continue on TLR until reaching an easier access point, like a driveway, to the Heritage Trail or just continue to walk, run or bike on TLR. The proposed Segment 9 does not eliminate mixed use of TLR. This analysis explores ways to increase the safety of TLR as a mixed-use road.

Speed limit reduction

Lowering the speed limit increases safety in a number of ways. Sight distance requirements are dependent on speeds travelling due to reaction time. The slower the speed, the more time for users to react and thus sight distance requirements are shorter to ensure safety. Slower speeds allow for more reaction time and the severity of accidents, if they do occur, are greatly reduced.

Posted speeds have been established at the speed at which eighty five percent of road users drive and that number has been rounded up in the past to establish posted speeds. If an engineering study and safety analysis concludes that mitigating factors justify lower speeds, posted speed can be reduced but not lower than the 50th percentile. The 2018 LCRC determined an 85th percentile speed of 37 MPH and thus a posted speed limit of 40 MPH. The speed counts were: 47.2% with speeds less than 30 MPH, 76.6% with speed 35 MPH or less, 16% with speeds 36-40 MPH, 6.2% with speeds 41-45 MPH, and 1% with speeds greater than 45 MPH.

Michigan Vehicle Code Act 300 was amended and signed into law April 2024, Public Act 33 of 2024, allowing local units of government to round down the posted speeds from the 85th percentile instead of rounding up. This is the section that was amended:

> (5) A speed limit established under this section must be determined in accordance with traffic engineering practices that provide an objective analysis of the characteristics of the highway and by the eighty-fifth percentile speed of free-flowing traffic under ideal conditions on the fastest portion of the highway segment for which the speed limit is being posted. The speed limit must be in multiples of 5 miles per hour and rounded to a multiple that is within 5 miles per hour of the eighty-fifth percentile speed. A speed limit established under this section may be set below the eighty-fifth percentile speed if an engineering and safety study demonstrates a situation with hazards to public safety that are not reflected by the eighty-fifth percentile speed, but must not be set below the fiftieth percentile speed.

In the case of TLR with an 85th percentile speed of 37 MPH, Cleveland Township could petition for the speed limit to be rounded down to establish posted speeds of 35 MPH, instead of 40 MPH, without an engineering and safety study. Posted speeds could possibly be lowered to the 50th percentile if a situation with hazards to public safety was demonstrated. Drivers reactively reduce speeds in the east and west end of TLR due to the curves but some would say that there should be a lower speed in those areas to improve safety. This new ability for local units of government to lower speed limits below the 85th percentile did not exist previously during conversations about using TLR as a shared road.

Increasing sight distance

As mentioned, sight distance is a big consideration in determining road safety. Speed is the biggest factor influencing the required sight distance with slower speeds requiring short sight distance. For a 35 MPH speed, 250' is required to ensure a safe stopping sight distance. Thus, reducing speed is the first step to consider when it comes to increasing sight distance safety.

Sight distance can also be impacted by elevation changes along the road. Most of TLR is flat with only one section that is gradually and slightly elevated. Preliminary observations indicate that safety guidelines for sight distance would be met along this elevated section but detailed survey measurements should be done to confirm. The elevation could easily be lowered slightly with some exaction or building up any low areas.

Quick Charts for Stopping Sight Distance

Design Speed (mph)	Stopping Sight Distance (ft)	Rate of Vertical Curvature, K*	
		Calculated	Design
15	80	3.0	3
20	115	6.1	7
25	155	11.1	12
30	200	18.5	19
35	250	29.0	29
40	305	43.1	44
45	360	60.1	61
50	425	83.7	84
55	495	113.5	114
60	570	150.6	151
65	645	192.8	193
70	730	246.9	247
75	820	311.6	312
80	910	383.7	384

Sight distance can also be impacted by visual barriers such as vegetation or earthwork around a curve. Sight distance along TLR can easily be increased by trimming of bushes and lower tree branches in most areas, or selective clearing of trees at specific curves (see photos of sight distance improvements in Appendix). There is one section from 992 E TLR to 1010 E TLR that requires removal of a small berm along the north side of TLR to provide sight distance through the curve. This is minor earthwork in a very small section with minimal impact to the scenic character of the road. The biggest challenge to sight distance is the curve around the large steep dune hill across from 1292 to 1310 E TLR and the curve around the garage at 1382 E TLR. The recommendation in this area is to trim lower vegetation, add a speed table before the curves from each direction to slow speeds, and add paved shoulders as feasible, possibly shifting the road center line slightly to the south within the county ROW. Other than this section, there are no significant engineering challenges to maximize sight distance along TLR and all work would be within the county right-of-way.

Traffic calming measures

Many communities incorporate traffic calming measures into the road design as a way to reduce vehicle speeds and increase safety. One of those measures is the use of speed tables, which is a long table typically 3-4" high with gradual inclines and 10 feet long, cushioning the speed of drivers. It allows vehicles to still maintain a speed, albeit lower, over the speed table, as compared to speed bumps. It is also more user friendly to trucks or vehicles pulling a trailer, such as a boat. Speed tables can be permanent configurations built into the road surface or can be portable synthetic devices, thus allowing removal during the winter snowplowing months.

The Federal Highway Administration has documented the effectiveness of speed tables in reducing vehicular speed. For roads with a 36-40 MPH 85th percentile speed, data from 90 speed tables shows that the most frequent post-implementation speed was 30 MPH, followed closely by values of 31 and 32 MPH. Based on this data, the 30-to-32 MPH range would appear to be a reasonable expectation for an 85th percentile speed for a new speed table installation on road with an 85th percentile speed of 36-40 MPH. In another study, data was collected after installing 7 speed tables on roads that had an average speed of 36-40 MPH with 27% of the drivers having measured speeds at least 10 MPH higher than the posted speed limit. After installation of a speed table, the high-speed traffic had dropped to an average of 3 percent of the total traffic and total traffic speeds were greatly reduced. In other studies, speed tables were shown to produce a 28 percent change in 85th percentile speed (10 MPH reduction in speeds), 15 percent change in average speed, and 28 percent decrease in auto collisions.

Locations of speed tables are strategic to reduce speeds in key locations along the road and to also bring road features to the attention of drives. Locating speed tables before curves will reduce driver speeds headed into curves which have shorter sight distances. Lower speeds should be maintained thereafter by the nature of the curves. Speed tables can also be located in straight aways as a reminder for drivers to check speeds. We have identified various locations along TLR where speed tables could be a viable traffic calming measure to reduce speeds. An experiment can always be done by first installing portable devices before a more permanent incorporation into the road surface.

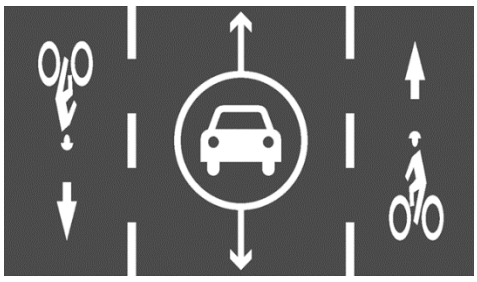
POSSIBLE SPEED TABLE LOCATIONS ALONG TRAVERSE LAKE ROAD

Widening the road

In designing mixed-use facilities, often roads are widened to add extra width for non-vehicular users, such as the addition of 5' bike lanes. The conditions of TLR would make it more difficult, but not impossible, to add 5' bike lanes along the entire width. As part of this analysis, a field survey was completed to map objects along the roadway. The TLR alignment survey is included as an Appendix. There are several obstacles, such as large mature trees, utility boxes and poles, and mailboxes, located 5' feet from the road edge. While LCRC has the right and ability to clear anything within the right-of-way, which is usually 33' from the centerline, the impact of adding 5'shoulders along this scenic road would require additional considerations and site preparation. There are only a couple obstacles located 3-4' feet from the paved road edge. From our observations and analysis, it would be feasible to add 2' paved shoulders on both sides of the road without removing or relocating obstacles, bringing the paved width to 24'. In making further improvements to sections of TLR, LCRC should consider a pavement width of 24'. The costs to add additional width is much less when the road is being rebuilt than trying modify later as an add on improvement. Foresight is most economical when applied in the present.

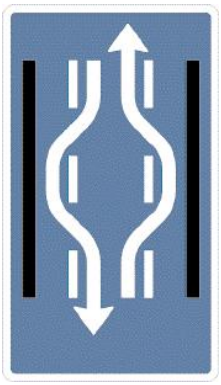
Shared road design

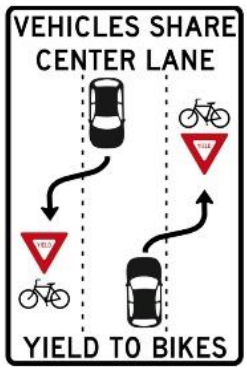
With these modifications, TLR could be used as a designated shared road, similar to Northwood Drive, Forest Haven Drive, Pine Haven Drive and Lacore Road. Many communities are also taking an additional design step by incorporating new innovative designs for shared roads that bring an additional element of safety and speed reduction through a concept called Edge Lane Roads (ELR). This design uses the existing road bed and changes the striping layout to reflect and communicate the mixed-use function of the road. The design has been used successfully in Europe and 11 countries since 1970 and nearly 100 communities in the US have applied the design to multiple road applications as part of the shared road design.



The ELR design creates a 10' wide center drive lane with dashed striping of edge lanes 5' wide or more, depending on width of pavement. Thus, the ELR treatment can be applied to existing road widths. If the pavement width was 24' (2' shoulders on each side of a traditional two lane road), the non-vehicular edge lanes would be 7' wide creating even more safety space. The dash lane indicates to drivers that they are allowed to cross the line as they pass other cars, move over giving non-vehicular users more space as they pass, or yield to other users as needed.

On traditional road designs, the vehicles and non-vehicular users are often in the same trajectory of travel, creating safety concerns for the non-vehicular user. With an ELR design, vehicles and vehicular users are not in the same travel trajectories and vehicular users yield to other road users, increasing safety. When a singular car encounters non-vehicular users, the driver can remain in the center or move over to give more space. When two on-coming cars meet, they move over and pass just like with a traditional road design. When non-vehicular users are part of two cars meeting, drivers yield to accommodate safe passage for all users.





Safety studies and community experience has shown that the design naturally slows down drivers down as they are more aware of non-vehicular users and the mixed-use function of the road. Drivers pay more attention to the non-vehicular users and give them more space, yielding to other cars and slowing down, increasing safety and thus reducing accident rates. User experience by non-vehicular users is high, citing an increased feeling of safety as vehicles are no longer driving in their trajectory of travel. Users feel like they have a designated space. For more information on safety studies and design aspects, visit www.edgelaneroads.com or www.advisorybikelanes.com .

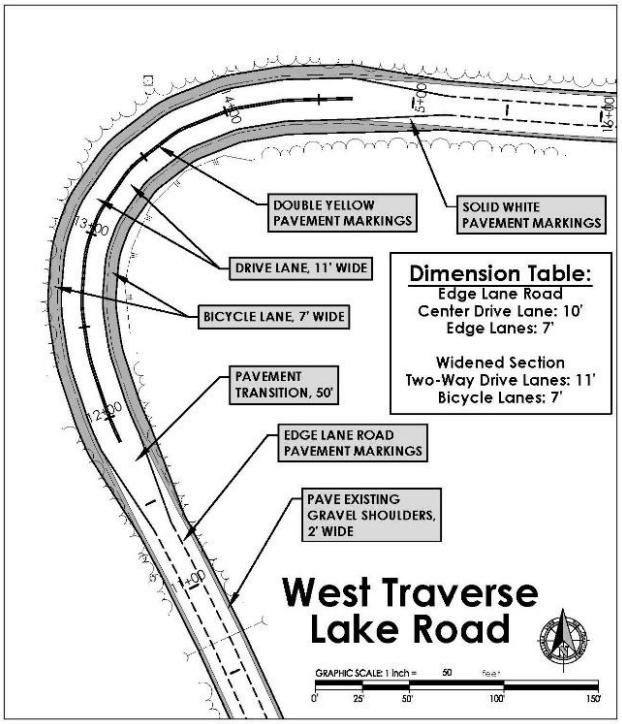
As with any new innovative designs, such as the left center turn lane decades ago (now common place but initially nicknamed “suicide lanes”) or traffic roundabouts today, education is a key part of the process. Community experience has shown that drivers and non-vehicle users quickly learn and adapt to this shared road design once they experience it. For TLR, most of the users are local residents so the educational process can be more targeted and focused. Striping can also start as a community experiment before it becomes a permanent design.

An added benefit is a reduction in capital costs that are needed to create a safe mixed-use design. The costs involved is road striping. Communities are also finding maintenance costs over time are less as weight and vehicular traffic is frequently on the center of the road bed rather than on the road edge. In comparison to capital costs required to build an off-road trail, the striping cost is minor allowing capital investment to be directed towards other community projects.

Speed limit reduction, increased sight distance, road widening (not mandatory), and incorporating traffic calming measures can all complement the ELR application, with the ELR design adding and additional inherent speed calming effects by its design. The ELR design can

be transitioned back to traditional road striping with shoulders around curves with limited sight distance. That transition could be incorporated as part of the east and west curves on TLR.

Replacement of the road culvert across Shalda Creek has been identified by the LCRC as a priority. The ELR design would not alter these plans or require different culvert designs than would be currently considered. MDOT has proposed shifting west TLR over 10' to the east. That would no longer be required with an ELR design using the existing roadway.



One community example is Vail, Colorado. Vail was looking for a way to connect two off-road trails similar to the Heritage Trail. The $12 million plan hit a roadblock with significant environmental challenges, private property impacts, increasing cost prohibitions, and concerns raised by local residents. Instead, Vail Valley Drive was converted into a multi-use facility using the innovative ELR design that accommodates two-way vehicular traffic and provides wide shared space for non-vehicular users, without widening the road. The community saved $12 million, had zero impact on the environment, and the connector road is now successfully used by 1200 bicyclists, 250 walkers and 400 vehicles (and 10 city buses) per day during peak summer usage with high user satisfaction. For a video on the Vail experience with edge lane roads, visit: https://vimeo.com/936813895 (Town of Vail).


Vail Valley Drive

Another example is Yarmouth, Maine that has now adopted the Edge Lane Road design on nine different roads due to the success of quality user experience, safety improvements, traffic calming effect. and low-cost implementation on existing roads without widening. Yarmouth has many roads that are similar in feel to those in Leelanau County, including TLR. Here is a good video on the Yarmouth experience with edge lane roads: https://youtu.be/8K2RI-uX2tU (Bicycle Coalition of Maine).

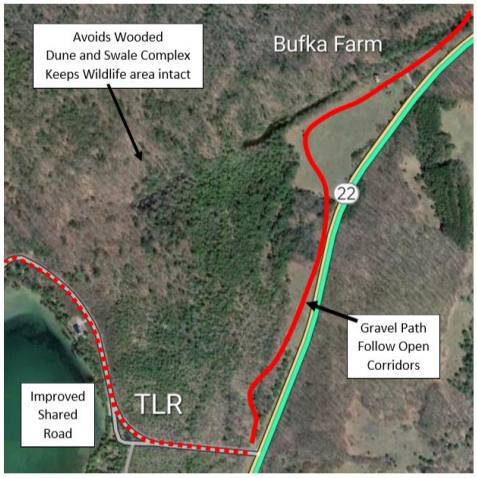
The ELR design is suitable for rural roads up to 3,000 vehicular trips per day or for low-speed urban roads with up to 6,000 vehicular trips per day. None of the roads as part of the Heritage Trail or those in the Good Harbor area have anywhere near this volume of users, either vehicular or non-vehicular users. There are less than 100 vehicular trips per day on TLR. The

Port Oneida Section Heritage Trail has less than 100 recreational users per day with an average of 8 per hour with a maximum of 12 users per hour. The Friends of Sleeping Bear utilize counters to monitor trail usage along the Heritage Trail. The 2016 data can be found on their website www.friendsofsleepingbear.org and they are in the process of updating the trail usage data. Utilizing the data presented from the busiest time of the year, June 1, 2016 – September 10, 2016, trail counts for the number of users were:

Section	**Daily Average** *(Number of Users)*	**Hourly Average** *(Daily Avg/12 hours)*	**Maximum Hourly** *(Number of Users)*
Dune Climb	349.2	29.1	55.7
Forest Haven	475.9	39.6	74.4
Homestead	92.4	7.7	13.2
Kelderhouse	70.9	5.9	9.2
Port Oneida	97.0	8.1	11.5
Voice Road	82.8	6.9	13.9

Lower impact alternative in Bufka Farm section

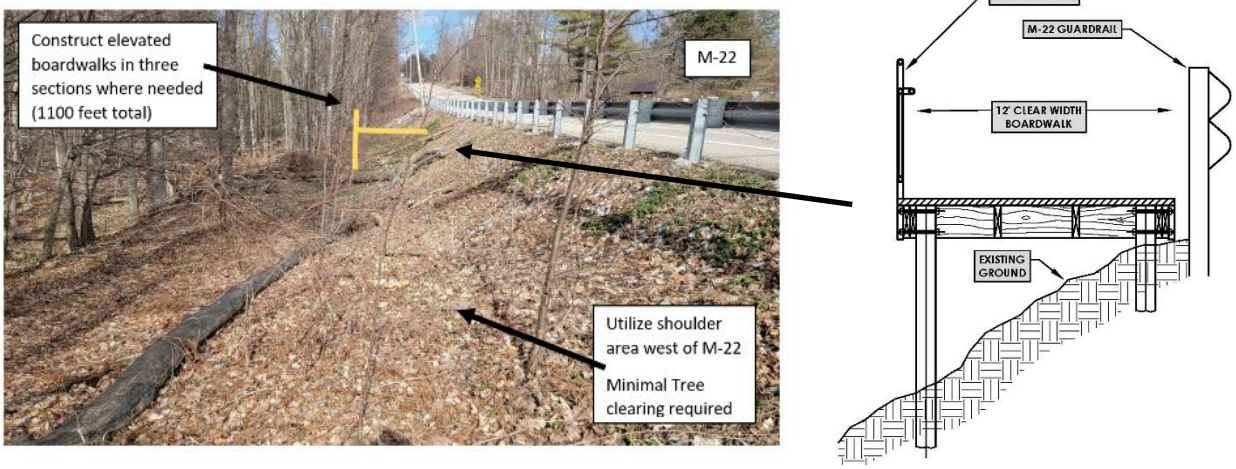
LOW IMPACT ALTERNATIVE FOR BUFKA FARM AREA



Under this lower impact alternative, the trail continues north from the shared TLR along M-22. For the section between the east intersection of TLR and M-22, an off-road trail would be routed in open corridors along the west side of M-22 and then through the open farm field. This routing minimizes tree clearing, avoids any wetlands or muck soils, and has flat topography. The trail would then extend north along the west side of M-22, within 30 feet from the road edge. A wide shoulder exists below the M-22 road bed on the west side of the guard rail.

There are three sections along the west side of M-22 where the bank drops off steeply to the ravine below and requires the construction of an elevated board walk, the west side supported by the road bank and the west side supported by pilings.

M-22 ALTERNATIVE – BUFKA FARM NORTH TO CR 651



These three sections are 300', 600' and 200' feet in length, for a total of 1100', of supported boardwalks. This is significantly less that the length of boardwalk required to traverse the wooded dune and swale complexes farther west of M-22 down in the ravine. Construction is also less complicated with access directly from M-22 rather than transporting materials and building a boardwalk in a remote wilderness wetland area. There would also be easy access by emergency services from adjacent M-22.

Unfortunately, the lower impact alternative would still end at the intersection of Good Harbor Trail / CR 651 and M-22 with the lack of available parking during summer capacity. This destination is also limited in not providing users additional opportunities to enjoy Lake Michigan and other features in this Good Harbor area of the Lakeshore.

Summary of environmental and engineering considerations

	Environmental Considerations	**Engineering Considerations**
Topography	Flat, no Critical Dune Area, steep downward slopes in 3 locations along M-22	Elevated boardwalk required for 1100' along west side M-22, no trail grade concerns
Wetlands	None	None
Streams & Creeks	Existing road crossing over Shalda Creek	Replace road culvert as part of road improvements
Vegetation	Minimal tree clearing along road edge	None
Land Use	Close proximity to private property along M-22 west of TLR	Construction within right-of-way
Trail Design		Sight distance improvement and TLR modifications for shared use Off-road trail

Cost considerations

Off road trail CR 669 to TLR (0.5 mile)	
Off-road trail along M-22	$ 462,000
Parking lot at CR 669 and M-22	$ 41,667
Total	$ 503,667
Modifications to TLR (2.4 miles)	
2' shoulders with extra gravel (not mandatory)	$ 380,160
Extra shoulders around curves	$ 97,500
Sight distance improvement	$ 52,500
Speed tables (3-5)	$ 15,000
Striping (back paint, two dashed white lines)	$ 76,032
Signage (new speed limit signs, ELR signs, speed table signs)	$ 2,400
Sub Total	$ 623,592

Matching funds to replace Shalda Creek road culvert	$ 700,000
Total	$1,323,592

Off-road trail along M-22 north from TLR to CR 651 (1.3 miles)

Off road trail construction	$1,008,700
Supported boardwalk (1,100')	$1,100,100
Total	$2,108,800

TOTAL COST: $3,936,059

COST SAVINGS: $10.5 million

Cost, environmental and engineering comparisons to the proposed Segment 9 trail:

> *There would be about $10.5 million in cost savings as compared to the $14.5M proposed Segment 9 route. This alternative route avoids the regulated wetlands with a State Special Concern Species on the west end of TLR, the forested dune along TLR, the steep State regulated Critical Dune Area that requires significant retaining wall construction, and the vulnerable wooded dune and swale complex between TLR and Bufka Farm, leaving the ecosystem intact. This alternative would not need construction of elevated boardwalk for 18% of trail length or require construction of 25' retaining walls for 950' along TLR. This alternative would not require removal of thousands of trees, would save millions of dollars and would still get users to the same end point. The downside is the same impact to private property along west M-22 and still ending the trail at a Good Harbor Trail / CR 651.*

Users would be able to enjoy the beautiful tree-canopied TLR. Users would be able to take in the Bufka Farm viewshed, unlike the proposed Segment 9 trail. The proposed Segment 9 trail passes by in the woods below and out of sight of the farm fields and homestead buildings. There would be no view of the historic Bufka Farm unless users intentionally went up the old farm lane as a short spur. The experience of tree lined canopy along Traverse Lake Road would be similar to the feel of creating a new 25' wide open corridor just 30' feet to the north of TLR. The modifications to TLR would benefit the local community which will still cross or use TLR for walking, biking and running, with or without an off-road trail. It still will be a route for road cyclists who do not frequently use off-road trails.

2. ACCESS GOOD HARBOR BAY VIA CR 669 AND LAKE MICHIGAN ROAD

An attractive feature for visitors to the Lakeshore is experiencing Good Harbor Bay and enjoying the sights and sounds of Lake Michigan. Nowhere else along the entire Heritage Trail do users have that amazing opportunity, except in Glen Haven. The pristine sandy beaches and sparkling waters of Lake Michigan are among the most important attractions to the Lakeshore. There are two ways to access Good Harbor Bay: one via Good Harbor Trail / CR 651 and one via Bohemian Road / CR 669 and then along Lake Michigan Road which parallels Good Harbor Bay. Cleveland Township has identified the area along Lake Michigan drive as an opportunity for recreational enhancement, consistent with the General Management Plan of the Lakeshore which designates this area as the recreational zone within the Good Harbor region. Cleveland Township and the Little Traverse Lake Association have long proposed routing the trail down Bohemian Road / CR 669 as the preferred way to access Good Harbor Bay. This beach area has parking facilities, restrooms and picnic facilities. In addition, other Lakeshore features can be accessed along Lake Michigan Road, including the Good Harbor Bay Picnic Area and Trail at the east end, facilities at the Shalda Creek outlet area, Shell Lake, and many other points with popular access to Lake Michigan beach along west Lake Michigan Road and Good Harbor Drive.

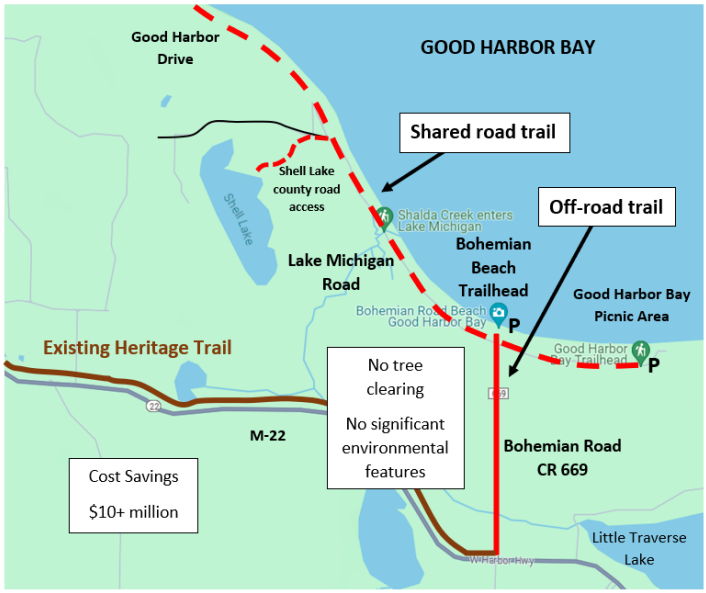
The proposed Segment 9 trail ends at Good Harbor Trail / CR 651. There are no additional Lakeshore features at the end of Good Harbor Trail / CR 651 other than that particular beach access, which is popular during the summer as a prime sunset watching spot. This northeast area of the Lakeshore does have the historic Bufka Farm similar to the old farmsteads along the Heritage Trail in the Port Oneida Historical District. But users of the proposed Segment 9 trail would not have a viewshed of the historic farm along the proposed route through the wilderness.

Description of alternative

The existing 22 miles of the Heritage Trail ends at the intersection of M-22 and Bohemian Road / CR 669 near the Cleveland Township Hall. This alternative proposes the Heritage Trail would

run north 1.3 miles along Bohemian Road / CR 669 to Bohemian Beach which has a stunning view of Good Harbor Bay. This would serve as a trailhead for the Heritage Trail with parking, restroom and picnic facilities. The Heritage Trail could be extended to create another 3.5 miles of recreational opportunities along Lake Michigan Road and Good Harbor Drive. This extension would incorporate access to all the other features in this Good Harbor region mentioned previously. One option of this alternative would include minor improvements to the beautiful winding 0.5 miles county road access to Shell Lake, which is exempt from the Wilderness Area, allowing use by bicyclists.

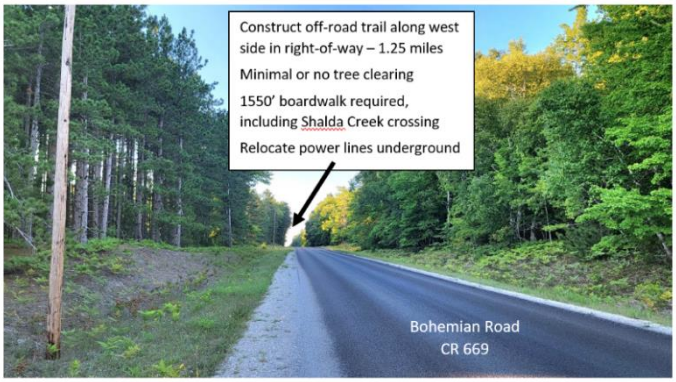
BOHEMIAN ROAD / CR 669 – LAKE MICHIGAN DRIVE ALTERNATIVE



Trail designs

A separated off-road trail would be constructed along the west side of Bohemian Road / CR 669 within the county road right-of-way. The existing power line would be relocated underground, improving the scenic viewshed of this access to beautiful Good Harbor Bay, and making trail construction easier. This might a good community enhancement project by the utility company. Virtually no tree removal or clearing is required within the right-of-way. There are three locations where wetlands are within the right of way and would require construction of elevated boardwalks with section lengths of 150', 200' and 1200', for a total of 1,550' in length, including crossing Shalda Creek. These boardwalks can be easily constructed from the road edge, including emergency service access. There are no other topographical or environmental considerations. There is no private property along this alternative route as the county road is within the Lakeshore.

BOHEMIAN ROAD / CR 669 HERITAGE TRAIL TO GOOD HARBOR BAY



Lake Michigan Road and Good Harbor Drive could be used to add an additional 3.5 miles of

recreational opportunities by creating a multi-use shared road path similar to that for TLR. These are dead-end, low-volume, non-connector and seasonal roads without snow plowing in the winter. The road would be paved to eliminate summer dusty conditions, could be 24' in width, and use the existing road base, resulting in lower construction costs.

Lake Michigan road would be designed specifically for the purpose of a multi-use recreational path within a public park that allows vehicles to also use the road. This purpose of this dead-end road is not for residential or business access but solely providing people access to features within the national park. Speed tables could also be incorporated into the road surface at time of paving and establishing a lower speed limit could be explored. According to Michigan Vehicle Code Act 300, Section 257.627 Speed limits:

> (2) Except as provided in subsection (1), it is lawful for the operator of a vehicle to operate that vehicle on a highway at a speed not exceeding the following:
>
> (c) Twenty-five miles per hour on a highway segment within the boundaries of a public park.

If an Edge Lane Road design was applied with pavement width of 24', the non-vehicular users would have 7' travel lanes with a 10' center drive lane. The vehicular volume is low on this road making it a desirable option for ELR treatment. Start with the concept of designing a multi-use recreational path within the Lakeshore that also allows vehicles to use the same path.

There is a powerline that runs along the east Lake Michigan Road to the Good Harbor Bay Picnic area. This cleared swath within the right-of-way could be used for an off-road trail but less desirable than ELR design due to the need to relocated the power line and the dusty summer conditions that exist on the adjacent dirt road, reducing user experience.

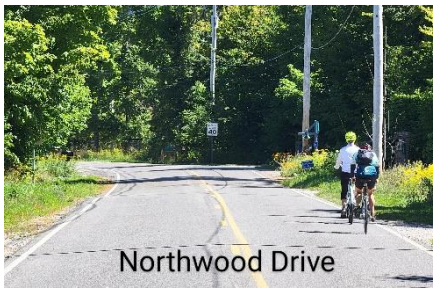

Lake Michigan Road East

The county road access to Shell Lake could be improved with the addition of a gravel or even limestone. This county road access, exempted from Wilderness Area designation, allows the use by bicyclists and is currently 10' in width. No other modifications or widening would be proposed to this beautiful winding path.

Shell Lake Access

The Heritage Trail uses four shared roads as part of its existing trail routing: Northwood Drive along Glen Lake, Lacore Road near Empire, Forest Haven Drive near Glen Arbor

and Pine Haven Drive accessing D.H. Day Campground. Good Harbor Trail / CR 651 is proposed to be a shared-use road as part of Segment 9 to access parking at the beach, assuming people do not park along the road edge. Thus, this proposed alternative utilizing Lake Michigan Road would follow that precedent of using shared roads as part of the Heritage Trail routing and a trailway plan.



Summary of environmental and engineering considerations

This alternative would have little environmental impact using the road-right-of-way in this Good Harbor area. Construction designs are straightforward with exception of 1,550’ of elevated boardwalk, including Shalda Creek crossing.

	Environmental Considerations	**Engineering Considerations**
Topography	Flat	No trail grade concerns
Wetlands	Three wetland locations along west side of CR 669 in right-of-way	Elevated boardwalk required for 1550’ in 3 locations, including crossing Shalda Creek
Streams & Creeks	Shalda Creek	Off-road trail requires bridging
Vegetation	Right-of-way and roadway is cleared	None
Land Use	No private property	None
Trail Design		Off-road trail construction Paving of existing dirt road

Cost considerations

Off-road trail along Bohemian Road / CR 669 (1.3 miles)	
Elevated boardwalk and Shalda Creek crossing (1,550')	$1,587,500
Bury power line	$ 57,640
Dry ground construction (approximately 1.0 mile)	$ 924,000
Total	$2,569,140
Lake Michigan Drive (3.5 miles)	
Paving existing roadbed 24' wide with incorporated speed tables	$1,570,800
Shell Lake county road access improvement (0.5 mile)	$ 31,680

TOTAL COST: $4,171,620

COST SAVINGS: $10 million

Cost, environmental and engineering comparisons to the proposed Segment 9 trail:

> *In comparison to the proposed Segment 9 route, this alternative would not require removing 7,300 trees or building massive retaining walls 25' high for 950' along scenic TLR. The alternative avoids all the protected, regulated, sensitive, and vulnerable areas along Segment 9 while still creating recreational opportunities. There are no vulnerable wooded dune and swale complexes and is not in the State-protected Critical Dune Area. Bohemian Beach would serve as a Heritage trailhead with existing parking, restroom facilities, and picnic areas. It avoids the congested Good Harbor Beach at the end of Good Harbor Trail / CR 651, which has insufficient parking during the summer. It also avoids all private property. There would be a cost savings of $10 million as compared to the proposed $14.5M Segment 9 extension of the Heritage Trail.*

The biggest benefit is introducing users to the many features in this area within the northeastern end of the Lakeshore and along Lake Michigan. This alternative is consistent with the recreational zones designated in the NPS General Management Plan. Users would access Good Harbor Bay with the trail ending at the beach, proving a stunning view of Lake Michigan as a way to start or end the trail ride and can experience the sights and sounds of Lake Michigan.

3. RECONSIDER THE M-22 ALTERNATIVE FROM CR 669 TO CR 651

NPS originally proposed two alternatives in 2008 and 2009 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment, one of those being an off-road trail along the *north* side of M-22 from Bohemian Road / CR 651 eastward to Good Harbor Trail / M-22. The preferred option became a shared road use of Traverse Lake Road due to its lower impact. The north side of M-22 has 41 driveways serving residential structures, which are closer to the road edge, and also has various muck soils closer to the west and east Traverse Lake Road intersections.

When the trail was moved off-road along Traverse Lake Road, the impact comparison, if actually and accurately completed, would have showed the M-22 alternative as having significantly less environmental impact. There was no community discussion about revisiting M-22, especially in consideration of the significant environmental impact and engineering designs that would be needed with the new proposed Segment 9 off-road trail.

This alternative revisits a M-22 route but as a separated trail within the State M-22 right-of-way along the ***south*** (east) side, rather than the north (west) side. This would truly serve a transportation purpose allowing people to access goods and services. The M-22 alternative would provide access to three businesses: Market 22, Traverse Lake Inn, and Good Harbor Gallery. It would provide the residents in this area, including Sugarloaf and Lime Lake Communities, with local residents having a safer and easier non-vehicular access to the Heritage Trail and Lake Michigan rather than riding down a busy M-22 Highway. The M-22 route option would provide a transportation purpose with a greater benefit to more local people than an off-road recreational trail through the wilderness along Traverse Lake Road.

Description of alternative

The Heritage Trail would be extended 5.0 miles east from the intersection of M-22 and Bohemian Road / CR 669 along the south side of M-22 within the State right-of-way until it reaches Overby Road, the northern boundary of the Lakeshore. The route would start by winding behind Cleveland Township Hall and through the Lakeshore open area until it reaches private property and then becomes a separated trail with the right-of-way.

HERITAGE TRAIL – ALTERNATIVE M-22 ROUTE

There are 27 driveways servicing structures between west TLR and Lime Lake Road intersections. These structures are set back farther from the road than those on the north side.

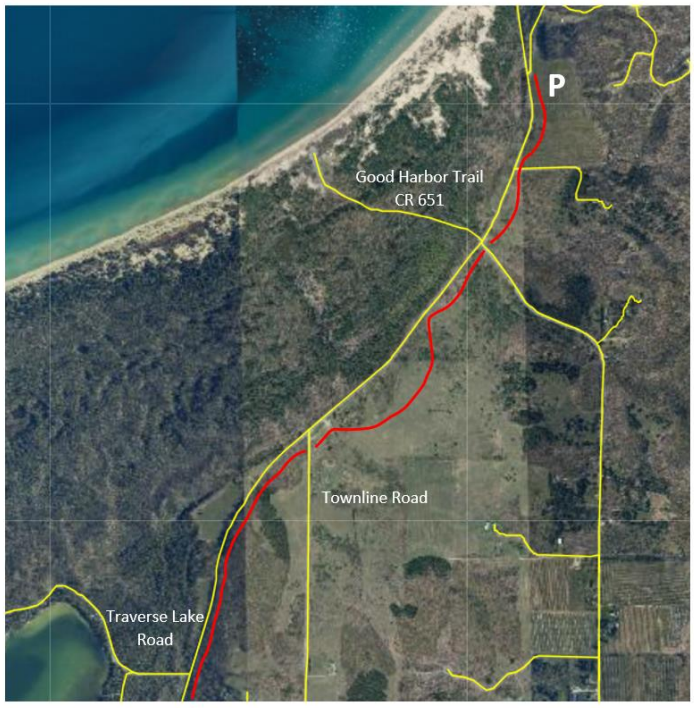
Impacts with the construction of a 10' separated path could be minimized. Those owners should be engaged in the conversation as to the impacts and safety concerns during the conceptual phase, not just in the construction stage. It cannot be presumed that creating a trail across private property, even in the right-of-way is acceptable to local residents. Due to safety concerns with the high-speed and high-volume M-22 Highway, property owners might enjoy an off-road sidewalk allowing for a separated and safer access to the Heritage Trail or Lake Michigan as a trade-off. It is important to consider that there is NO private property along Bohemian Road / CR 669 and Lake Michigan Drive, making the CR 669 option a preferred alternative due to its low or no impact to private property, among other reasons.

From the Lime Lake Road intersection, the trail continues further north and east along M-22 until it reaches the Lakeshore, which provides additional routing flexibility. There are no driveways servicing structures in this northeastern section of the route, with the exception of St. Paul's Lutheran Church and Gousty Knowe Lane. As the route clears the large wooded hills from Sugar Loaf Mountain Road to Townline Road, the trail then would meander through the open meadows in the Lakeshore. The

M-22 ALTERNATIVE – WESTERN SECTION

M-22 ALTERNATIVE – MIDDLE SECTION

M-22 ALTERNATIVE – THE FARM MEADOW ROUTE



trail would be routed along natural contours to meet required 5% accessibility grade requirements (see plan/profile detail in Appendix).

The trail would end with a parking lot trailhead near Overby Road at the Northern boundary of the Lakeshore, avoiding all the problems with proposed Segment 9 route ending at Good Harbor Trail / M-22 with over-capacity parking challenges at the beach.

The northern portion of this M-22 alternative would create a beautiful experience allowing the user to enjoy the scenic farm meadows along the east side of M-22. These meadows are part of the Sleeping Bear National Lakeshore and are currently underutilized and not fully appreciated by visitors This route would create a detour from the sights and sounds of M-22. It could be a superior experience than what is being proposed in the Bufka Farm area, without users encountering extensive boardwalks and massive retaining walls. The open viewsheds in the scenic meadow areas are inspiring as well.

There are fewer environmental features as compared to the north and west side of M-22, even though an elevated boardwalk would be required for 350' across Shetland Creek and associated wetlands. It avoids the challenges associated with the Bufka Farm area, including the wooded dune and swale complexes and steep ravines close to M-22 on the west side. Tree removal is required between Sugar Loaf property and Townline Road, with two 300' sections of 5' retaining wall due to slopes. The trail could possibly be offset farther by working with the property owners so as to maintain the scenic M-22 tree canopy and provide the user with a more natural wooded experience along the trail. This route is not within the State regulated Critical Dune Area, unlike 85% of the proposed Segment 9 trail.

While not a goal of NPS or the Lakeshore's mission, TART Trails has publicly mentioned the concept of connecting to the Suttons Bay and the Leelanau Trail. The community should be engaged on that bigger concept, where a connector trail should go, the defined purpose or the user demand. That is helpful before assuming the Heritage Trail should be extended as a trail connector to Suttons Bay, which is not the mission of NPS. If the trail was to be extended 4.0 miles north from Overby Road to M-204, there are 11 driveways servicing structures on east side ("south"), including Good Harbor Winery and, in comparison, 75 driveways on the west side ("north") of M-22. So routing a trail along the south (east) side of M-22 would make more sense than NPS original 2008 & 2009 alternative of routing along the north (west) side of M-22.

Summary of environmental and engineering considerations

Construction design is a standard separated off-road trail. The section from Bohemian Road / CR 669 to Lime Lake Road requires minimal tree clearing in the right-of-way. The section between Sugar Loaf property and Townline Road is wooded, requiring tree clearing, with two

M-22 ASPECTS	Trail along South/East side	Trail along North/West side
CR 669 east to CR 651		
Driveways serving structures	27 - Structures further from road	41 - Structures closer to road
Road crossings	Bohemian Road / CR 669 Harbor Ridge Court Maple City Road Lime Lake Road Sugar Loaf Mountain Road Town Line Road Good Harbor Trail / CR 651	Bohemian Rd / CR 669 Traverse Lake Road Traverse Lake Road Good Harbor Trail / CR 651
Notable businesses	Market 22 Little Traverse Inn Good Harbor Gallery	Swanson Preserve Farm Market
Environmental Considerations	Shetland Creek	Shetland Creek Wetlands along western end Wetlands along Swanson Preserve
Engineering Considerations	Shetland Creek Crossing	Shetland Creek Crossing Possible muck soil in spots
CR 651 north to M-204		
Driveways serving structures	11 - Structures further from road	75 - Structures closer to road
Road crossings	Gusty Knowe Lane Overby Road Schomberg Road Highland Drive	Birdsong Road Birch Landing Road Manitou Passage Trail
Notable businesses	Good Harbor Vineyard	Snowbird Inn Jolli Lodge

	Environmental Considerations	Engineering Considerations
Topography	Flat with inclines in north section Two sections, 350’ in length have sidewise slopes	No challenges with accessibility Two 350’ sections required some retaining walls to traverse sidewise slopes (5’ high)
Wetlands	Wetlands on banks of Shetland Creek	350’ boardwalk required
Streams & Creeks	Shetland Creek	Requires bridge crossing
Vegetation	Cleared right-of-way from CR 669 to Manitou Passage Golf Course Wooded from Sugar Loaf to Townline Road Open Meadow from Townline Road to Overby Road	Requires full 25’ width tree clearing from Sugar Loaf property to Townline Road
Land Use	Significant private property from TLR to Lime Lake Road – 27 structures	Work with property owners to minimize impact
Trail Design		Standard asphalt trail

sections that have slopes requiring some retaining walls (less than 5' high for 350' in length). There are wetlands associated with Shetland Creek that require boardwalk construction (350' in length) as part of the stream crossing. There is no State regulated Critical Dune Area. Grades would meet accessibility requirements and no major excavation of hills is required. Without significant environmental features or extensive construction designs required, construction costs would be more typical of standard trail construction.

Cost considerations

Separated Trail along M-22 (5.0 miles)	
Standard on-ground trail construction (5.0 miles)	$4,778,400
Wetland boardwalks and Shetland Creek crossing (350')	$ 387,500
Two sections 5'retaining walls (700' total)	$ 336,000
Total	$5,501,900

TOTAL COST: $5,501,900

COST SAVINGS: $9 million

Cost, environmental and engineering comparisons to the proposed Segment 9 trail:

The M-22 alternative serves a transportation purpose, not just a recreational purpose, providing access to local businesses and area communities. It is much more than a recreational trail through the remote wilderness. While providing a safer, separated, non-vehicular option along M-22 Highway for local residents and nearby local communities, the route does cross a significant number of private parcels. A parking lot and trailhead is created at the north end of the M-22 alternative without increasing the burden at Good Harbor beach. Access to the beach for trail users would be similar using Good Harbor Trail / CR 651.

This alternative along M-22 is not in the State regulated Critical Dune Area, unlike 85% of Segment 9. While nearly 20% of the proposed Segment 9 requires construction of elevated boardwalk, including through globally rare and State Concern wooded dune and swale complexes, the M-22 alternative only requires 350' of boardwalk to cross Shetland Creek along M-22. While the proposed Segment 9 requires construction of 25' retaining walls for 950', the M-22 requires using 5' retaining in two sections for a combined length of 700' but would be shielded from direct view from M-22. While tree clearing is required between Sugar Loaf property and Townline Road, the majority of M-22 alternative is located within the cleared M-22 right of way or through open meadows. There would be a cost savings of $9.0 million as compared to the $14.5 million proposed Segment 9.

4. CREATE A HERITAGE *WALKING* TRAIL TO EXPERIENCE NATURE

One of the goals of the Heritage Trail concept stated in the 2009 Leelanau Scenic Heritage Route Trailway Plan and Environmental Assessment is to connect recreational paths and to create recreational opportunities for people to engage in healthy non-motorized activity. Recreational opportunities do not have to be limited to just a paved 10' asphalt path. Not all forms of recreation, such as walking, running, biking or skiing, need to happen on the same path. The group Sleeping Bear Naturally has advocated the best way to experience nature is a low-impact walking path, especially through sensitive or vulnerable ecosystems. An option exists for creating a low-impact, non-asphalt Heritage *Walking* Trail network in this Good Harbor region where people can walk, run, or ski as a complement to a bike route utilizing asphalt. There are 22 miles of paved trail options for visitors, mostly used by bicyclists. A low impact non-bicycle trail would allow users to enjoy nature in its more natural environment as part of the Heritage Trail experience.

Description of alternative

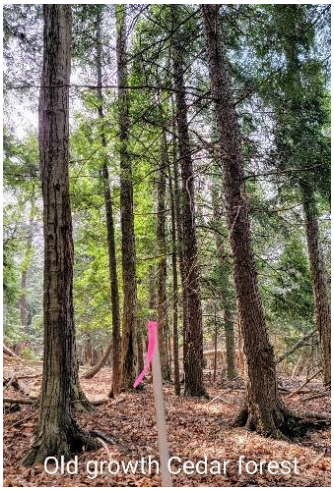
This concept would serve as a trail connector, one of the goals in the Trailway Plan. The Good Harbor Bay Trail is a hiking path that begins at the picnic area at the eastern end of Lake Michigan Road. This is a loop that connects to the west end of Traverse Lake Road (TLR). Further east there is an old roadbed that runs north and then turns east, locally known as Swanson Trail / Juniper Trail. It is only a short walk from both of these existing trails to access Lake Michigan, and people frequently walk along the beach. Swanson Trail and Juniper Trails were both graded a few years ago by NPS so dump trucks could remove building material from the houses that used to be on Lake Michigan. Both of these trails are in the Wilderness Area and thus bicycles are not allowed.

CREATE A HERITAGE *WALKING* TRAIL NETWORK

A narrower, low-impact walking trail would use natural material and be only 5-6' wide for two people to walk side by side or pass. Due it is narrow width, the trail could more easily meander around trees from the west end curve of TLR and proceed east along the staked Segment 9 route to the Swanson / Juniper Trail. This new walking path, approximately 1.5 miles in length, would connect the two existing trails. Walking along Lake Michigan would complete the loop if a hiking trail was not established between the two along the shore. Access could be created at Cleveland Township Park which has parking, restrooms and a picnic area in addition to the facilities at the Good Harbor Trail picnic area to the east end of Lake Michigan Drive. Trail funds could be used to improve and upgrade the facilities at

Cleveland Township Park. Roadside parking along TLR, currently occurring, would be improved at two locations.

This low-impact trail would serve as a scenic natural walking path along TLR. It could also be used for non-groomed cross-country skiing or snowshoeing in the winter. The new walking trail along TLR could still meet all accessibility requirements (wheelchairs) with a low impact improved path, as well as the existing Swanson Trail / Juniper Trail which has also been recently graded and should regularly be kept clear of fallen debris for those with disabilities. The Good Harbor Bay Trail loop would not meet accessibility requirements unless improved (west trail portion of loop worthy of consideration). There are few opportunities for users with disabilities to enjoy nature with Sleeping Bear Dunes National Lakeshore without having to go on asphalt paths. Mechanized forms of transportation, such as bicycles, are not allowed in the Wilderness Area but wheelchairs are. If one desires an improved paved path, there are 22 miles of options along the existing Heritage Trail.


Old growth Cedar forest

This alternative would avoid the sensitive and vulnerable environmental areas and avoid introducing new traffic corridors into the most sensitive wooded dune and swale complexes. It would utilize low-impact construction methods with minimal trail width requiring far less tree removal; it could more easily meander around the more sizeable trees, unlike clearing a 25' width path to construct an asphalt path.

Bufka Wilderness Hiking Trail

If trails were designed to complement the ecosystem and to maximize the user experiencing nature, clearing a 25' wide swath and constructing a paved asphalt trail may not be the best approach. Perhaps a non-impact hiking trail might be better suited. The ecosystems in the Bufka Farm area are unique, predominantly consisting of globally rare and State Concern wooded dune and swale complexes. The wetlands are wooded and there are mature stands of large cedar trees. It is a beautiful area. Clearing of trees, construction of an asphalt path, and building extensive elevated


No-impact wilderness hiking trail in Bufka area

boardwalks in this wilderness area has significant construction challenges and would alter the current unfragmented experience of this ecosystem.

Serious consideration should be given to creating a no- impact wilderness *hiking* trail that would follow the proposed Segment 9 staked route in the Bufka area, staying on higher ground rather than traversing the wetlands. The down trees could be cut and laid along the path to help delineate the trail route. Bufka Farmstead would serve as the trailhead. There would be lots of educational opportunities along the way to educate users about the various natural features.

The creation of Heritage Walking Trail along TLR, connecting with other existing trails, and the establishment of a Bufka Wilderness Trail would be a great complement to other alternatives in the Good Harbor region that provide recreational opportunities on asphalt.

Summary of environmental and engineering considerations

	Environmental Considerations	**Engineering Considerations**
Topography	Flat	No trail grade concerns, as similar to typical Lakeshore nature trails.
Wetlands	No wetlands along north TLR Wooded dune and swale complexes in Bufka area	No elevate board walks required if trail stays on higher ground
Streams & Creeks	None	None
Vegetation	Mature forest	TLR section - Trail width is narrow facilitating meandering around signature trees Bufka section – wilderness hiking trail with removal of dead trees within path
Land Use	No private property	None
Trail Design		TLR trail – improved gravel trail Bufka trail - natural

Cost considerations

Walking Trail along TLR (1.5 mile)	$ 79,200
Wilderness Trail in Bufka area (1.5 mile)	$ 15,840
Upgrade restroom facilities Cleveland Township Park	$ 35,000
Upgrade parking along TLR	$ 5,000
Total	$135,040

TOTAL COST $135,040

Cost, environmental and engineering comparisons to the proposed Segment 9 trail:

> *The two non-asphalt walking impacts would be low impact by design, thus eliminating the need to remove 7,000 trees along the proposed staked route so as to create recreational opportunities. No large 25' high dunes would need to be constructed and boardwalks would not need to be built in the State regulated wooded dune and swale complexes. Users would be able to experience and appreciate the unique ecosystems in an unaltered, natural condition. The addition of a Heritage Walking Trail network would enhance the existing network of non-bicycle opportunities within the Good Harbor region. Other asphalt bicycle opportunities can still be created with other proposed alternative approaches in this Good Harbor region. This alternative would still meet the goals and principles of the Heritage Trail and be in greater alignment with the core mission of the Lakeshore to protect the unique natural resources and vulnerable ecosystems within this Good Harbor region.*

5. CONSIDER A COMPREHENSIVE COMBINATION OF ALTERNATIVES

Perhaps it is time for the community to consider a more comprehensive approach rather than a narrow scope of focus designing a line on the map that was drawn 15 years ago. What if the community and all stakeholders looked at a bigger picture of what could be achieved with $14.5 million in a more cost-efficient design approach? Maybe this is not about determining winners and losers but being able to complete a comprehensive approach for the entire Segment 9 Good Harbor region benefitting a greater number of people.

> *Perhaps there does not have to be just one solution. All of the alternatives are feasible from design aspects, have low environmental impact, and are reasonable in cost while creating desirable recreational opportunities. Each alternative alone would save about $10 million and thousands of trees as compared to the proposed Segment 9 route. It is our suggestion to consider a broad implementation of all options together to create a comprehensive approach to recreational opportunities in the entire Good Harbor region, including:*

- Modifications and design improvements to the 2.4 mile Traverse Lake Road to improve safety as an option for bicyclists and other non-vehicular users, including $700K matching funds to replace Shalda Creek culvert. No environmental impacts. Cost: $1,323,592.

- A 1.3 mile off-road trail in the county right-of-way along Bohemian Road / CR 669 north to Good Harbor Bay; paved improvements and a shared road design along the seasonal 3.5 mile Lake Michigan Road; gravel improvements to the 0.5 mile Shell Lake county road access. Shalda Creek stream crossing required but no other environmental impact within cleared right-of-way. Cost: $4,171,620

- A 4.8 mile off-road trail within the State right-of-way (10' from white line) along the south (east) side of M-22 from CR 669 north to CR 651. Shetland Creek stream crossing required but no other wetlands, no State regulated Critical Dune area and much less extensive tree clearing required in the right-of-way. Cost: $5,501,900

- A 1.5 mile low impact, non-intrusive Heritage *Walking* Trail, as part of an existing network, using the staked route along Traverse Lake Road for people to enjoy the full natural experience while running, walking, skiing or using wheelchairs. Include a 1.5 mile no-impact Bufka Wilderness *Hiking* Trail to fully appreciate the beauty of the sensitive and vulnerable ecosystems in the areas. Complete upgrades to restroom facilities at Cleveland Township Park and enhance road side parking along TLR. Minimal tree removal, no wetlands, no dune hills. Cost: $135,040

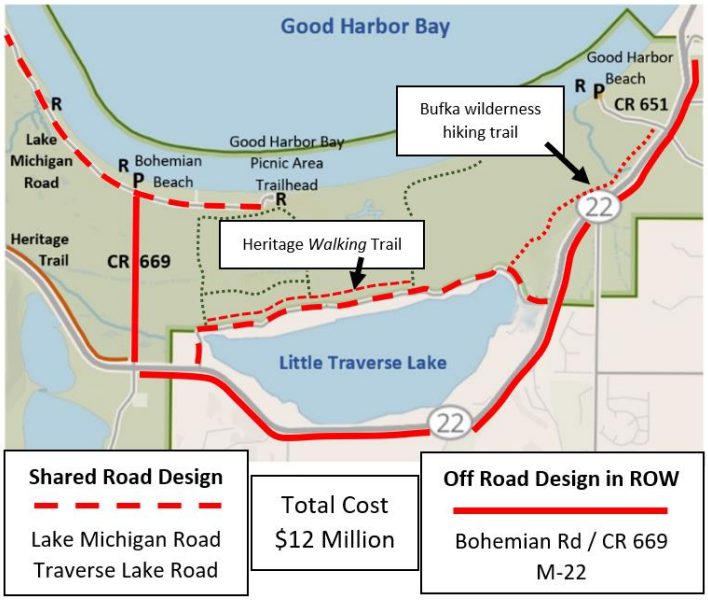
COMBINED TOTAL OF ALL OPTIONS: $11,132,152

COST SAVINGS: $3 million

ALL of these options could be built in combination for less than the proposed $14.5M Segment 9. There would be an additional savings of $3 would offset all the engineering design expenses accrued to date while creating a comprehensive approach to recreational opportunities.

Timing and process considerations

COMBINATION OF ALL RECREATIONAL OPPORTUNITIES



All of these improvements are within the right-of-way of a State highway or county roads, with the exception of the Heritage *Walking* Trail, the Bufka Wilderness *Hiking* Trail, and the northern meadow section of the M-22 alternative, all of which are in the Lakeshore. The concept of the M-22 alternative is already included in the 2009 Leelanau Scenic Heritage Route Trailway Plan and Environment Assessment making the process of amending easier. NPS approval is not required nor would the federal project requirements apply to projects within the road right-of-way if this was a cooperative project between Cleveland Township, State of Michigan, Leelanau County Road Commission, and TART Trails.

Instead of the ownership being NPS, this could be a partnership project with Cleveland Township being the lead as creating recreational opportunities for the broader community. The point is that NPS involvement as a trail owner for portions of trail within road right-of-way is not essential, even though should be an important part in stakeholder discussions like all other community members. This has implications to the requirements necessary to complete the project. The permit process would be less complicated by avoiding all the vulnerable ecosystems, sensitive environmental features, and less complicated engineering designs. A botanical study would be less extensive within a road right-of-way and the required engineering design hours would be fewer. There may also be more excitement and enthusiasm from a broader cross section of the community that would support a more comprehensive and less intrusive approach to creating recreational opportunities.

Professional evaluation of these options could be completed during the summer 2024, including conceptual route staking, a botanical survey identifying environmental features, and a preliminary engineering analysis identifying key design features along the route and any engineering requirements. Community input could be facilitated during the summer, including a survey of local residents and gaining public feedback. If there is broad community buy-in, then engineering could be completed during fall and winter 2024 (use multiple engineering firms

under the oversight of MDOT and LCRC), permits applied for in winter 2025, with construction started Spring 2025 and completed by fall 2025. The timeline would be no different than the proposed Segment 9 with all of its extreme engineering design features that takes extra time and cost to build. But again, there is no huge demand or need that justifies the urgency of building within a rushed time schedule. Completion of trail alternatives is possible in 2025 although that timeline is not critical. However, trail alternatives should be considered in planned infrastructure improvements, including Traverse Lake Road. The alternatives can also be phased from a construction standpoint.

> *With all the information that is available today and greater public understanding of the environmental features and impacts, engineering designs, recreational alternatives, Cleveland Township Master Plan, and the Lakeshore General Management Plan, the proposed Segment 9 line would likely not be drawn on the map if there was a blank slate today. Taking a pause and allow the community to explore a more comprehensive approach is worth the time and effort. It seems that discussion has not been allowed by NPS or TART Trails in the last 15 years. The only discussion that seems to be acceptable is about one broad line on a small map and even that discussion is extremely limited and narrow. There is no time urgency to build this trail. While the benefit of creating recreational assets is important to sustainable and livable communities, the proposed Segment 9 is a non-essential recreational trail that has permanent impacts for generations. There are long-lasting irreversible alterations to the human and natural environment with off-road asphalt trail construction. Trails are important and of great value, but should also be designed to fit the need, the community, and the environment. Perhaps it's time to have the bigger community discussion on creating recreational opportunities in this Good Harbor area within Cleveland Township.*

CONCLUSION AND RECOMMENDATIONS

A community is always better for taking the time to reevaluate the bigger picture when there has been significant change in the last 15 years. Community interests and priorities, environmental conditions, engineering designs, and costs all change over time. There is no downside risk to spending time on open community dialogue, regardless of conversations that happened years or decades ago.

Summary of Findings

The proposed Segment 9 route will require significant alteration of State regulated Critical Dune Area to construct the asphalt trail along a scenic road that borders the Wilderness Area within the Sleeping Bear Dunes National Lakeshore. This alteration includes the clearing of trees to almost the top of the Critical Dune followed by removal and hauling away a significant portion to a landfill area. Construction of the trail through the State regulated Critical Dune Area along east Traverse Lake Road requires building retaining walls for 950' (nearly 1/5 mile) that can be 25' or more in height. A multi-tiered design for the retaining walls would extend the height up to 37' in height. This height is greater than a 2.5 story house.

The proposed Segment 9 route will require extensive construction of elevated boardwalks for nearly 20% of trail length. Building the trail in the globally rare and State Concern wooded dune and swale complexes presents construction challenges in the remote wilderness and will alter the currently unfragmented ecosystem. The wetlands all have an additional level of significance, having a population of State Concern Species or being part of a globally rare and vulnerable ecosystem that has been identified as of State Concern.

The current cost projection of $14.5 million may be low when it comes time to receive construction bids due to the extensive construction features not represented in the 2009 Trailway Plan and Environmental Assessment. The projected Segment 9 cost of $3.4 million per mile to construct a 10' wide path is more than 3.4x the cost for Leelanau County Road Commission to rebuild, reconstruct and repave a 22' wide county road.

Information related to Segment 9 is identical in the 2009 Environmental Assessment for an off-road trail in comparison to the 2008 Environmental Assessment for an on-road trail along Traverse Lake Road. Actual environmental features and engineering designs along the proposed route were not identified or included in the 2009 Environmental Assessment due to various errors and omissions. If scored properly, Segment 9 would have the greatest environmental impact as compared to any other segment of the Heritage Trail or alternatives.

Based on our in-field observations and engineering evaluation, the proposed alternatives have feasible designs, minimal environmental impacts, and lower costs while creating unique and comprehensive recreational opportunities in the Good Harbor region. Alternatives could still be constructed in 2025 and all of the options combined can be constructed for less than the current $14.5 budget for the proposed Segment 9. Each of the individual alternatives could be

constructed for a cost savings of $10 million while avoiding removal of thousands of trees. These feasible alternatives are worthy of additional consideration by the community and included:

- A lower impact alternative to the proposed Segment 9,
- Access to Good Harbor Bay via CR 669 and Lake Michigan Drive,
- Utilizing M-22 corridor to get to the northern boundary of the Lakeshore,
- Creating a Heritage Walking Trail network to experience nature, and
- A comprehensive combination of ALL the above alternatives.

Recommendations

Based on new information available to the public, it would be prudent to pause and reevaluate the cost-benefit-environment analysis of the proposed Segment 9 Heritage Trail extension and compare it to other feasible alternatives in the Good Harbor Bay region. Taking the time may result in community benefits to all stakeholders and ensure that lasting impacts from trail construction do not have long-lasting permanent alterations of the human and natural environment.

Because of the errors and omissions in the 2009 Environmental Assessment and new information available 15 years later, a new Environmental Assessment and an Environmental Impact Statement should be completed for the proposed Segment 9 route that fully identifies and evaluates all environmental features and the impact of engineering designs on vulnerable ecosystems. The Environmental Assessment should also consider all alternatives to creating recreational opportunities in the Good Harbor region and compare environmental impacts and engineering design features required.

Engage the community in a broader discussion on how best to provide recreational opportunities in the broader Segment 9 Good Harbor area, rather than a narrow focus on a line drawn on the map 15 years ago. That discussion should include deeper evaluation of alternatives and their design possibilities in accommodating mixed use forms of transportation and recreation.

Consider how various stakeholder groups can serve in an additional roles and capacities in creating recreational opportunities within the Good Harbor region. This does not need to be a solo effort by the National Park Service and TART Trails. Consider alternatives that create recreational opportunities that all stakeholders, including agencies, trail users, local community members, and the environment, can support and be excited about. Perhaps this could be a showcase approach to creating recreational opportunities that models environmental stewardship, design flexibility and financial feasibility.

Engineering Design Analysis of Recreational Opportunities in the Good Harbor Region

Mansfield Land Use Consultants

APPENDIX

Traverse Lake Road Base Road Map

Design Cross Sections

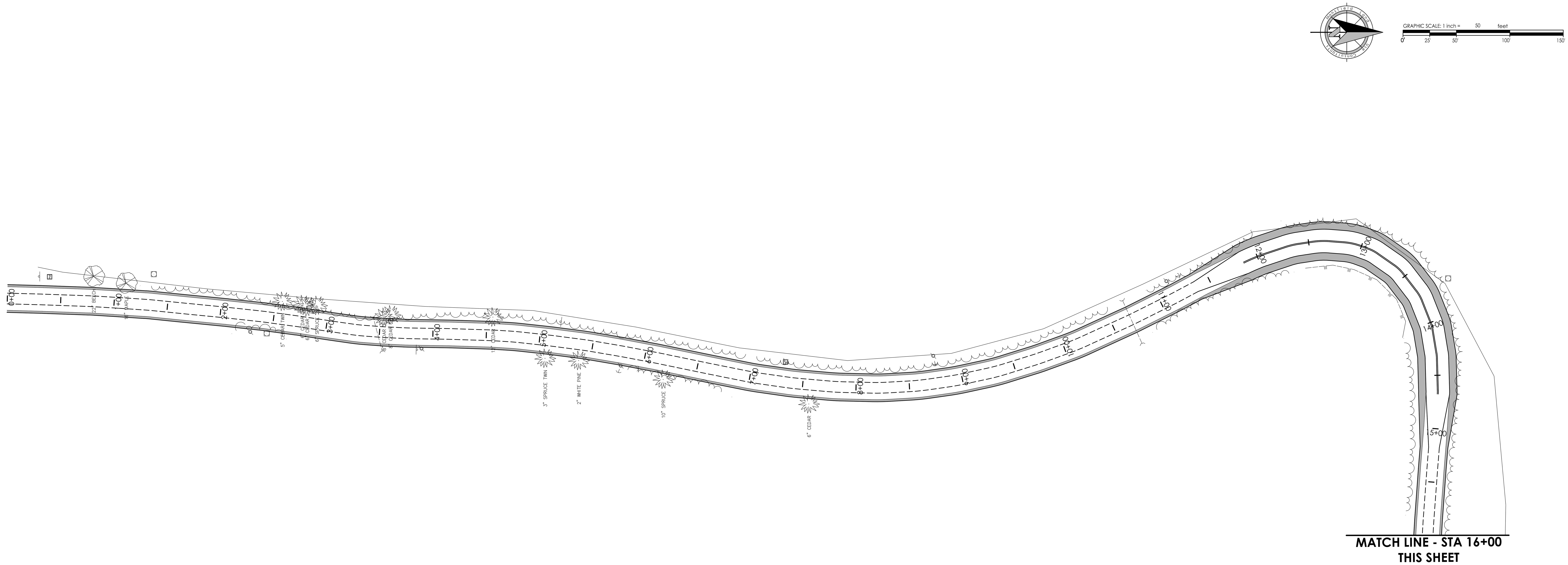
- Cross section of existing dunes
- Cross section meeting LCRC drainage requirements with existing road width (11’ lane width)
- Cross section meeting LCRC drainage requirements with LCRC requirements for new road construction (15’ lane width)
- Cross section for proposed Trail construction using a multi-tiered retaining wall design
- Cross section for proposed Trail construction using a single-tiered retaining wall design

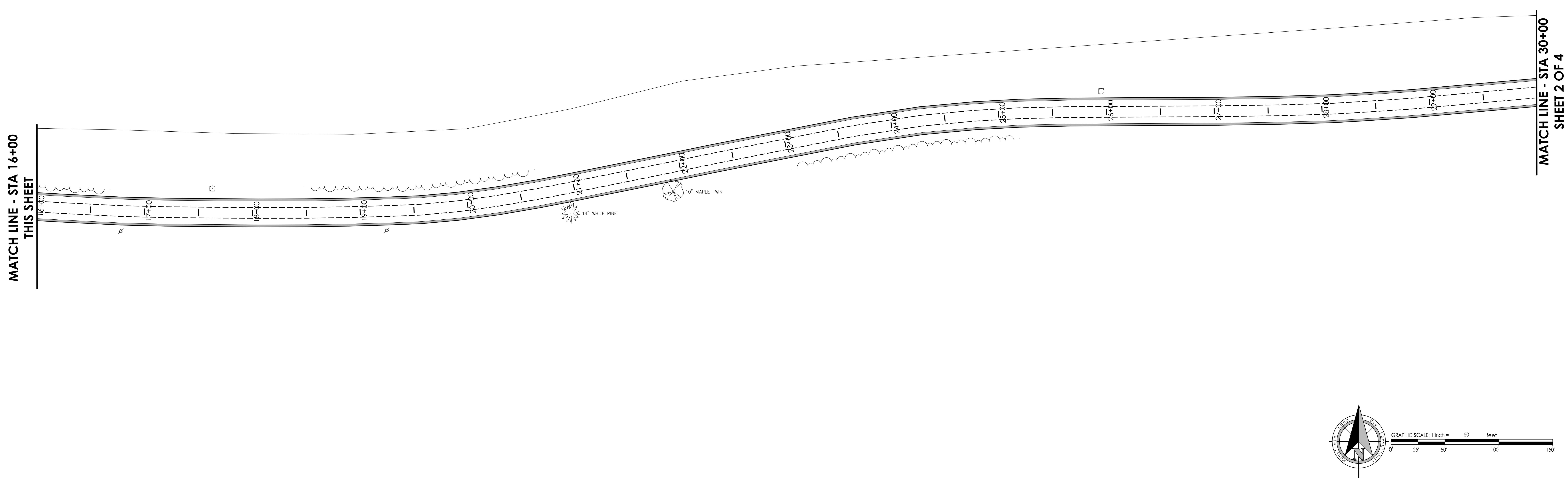
2008 NPS Environmental Assessment Tables for Segment 9

2009 NPS Environmental Assessment Tables for Segment 9

Sight Distance Improvement along TLR

Plan/Profile – Alternative Route East Side M-22 from TLR to North Park Boundary





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YY.MM.DD	MKG	MKG	MKG		ORIGINAL DESIGN

LITTLE TRAVERSE LAKE TRAIL

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DR.: XXX | CKD.: . | CREATED: 01.19.24

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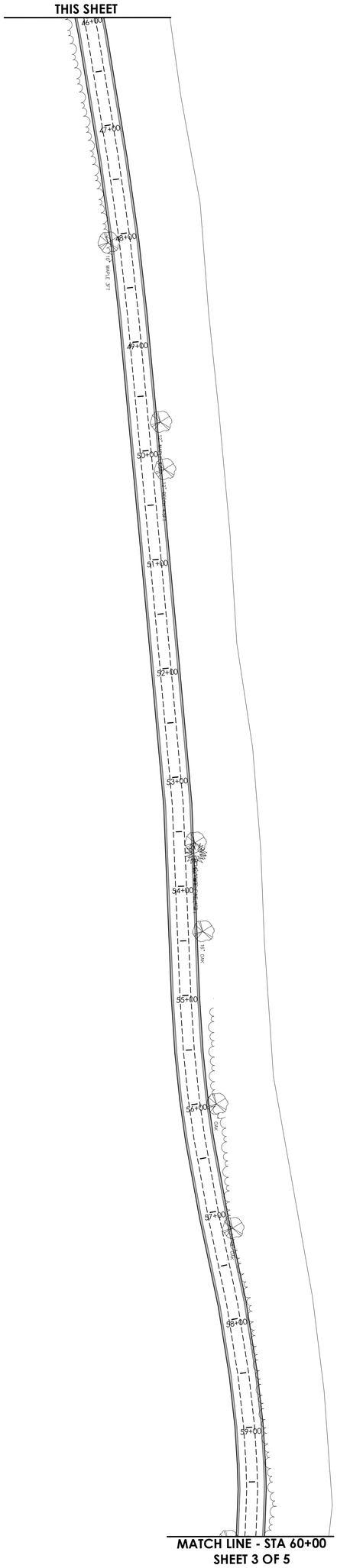

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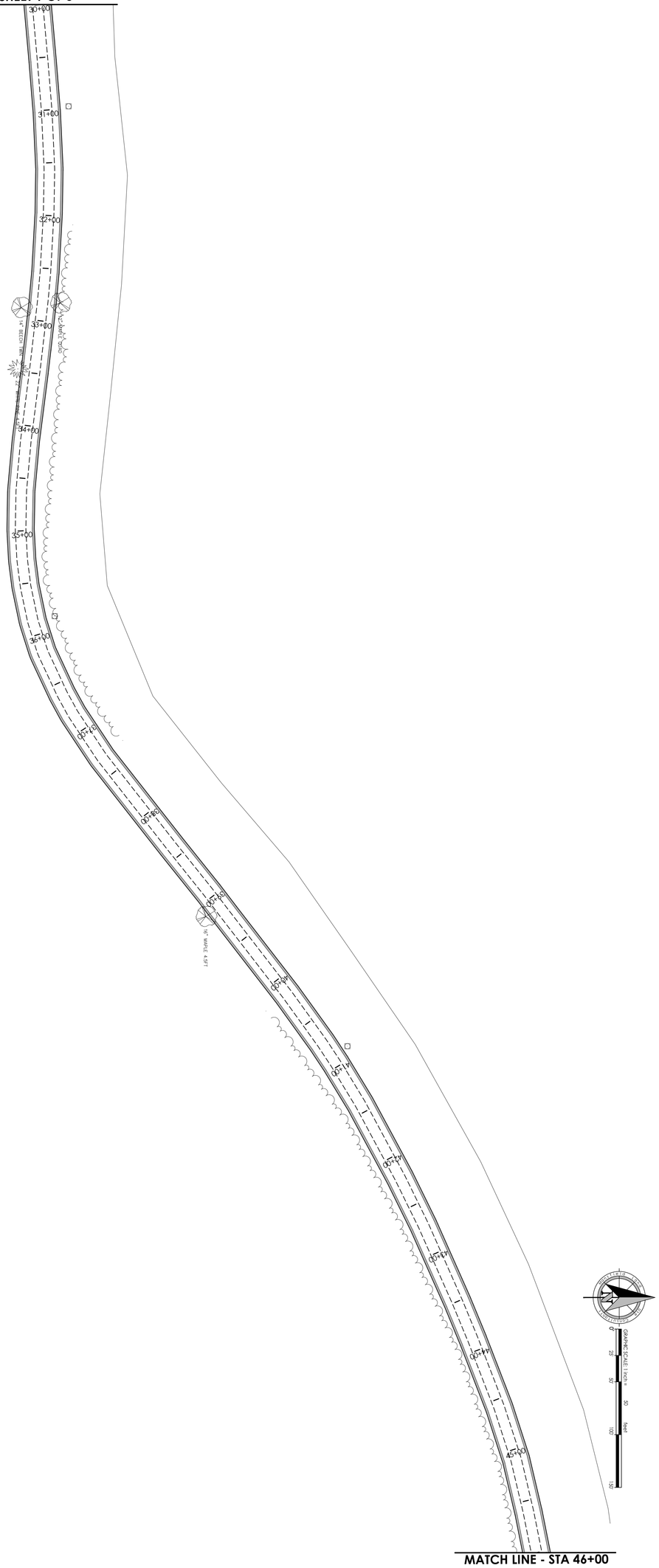

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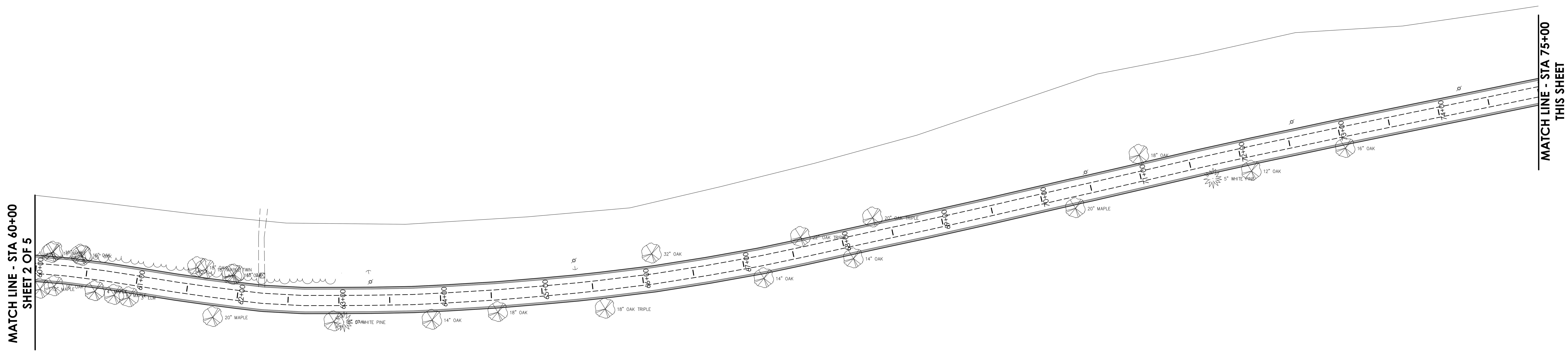

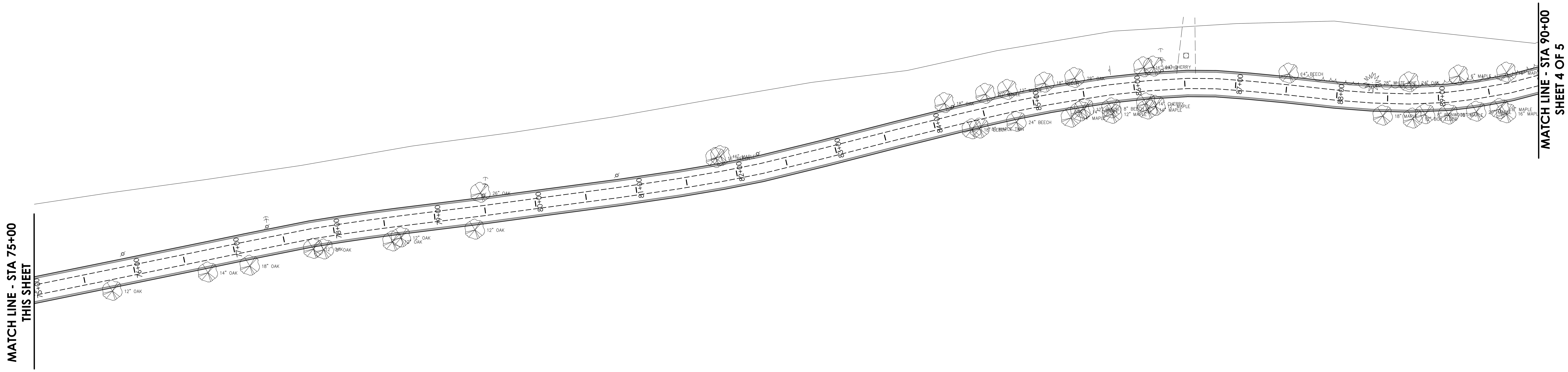

GRAPHIC SCALE: 1 inch = 50 feet
0' 25' 50' 100' 150'

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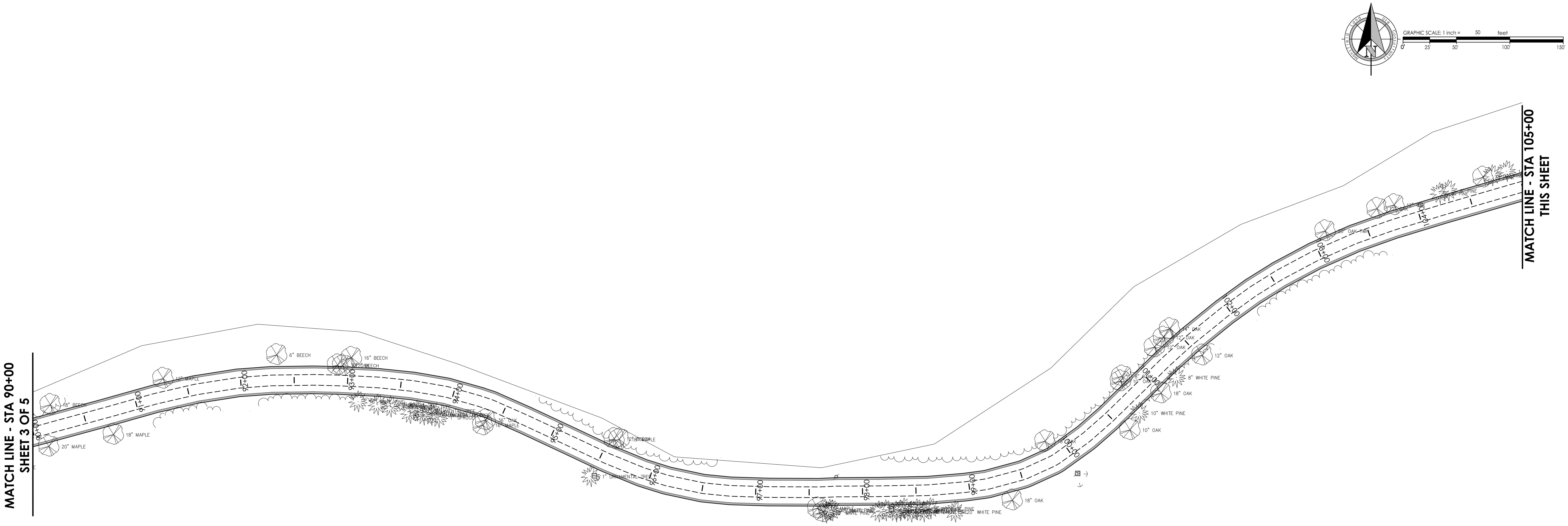

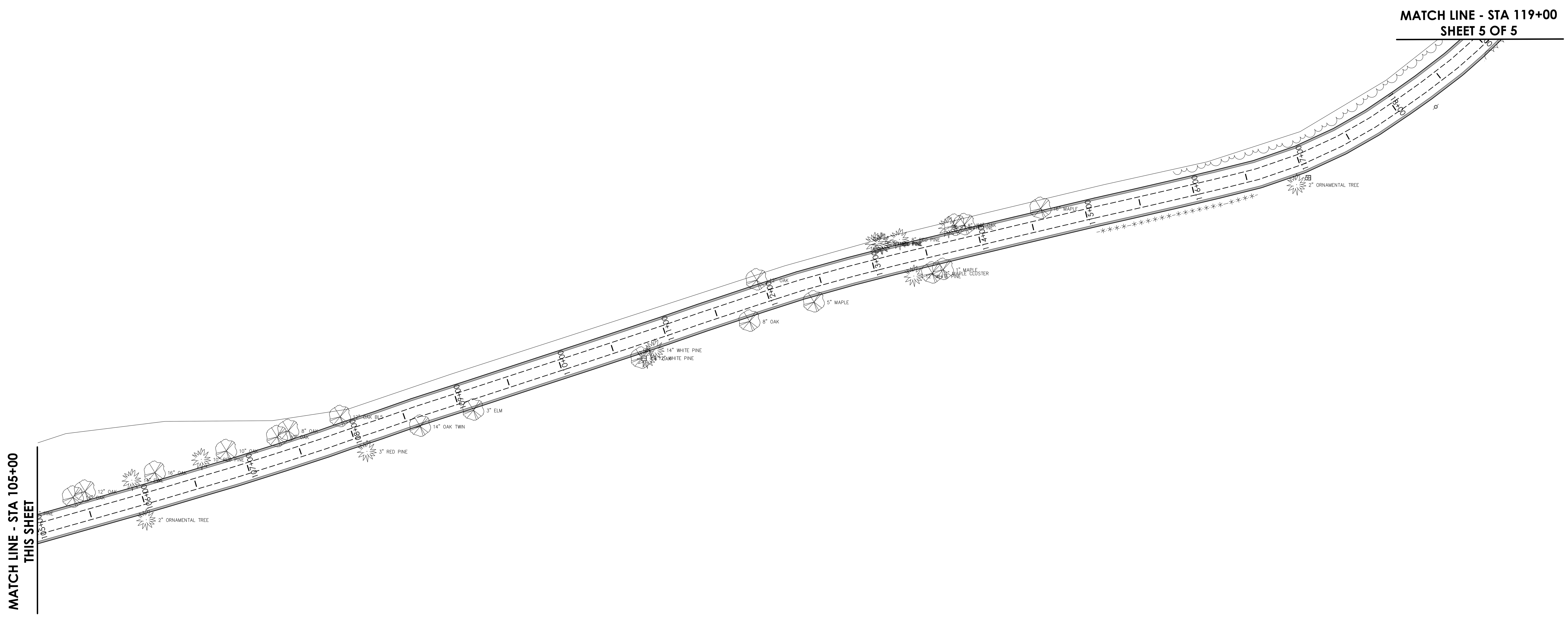

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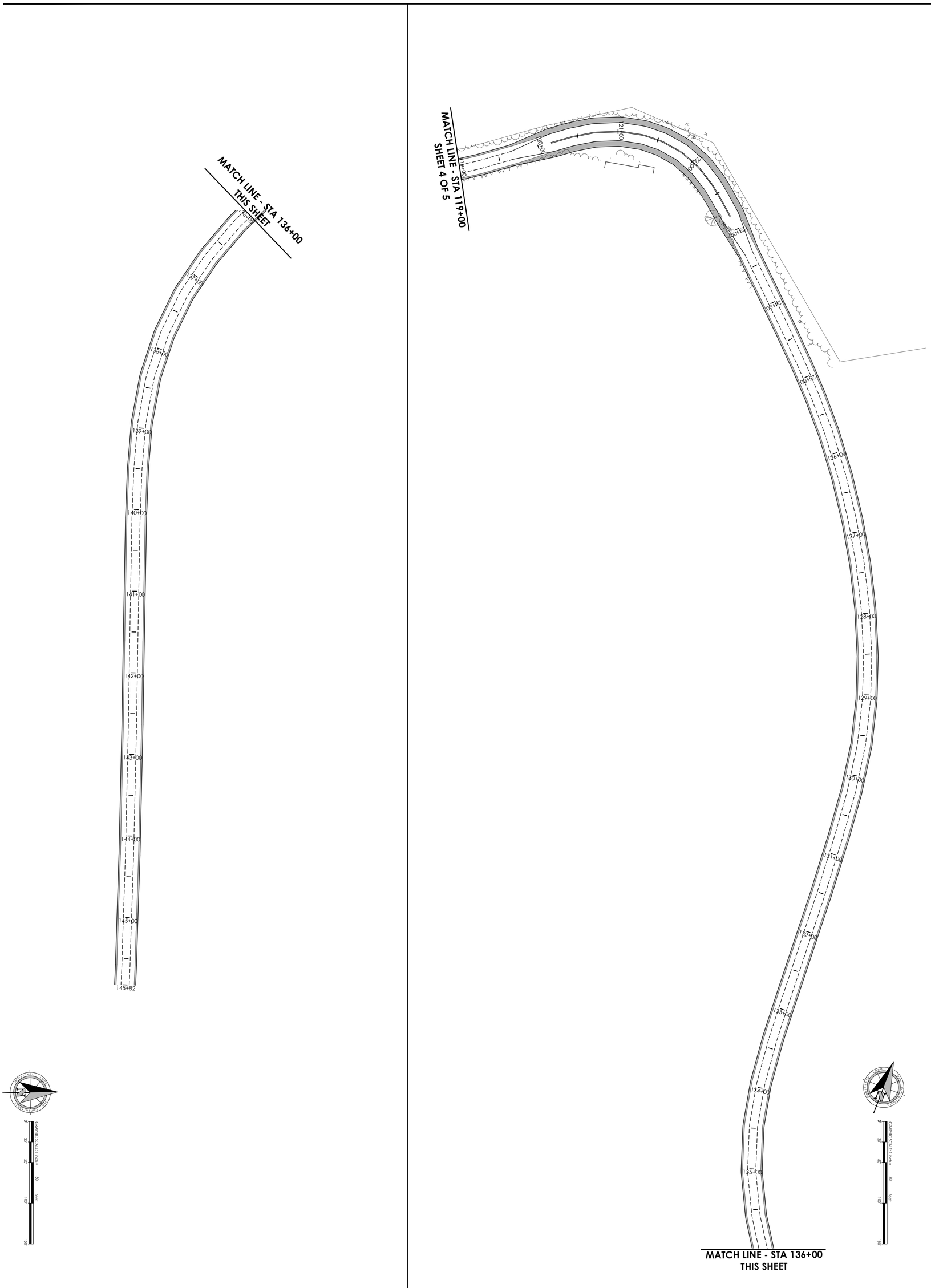
LITTLE TRAVERSE LAKE TRAIL

P.M.:

DR.: XXX CKD.: . CREATED: 01.19.24

JOB NO.: 11092

SHT 4 OF 5



SHT 5 OF 5

11092

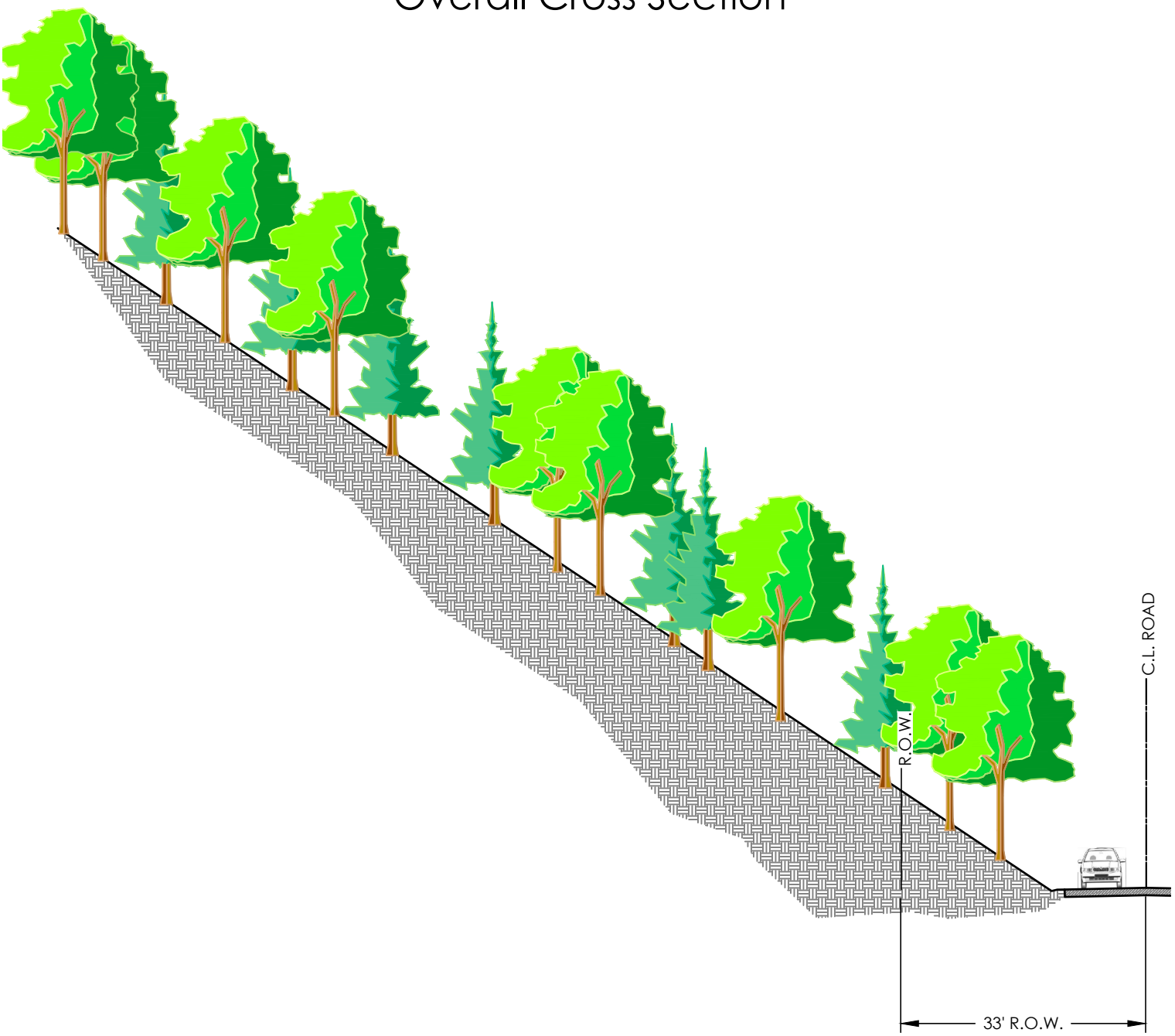
LITTLE TRAVERSE LAKE TRAIL

REV#	DATE	DES	DRN	CHK	DESC
1	4/4/24	MKG	MKG	MKG	ORIGINAL DESIGN

Mansfield
Land Use Consultants
Planners - Civil Engineers - Surveyors

PO Box 4015
830 Cottageview Dr., Suite 201
Traverse City, MI 49685
ph: 231-946-9310
fax: 231-946-8926
www.maaeps.com
email: info@maaeps.com

Overall Cross Section



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LITTLE TRAVERSE LAKE TRAIL

DRN:MMM | CKD: DLM

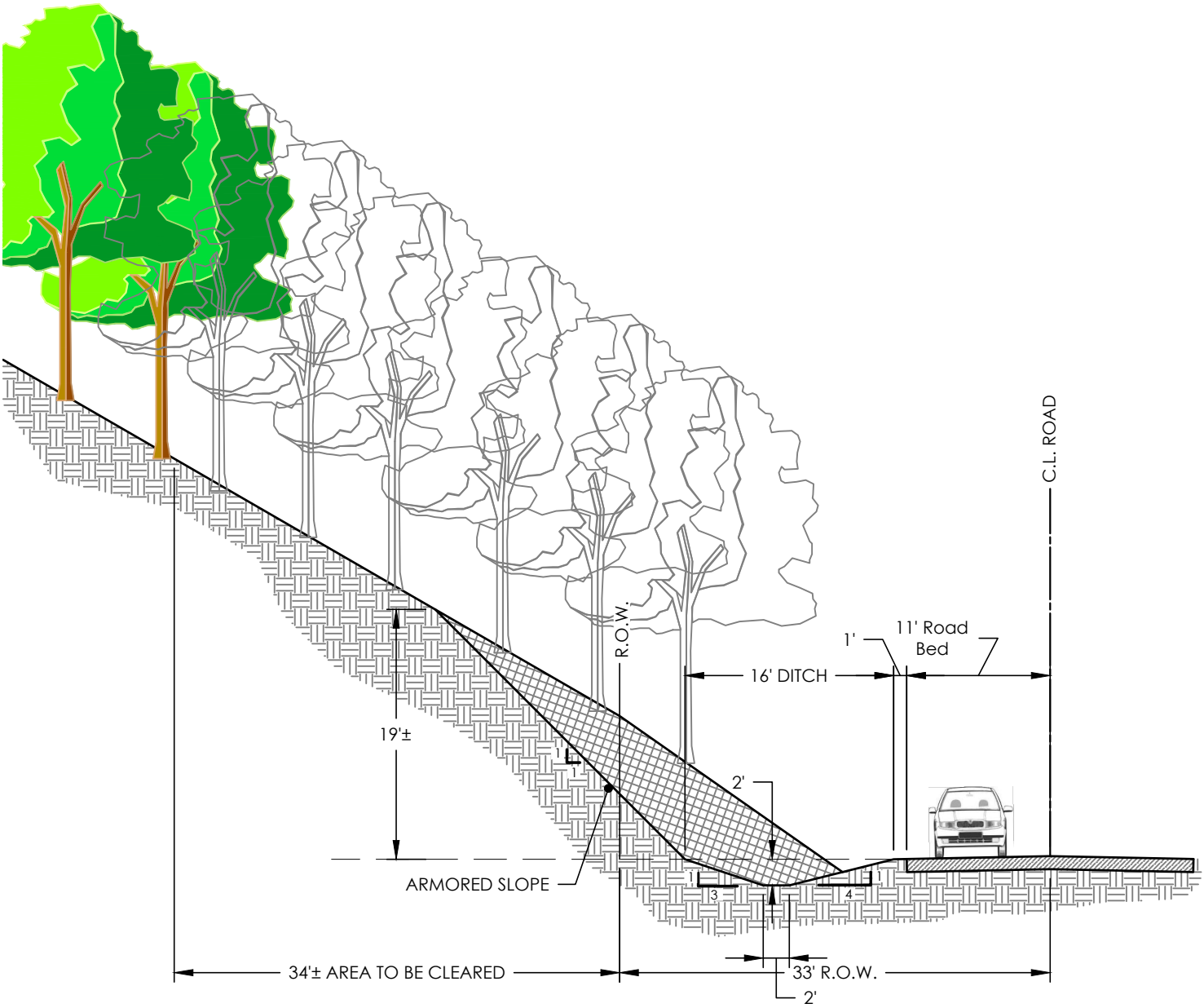
PROPOSED HERITAGE TRAIL EXPANSION
EXISTING
CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

04.12.2024

11092

SHT 1 OF 3

Cross Section



THIS EXHIBIT REPRESENTS IMPROVING THE EXISTING ROAD WITH AN APPROPRIATE DRAINAGE DITCH, ALL PURSUANT TO LEELANAU COUNTY ROAD COMMISSSION STANDARDS.

Mansfield
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LITTLE TRAVERSE LAKE TRAIL

PROPOSED HERITAGE TRAIL EXPANSION "C"

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

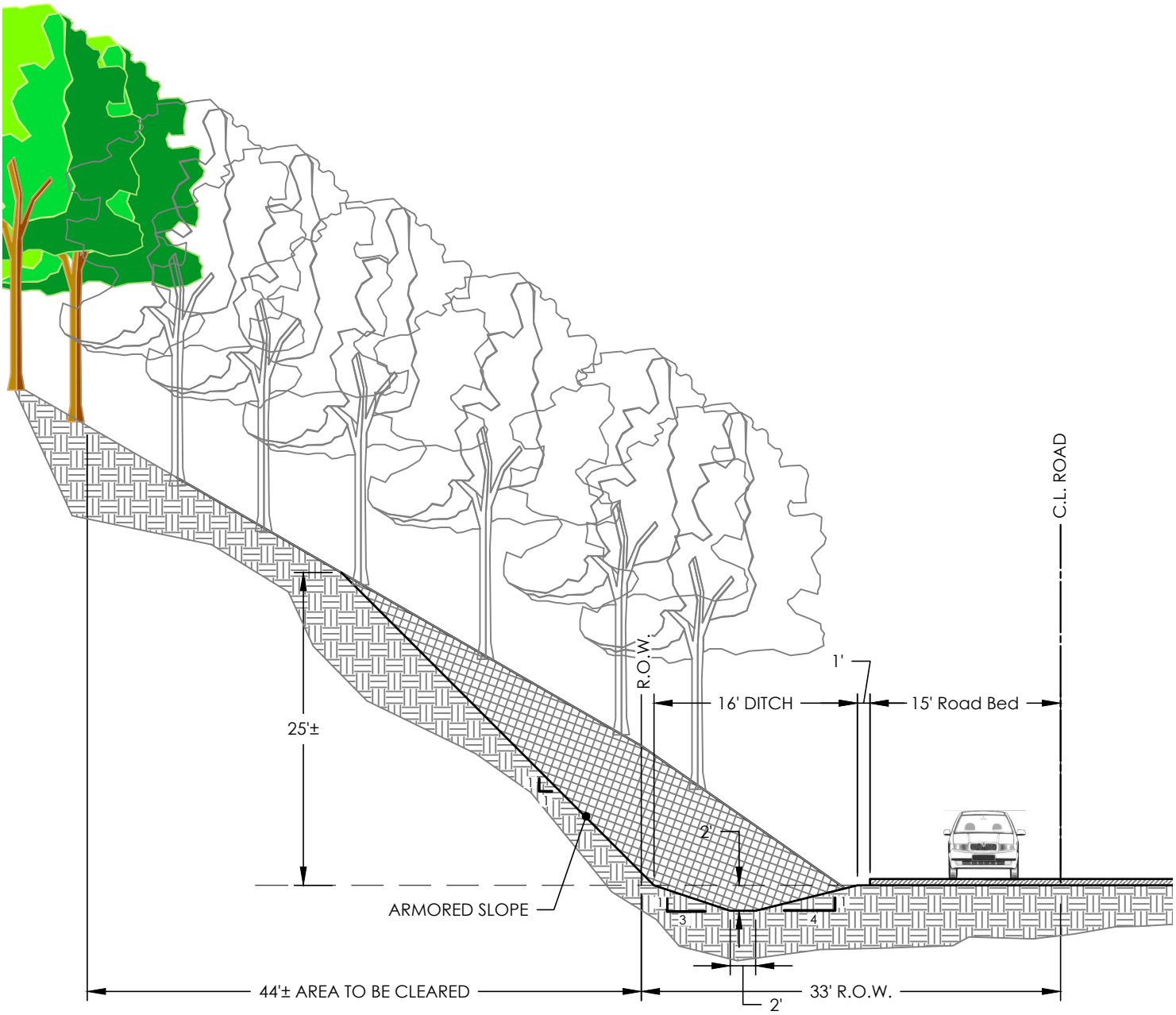
DRN:MMM | CKD: DLM

04.12.2024

11092

SHT 1 OF 1

Cross Section



THIS EXHIBIT REPRESENTS IMPROVING THE EXISTING ROAD WITH THE ADDITIONAL PAVEMENT WIDTH AND SHOULDER AND DRAINAGE DITCH PURSUANT TO LEELANAU COUNTY ROAD COMMISSION STANDARDS

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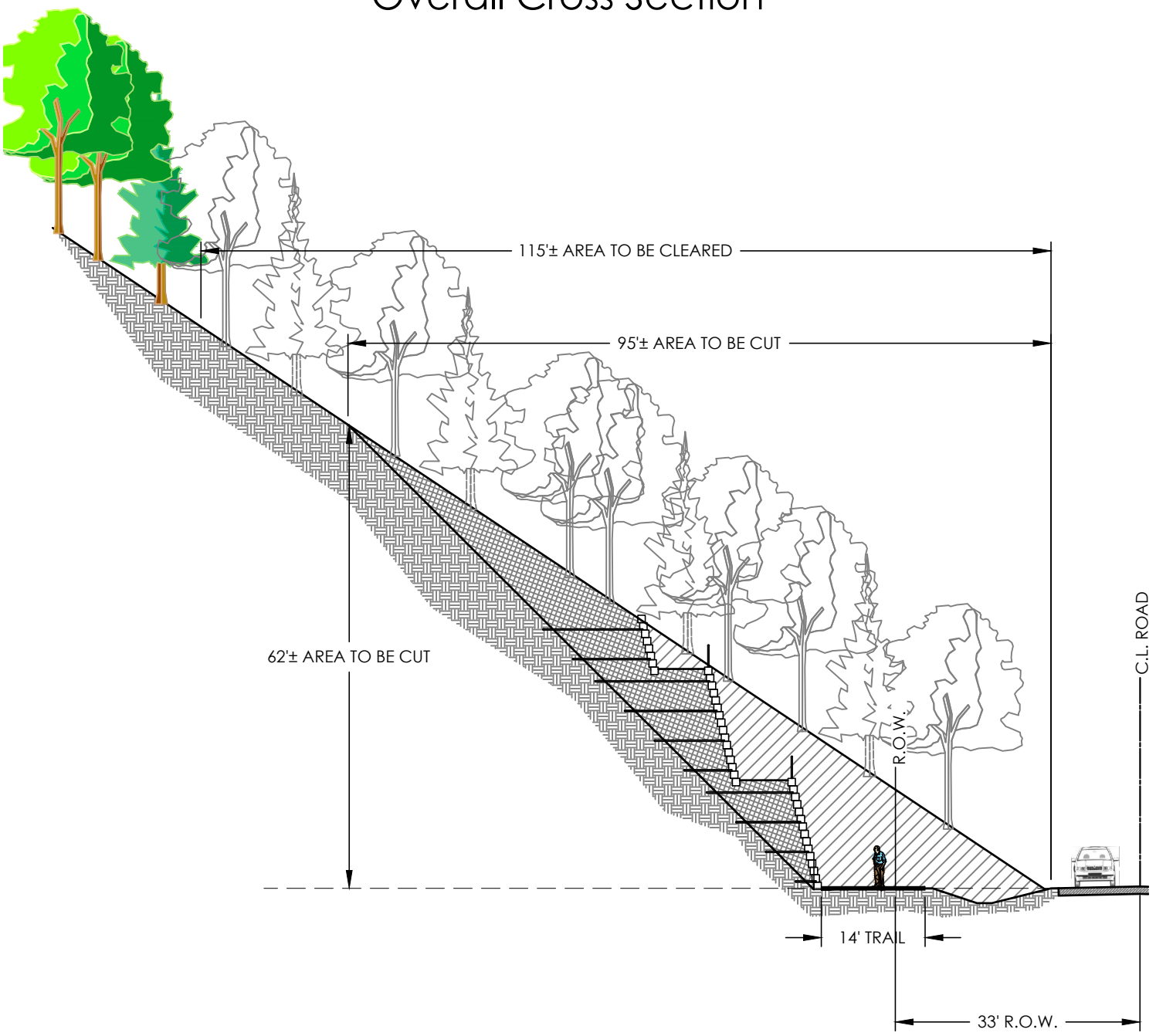
LITTLE TRAVERSE LAKE TRAIL

PROPOSED HERITAGE TRAIL EXPANSION "D"

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

DRN:MMM | CKD: DLM | 04.12.2024 | 11092 | SHT 1 OF 1

Overall Cross Section



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LITTLE TRAVERSE LAKE TRAIL

PROPOSED HERITAGE TRAIL EXPANSION "A"

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

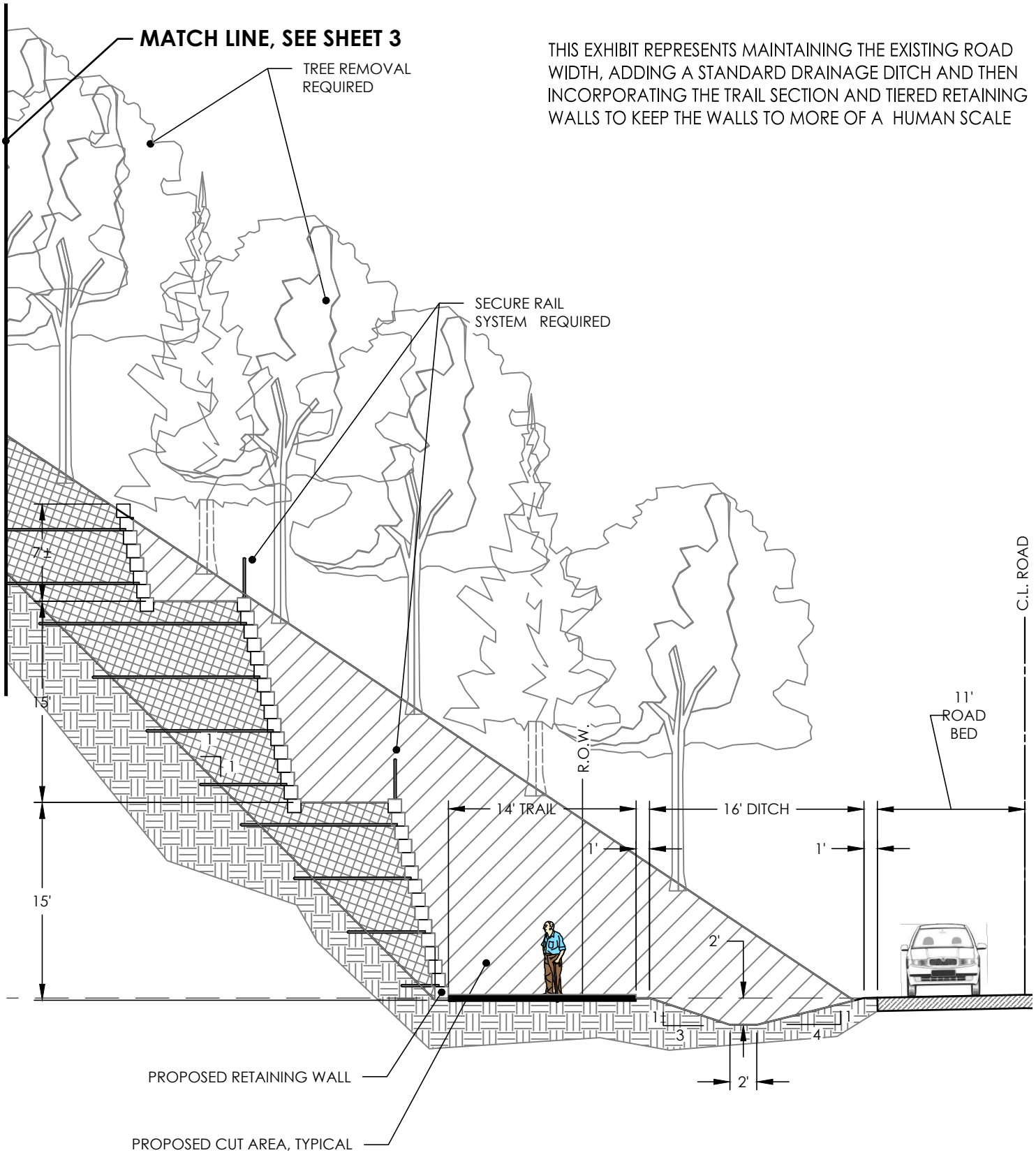
DRN:MMM | CKD: DLM

04.12.2024

11092

SHT 1 OF 3

Cross Section - Detail



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LITTLE TRAVERSE LAKE TRAIL | DRN:MMM | CKD: DLM

PROPOSED HERITAGE TRAIL EXPANSION "A"

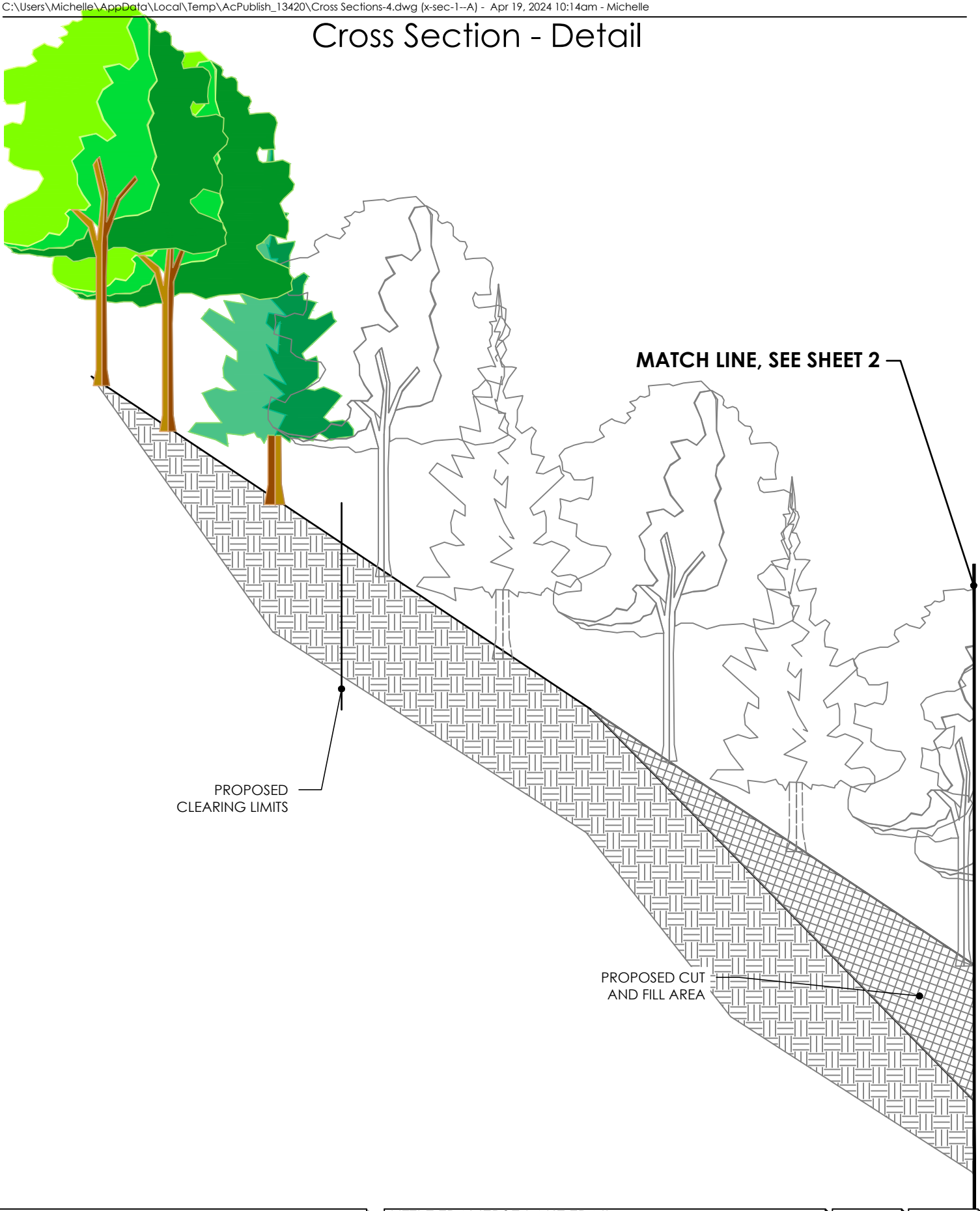
CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

04.12.2024

11092

SHT 2 OF 3

Cross Section - Detail



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LITTLE TRAVERSE LAKE TRAIL

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PROPOSED HERITAGE TRAIL EXPANSION "A"

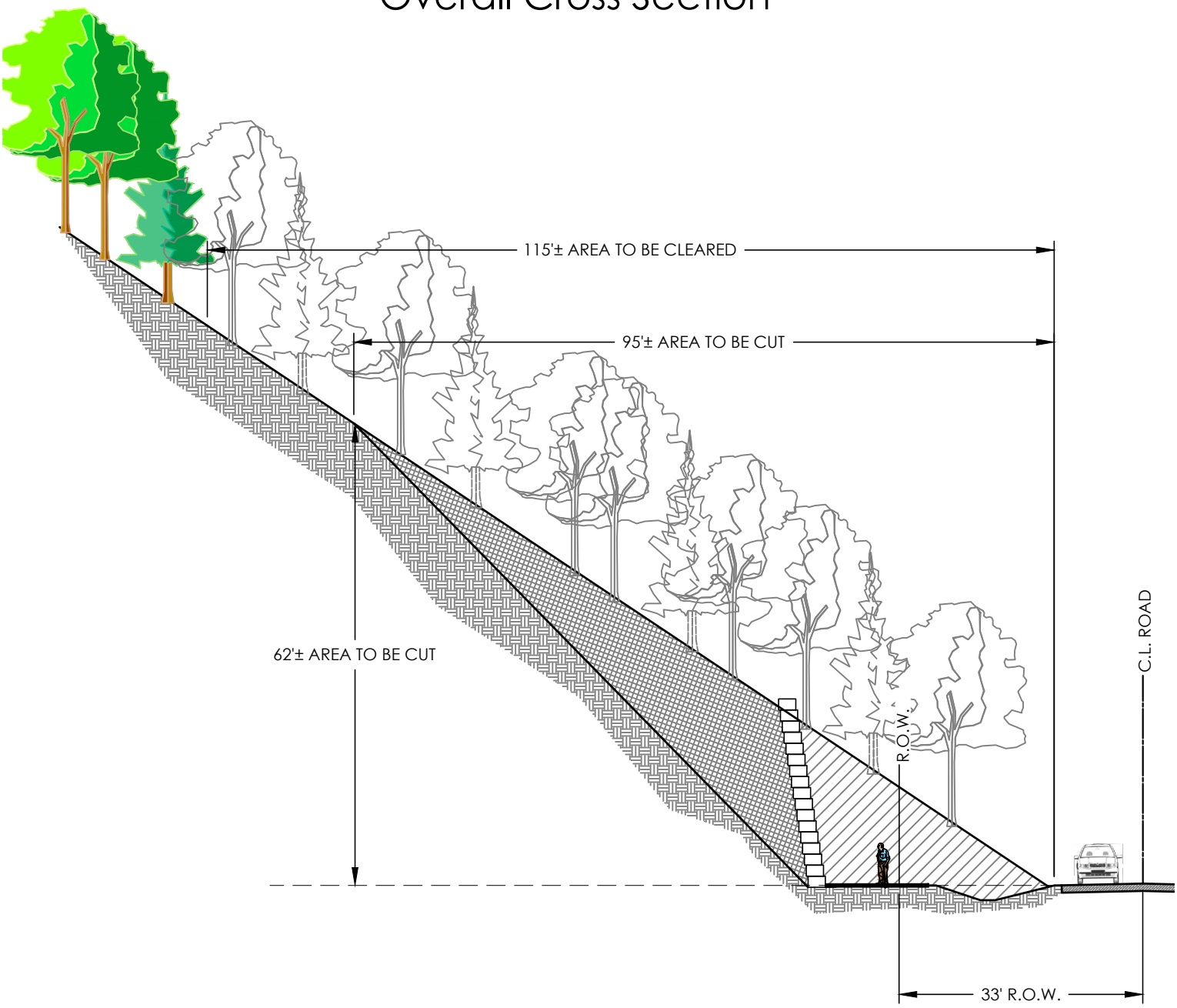
CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

04.12.2024

11092

SHT 3 OF 3

Overall Cross Section



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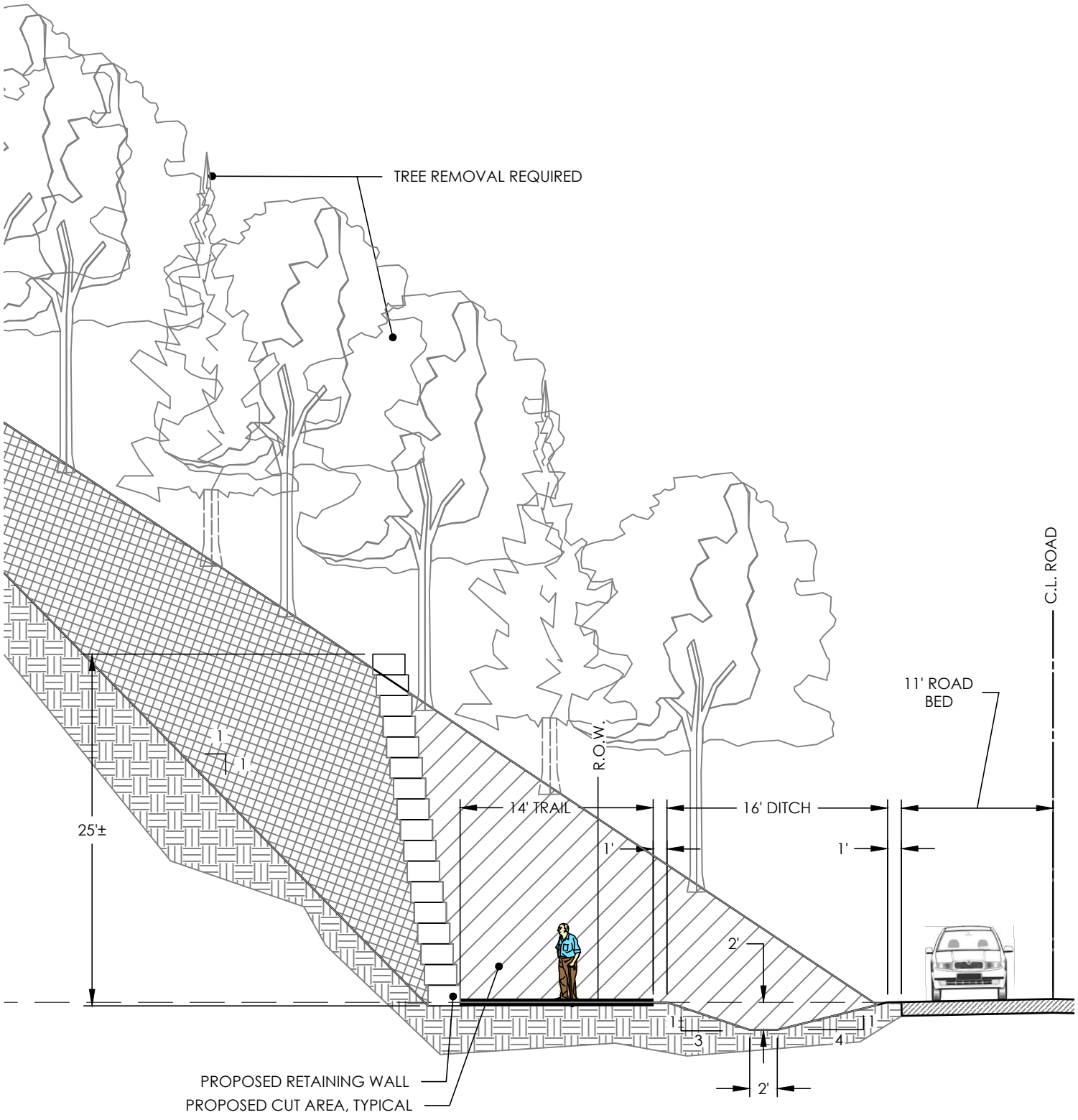
LITTLE TRAVERSE LAKE TRAIL

PROPOSED HERITAGE TRAIL EXPANSION "B"

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

DRN:MMM | CKD: DLM | 04.12.2024 | 11092 | SHT 1 OF 2

Cross Section - Detail



THIS EXHIBIT ILLUSTRATES MAINTAINING THE EXISTING PAVED ROAD BED WITH DEVELOPING THE STANDARD DRAINAGE DITCH, INCORPORATING THE TRAIL SECTION AND A SINGLE 25 FOOT HIGH RETAINING WALL.

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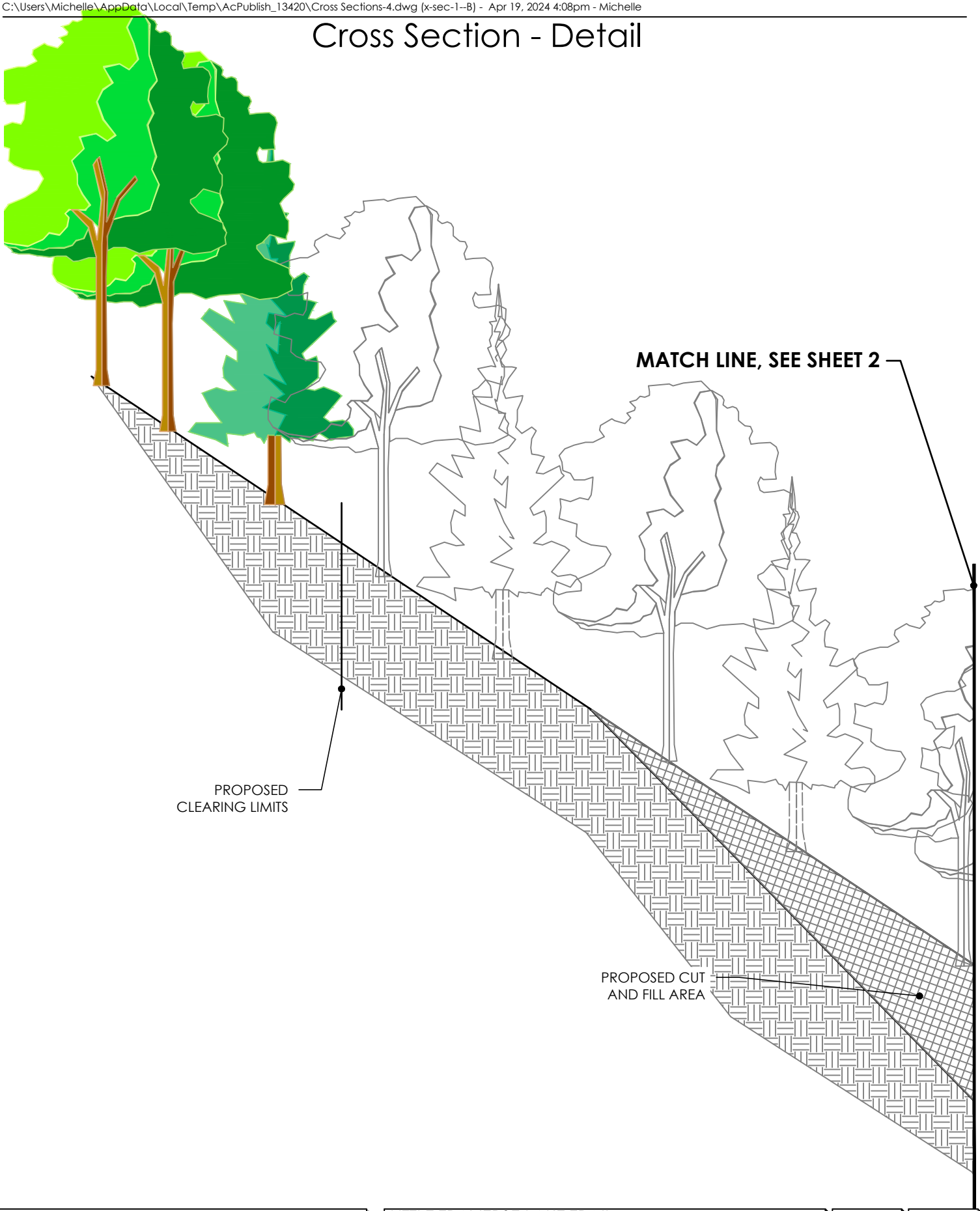
LITTLE TRAVERSE LAKE TRAIL | DRN:MMM | CKD: DLM

PROPOSED HERITAGE TRAIL EXPANSION | 04.12.2024

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN | 11092

SHT 2 OF 2

Cross Section - Detail



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LITTLE TRAVERSE LAKE TRAIL

PROPOSED HERITAGE TRAIL EXPANSION "B"

CLEVELAND TOWNSHIP, LEELANAU COUNTY, MICHIGAN

DRN:MMM | CKD: DLM

04.12.2024

11092

SHT 3 OF 3

NPS – <u>2008</u> Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment

Opt. 9.2 – <u>On-road</u> Trail

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 16N

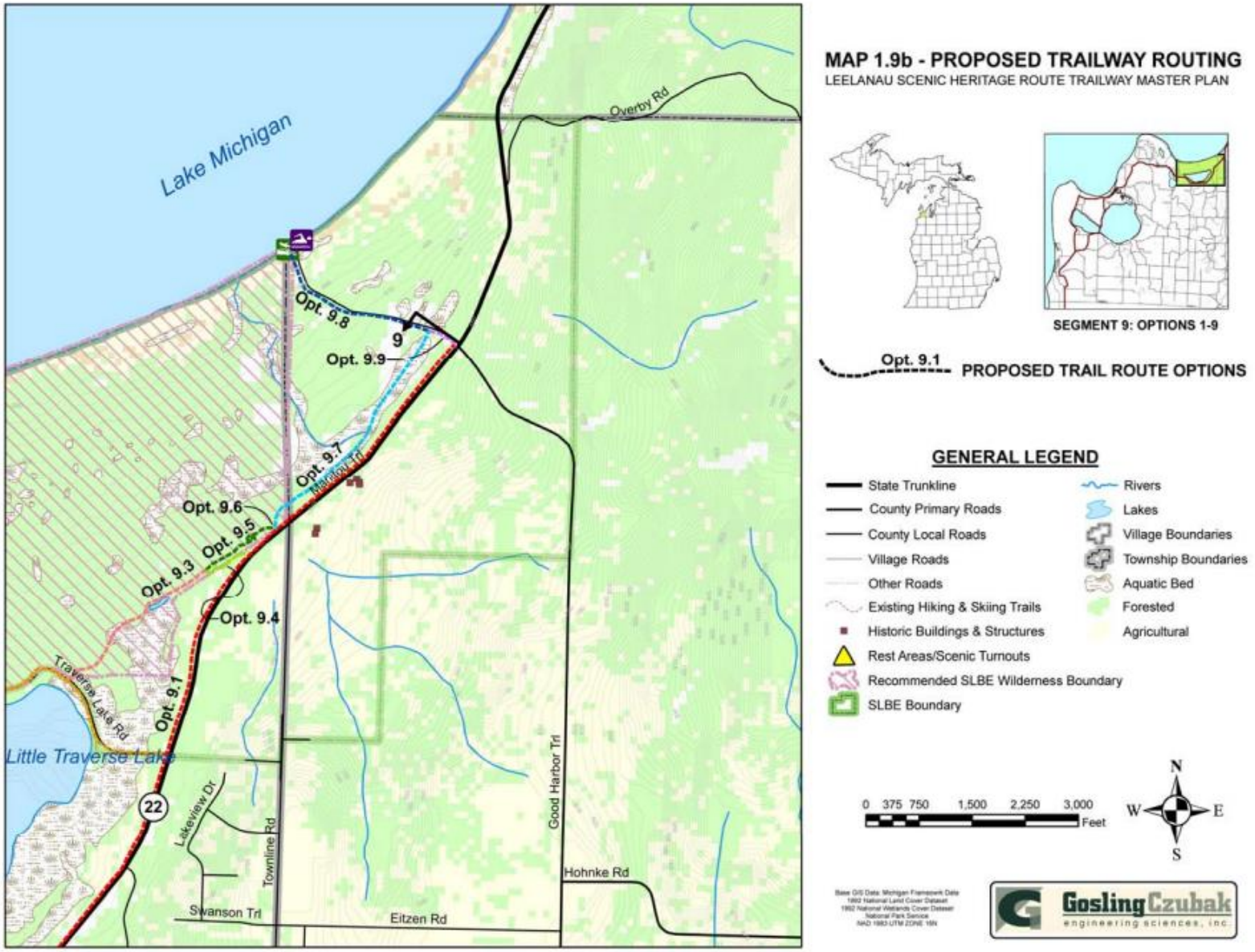
N
W E
S

0 375 750 1,500 2,250 3,000
Feet

GoslingCzubak
engineering sciences, inc.

NPS – <u>2008</u> Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment

Opt. 9.2 – <u>On-road</u> Trail



NPS – 2008 Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment

Opt. 9.2 – On-road Trail

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.
SEGMENT 9										
M-22 R.O.W. **Option 9.1**	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)
TLR ON-Road **Option 9.2**	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
Option 9.3	1 Proposed; Minor long. slope	3 Limited brdwalk	0	3 Wetland	1 Wetland	1 Wetland	0	3 Trail borders recommended Wilderness Boundary	0	12
Option 9.4	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
Option 9.5	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
Option 9.6	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
Option 9.7	2 Proposed; Moderate long. slope	3 Wetland Deliniation needed	1	3 Limited muck soil	0	0	0	0	0	9
Option 9.8	0	0	0	0 modified	0	0	0 County Road Gravel Improved	0	0	0
Option 9.9	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										

NPS – 2008 Leelanau Scenic Heritage Route Trailway Plan & Environmental Assessment

Opt. 9.2 – On-road Trail

M-22 R.O.W.

TLR ON-Road

Table 18 – Segment 9 Impact to Feasibility

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
SEGMENT 9							
Option 9.1	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)
Option 9.2	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
Option 9.3	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
Option 9.4	0	2 Proximity to proposed Wilderness boundary and Bufka Farm	0	2 Limestone	Evaluation with assistance from SLBE Staff	4	11
Option 9.5	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
Option 9.6	0	3 Goes through proposed Wilderness boundary	0	2 Limestone	Evaluation with assistance from SLBE Staff	5	10
Option 9.7	0 Ridge and swale ecosystem interpretation;	0	1 Remoteness; Gradient	3 Limestone, Clearing and grubbing	Evaluation with assistance from SLBE Staff	4	13
Option 9.8	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
Option 9.9	0	0	2 Gradient; Trail access	0 Utilize existing road no modification - Good Harbor Rd.	Evaluation with assistance from SLBE Staff	2	2
Segment 9: Bohemian Rd. to Good Harbor Trail							

TRAIL SEGMENT 9 - Alt B

COST PROJECTION
Leelanau Scenic Heritage Route Trailway
Phase I - Planning Project - February 2008

Total Trail Section Length: 25,133 Ft. 4.76 MI.

Description: In M-22 ROW on north side from Bohemian Rd. to Little Traverse Lake Rd.(paved); Out of ROW west of Bufka Farm on north side of buildings to Townline Rd. (limestone) and possible boardwalk sections.

Item	Estimated Quantity	Units	Unit Price in Year 2007	Estimated Cost	Notes	Subtotal	Subtotal
R.O.W. / DESIGN ENGINEERING							
ROW Land and Purchase (Survey, Legal, Admin. etc	NA/	LS			None		
Surveying (5%)	0.05	LS	$13,179	$13,179	50% wooded wetlands		
Permit Processing; Engineering Design (12%)	0.12	LS	$31,629	$31,629	SESC; MDOT, MDEQ pemits		
Subtotal:						**$44,807**	**$0**
TRAIL CONSTRUCTION COSTS							
General Construction Costs							
Bonds and Insurance (typ. 1-2%)	0.01	LS	$3,956	$3,956			
Mobilization (3-5K)	1	LS	$4,000	$4,000			
Site Preparation							
Clear and Grub; Topsoil (Remove and Stockpile)	2	MI	$4,000	$8,000	yes, wooded wetlands		
Unclassified Embankment; Subgrade excavation	0.5	MI	$3,600	$1,800	limited		
Traffic control	1	LS	$4,000	$4,000	yes		
Trail Cross section							
Asphalt paving (2") (220#/sy)(6" - 22A)(Trail grading	0.38	MI	$158,400	$60,192	Traverse Lake Rd. (ex. paved rd.) - (2.76 mi.) or Good Harbor Beach trailhead link on Townline Rd. (.46 mi.)		
Asphalt paving (2") (220#/sy)(3"- 22A + Ex. Gravel)		MI	$100,300	$0			
Limestone paving (4")(Base amend)(Trail grading)	1.27	MI	$116,200	$147,574	Additional spur to connect to Port Oneida Rd. (500 l.f.)		
On-Road Bikelane (4" white waterborne - two sides)	2.43	MI	$7,500	$18,225	Little Traverse Lake Road		
Wood boardwalk - auger supported (10' width)		LF	$360	$0	Possible with wetlands near Bartunek Rd. and near Townline Rd. west of the Bufka Farm		
60	0.57	MI	$0	$0	Good Harbor Beach Road - to be paved by NPS		
Trail Restoration							
Seeding / Vegetation (restoration)	3.5	MI	$950	$3,325	yes, wooded and wetland edge restoration		
Trees (restoration)	50	EA	$250	$12,500	yes, wooded understory		
Subtotal:						**$263,572**	**$0**
STRUCTURES / SPECIAL FEATURES / SAFETY / DRAINAGE							
Culverts; Rip-rap; Erosion Control (Silt fencing)		LS		$0	yes		
Crossing Advanced Warning (lights, signs, striping)		LS		$0	Port Onieda Rd.; S. Basch Rd.		
Pavement markings		LS		$0	2 crosswalks		
Perminant signage		LS		$0	Mile markers; Interpretive		
Bridge (10' width); Bridge Abutment/Wing walls	1	LS		$70,000	es, creek location w. of Bartunek Rd. (30 Ft. span)		
Retaining Walls (Wood, modular conc.)		LS		$0	yes, possible		
Subtotal:						**$0**	**$0**
CONSTRUCTION ENGINEERING							
Material Testing; Construction Management (7%)	0.07	LS	$18,450	$18,450			
Grant management / assistance	0.005	LS	$1,318	$1,318			
Subtotal:						**$19,768**	**$0**
SUBTOTAL ENGINEERING AND CONSTUCTION:				$398,147		**$328,147**	**$0**
PROJECT CONTINGENCY (20%):	0.2			$79,629			
TOTAL PROJECT COST PROJECTION				**$477,776**			

TLR
ON-Road

Gosling Czubak engineering sciences, inc.

NPS - <u>2009</u> Leelanau Scenic Heritage Trailway Plan & Environmental Assessment

Opt. 9.2 - <u>Off-road</u> trail

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

N W E S

0 375 750 1,500 2,250 3,000 Feet

Gosling Czubak engineering sciences, inc.

NPS - <u>2009</u> Leelanau Scenic Heritage Trailway Plan & Environmental Assessment

Opt. 9.2 - <u>Off-road</u> trail

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
- 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

0 375 750 1,500 2,250 3,000 Feet

N W E S

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

GoslingCzubak engineering sciences, inc.

NPS - 2009 Leelanau Scenic Heritage Trailway Plan & Environmental Assessment

Opt. 9.2 - Off-road trail

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.
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TLR OFF-Road **Option 9.2**	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
Option 9.3	1 Proposed; Minor long. slope	3 Limited brdwalk	0	3 Wetland	1 Wetland	1 Wetland	0	3 Trail borders recommended Wilderness Boundary	0	12
Option 9.4	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
Option 9.5	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
Option 9.6	2 Proposed; Moderate long. slope	0	0	3 Limited muck soil	0	0	0	0	0	5
Option 9.7	2 Proposed; Moderate long. slope	3 Wetland Deliniation needed	1	3 Limited muck soil	0	0	0	0	0	9
Option 9.8	0	0	0	0 modified	0	0	0 County Road Gravel Improved	0	0	0
Option 9.9	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

NPS - 2009 Leelanau Scenic Heritage Trailway Plan & Environmental Assessment

Opt. 9.2 - Off-road trail

Table 18 – Segment 9 Impact to Feasibility

	Recreational Experience	SLBE Visitor Experience	Safety	Cost	Operation & Maintenance	TOTAL IMPACT TO FEASIBILITY	TOTAL COMBINED IMPACT
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TLR OFF-Road **Option 9.2**	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
Option 9.3	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
Option 9.4	0	2 Proximity to proposed Wilderness boundary and Bufka Farm	0	2 Limestone	Evaluation with assistance from SLBE Staff	4	11
Option 9.5	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
Option 9.6	0	3 Goes through proposed Wilderness boundary	0	2 Limestone	Evaluation with assistance from SLBE Staff	5	10
Option 9.7	0 Ridge and swale ecosystem interpretation;	0	1 Remoteness; Gradient	3 Limestone, Clearing and grubbing	Evaluation with assistance from SLBE Staff	4	13
Option 9.8	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
Option 9.9	0	0	2 Gradient; Trail access	0 Utilize existing road no modification - Good Harbor Rd.	Evaluation with assistance from SLBE Staff	2	2
Segment 9: Bohemian Rd. to Good Harbor Trail							

NPS - 2009 Leelanau Scenic Heritage Trailway Plan & Environmental Assessment

Opt. 9.2 - Off-road trail

TRAIL SEGMENT 9 - Alt B

COST PROJECTION
Leelanau Scenic Heritage Route Trailway
Phase I - Planning Project - February 2008

Total Trail Section Length: **25,133 Ft.** **4.76 MI.**

Description: In M-22 ROW on north side from Bohemian Rd. to Little Traverse Lake Rd.(paved); Out of ROW west of Bufka Farm on north side of buildings to Townline Rd. (limestone) and possible boardwalk sections.

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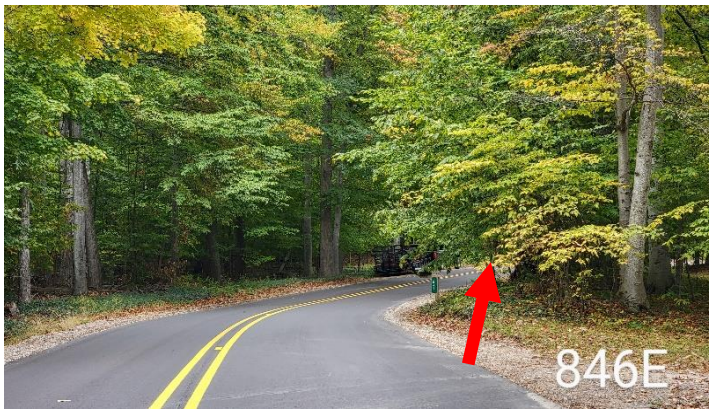
Subtotal:						**$44,807**	**$0**
TRAIL CONSTRUCTION COSTS							
General Construction Costs							
Bonds and Insurance (typ. 1-2%)	0.01	LS	$3,956	$3,956			
Mobilization (3-5K)	1	LS	$4,000	$4,000			
Site Preparation							
Clear and Grub; Topsoil (Remove and Stockpile)	2	MI	$4,000	$8,000	yes, wooded wetlands		
Unclassified Embankment; Subgrade excavation	0.5	MI	$3,600	$1,800	limited		
Traffic control	1	LS	$4,000	$4,000	yes		
Trail Cross section							
Asphalt paving (2") (220#/sy)(6" - 22A)(Trail grading	0.38	MI	$158,400	$60,192	Traverse Lake Rd. (ex. paved rd.) - (2.76 mi.) or Good Harbor Beach trailhead link on Townline Rd. (.46 mi.)		
Asphalt paving (2") (220#/sy)(3"- 22A + Ex. Gravel)		MI	$100,300	$0			
Limestone paving (4")(Base amend)(Trail grading)	1.27	MI	$116,200	$147,574	Additional spur to connect to Port Oneida Rd. (500 l.f.)		
On-Road Bikelane (4" white waterborne - two sides)	2.43	MI	$7,500	$18,225	Little Traverse Lake Road		
Wood boardwalk - auger supported (10' width)		LF	$360	$0	Possible with wetlands near Bartunek Rd. and near Townline Rd. west of the Bufka Farm		
60	0.57	MI	$0	$0	Good Harbor Beach Road - to be paved by NPS		
Trail Restoration							
Seeding / Vegetation (restoration)	3.5	MI	$950	$3,325	yes, wooded and wetland edge restoration		
Trees (restoration)	50	EA	$250	$12,500	yes, wooded understory		
Subtotal:						**$263,572**	**$0**
STRUCTURES / SPECIAL FEATURES / SAFETY / DRAINAGE							
Culverts; Rip-rap; Erosion Control (Silt fencing)		LS		$0	yes		
Crossing Advanced Warning (lights, signs, striping)		LS		$0	Port Onieda Rd.; S. Basch Rd.		
Pavement markings		LS		$0	2 crosswalks		
Perminant signage		LS		$0	Mile markers; Interpretive		
Bridge (10' width); Bridge Abutment/Wing walls	1	LS		$70,000	es, creek location w. of Bartunek Rd. (30 Ft. span)		
Retaining Walls (Wood, modular conc.)		LS		$0	yes, possible		
Subtotal:						**$0**	**$0**
CONSTRUCTION ENGINEERING							
Material Testing; Construction Management (7%)	0.07	LS	$18,450	$18,450			
Grant management / assistance	0.005	LS	$1,318	$1,318			
Subtotal:						**$19,768**	**$0**
SUBTOTAL ENGINEERING AND CONSTUCTION:				$398,147		**$328,147**	**$0**
PROJECT CONTINGENCY (20%):	0.2			$79,629			
TOTAL PROJECT COST PROJECTION				**$477,776**			

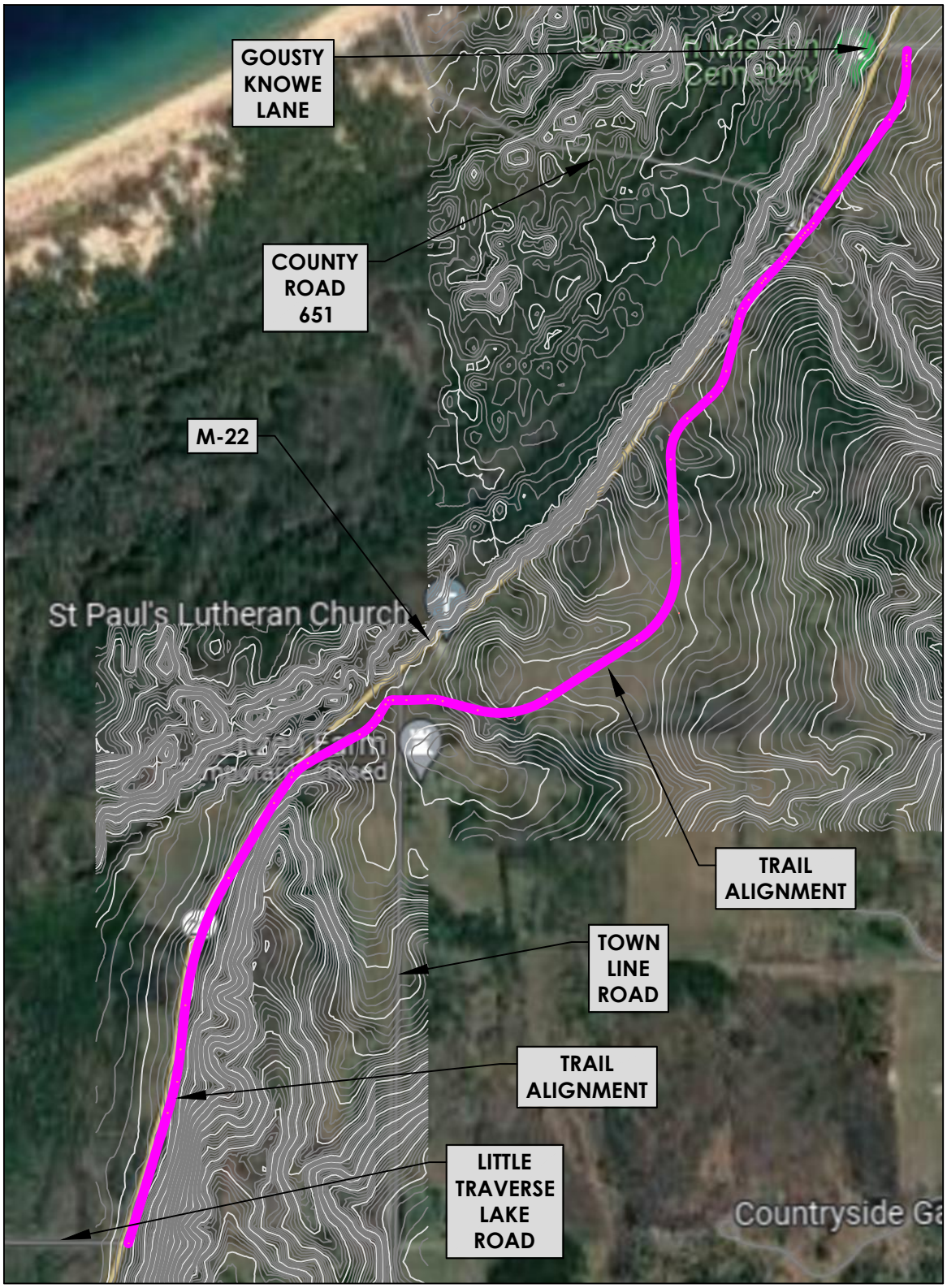
TLR
OFF-Road

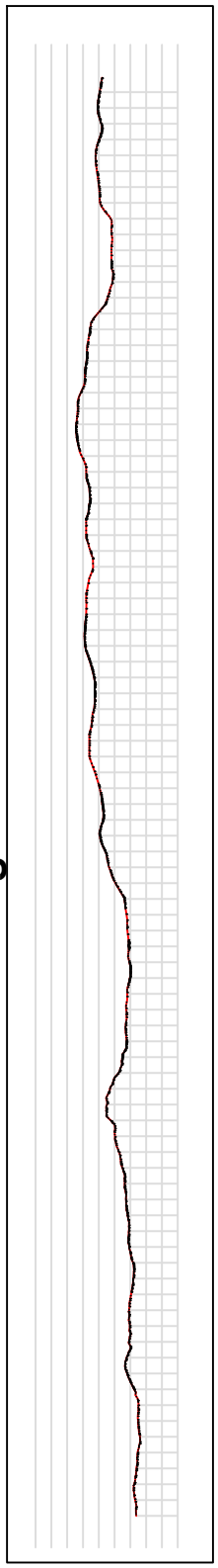
Gosling Czubak engineering sciences, inc.

BRANCH AND BUSH TRIMMING TO IMPROVE SIGHT DISTANCE ALONG TRAVERSE LAKE ROAD



More significant measures required





Alternate Trail Alignment

Little Traverse Lake Road to Gousty Knowe Lane

Plan View Notes
Approximately 9100 lft of trail (1.72 mi)
Periodic areas of 5'+/- tall wall required
Not to Scale

Profile View Notes
Vertical Grid = 10' / Horizontal Grid = 50'
Existing Grade Maximum at 5% +/-
Not to Scale