
Appendix A

Highway 1/169 Eagles Nest Project - Alternatives Development & Evaluation Technical
Memorandum

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MEMORANDUM

TO: Michael Kalnbach, P.E. MnDOT

FROM: Chris Hiniker, AICP
Bob Rogers, AICP

DATE: September 2, 2014
Revised: December 8, 2014

RE: Highway 1/169 Eagles Nest Project - Alternatives Development & Evaluation Tech Memo

The purpose of this memorandum is to document the process and rationale followed to develop, evaluate, and screen the range of alternatives considered as part of the Highway 1/169 Eagles Nest Project. The Highway 1/169 Eagles Nest project study area includes the portion of Highway 1/169 from approximately Sixmile Lake Road to Bradach Road, in St. Louis County, MN (see Figure 1). The process for identifying the full range of project alternatives and the development of the screening criteria used to evaluate alternatives considered study issues identified through stakeholder input and through review of social/economic/environmental, traffic, and land use data. Below is a list of guiding principles and supporting actions that were used in defining and evaluating the range of alternatives:

- Alternatives considered must satisfy the primary purpose and need objectives, which include addressing the pavement maintenance and providing safety improvements within the project corridor. In addition, alternatives that address secondary needs (i.e., geometric design deficiencies and maintaining mobility) should also be developed and evaluated.
- To the extent practical, alternatives should avoid and minimize social, economic and environmental impacts.
- While not to be used as a determining factor, the alternatives evaluation process should consider ways to minimize short- and long-term costs.

Project Alternatives Development and Evaluation Process

This section describes a multi-step alternatives development, evaluation, and refinement process that unfolded over a three year time period. The process included the following:

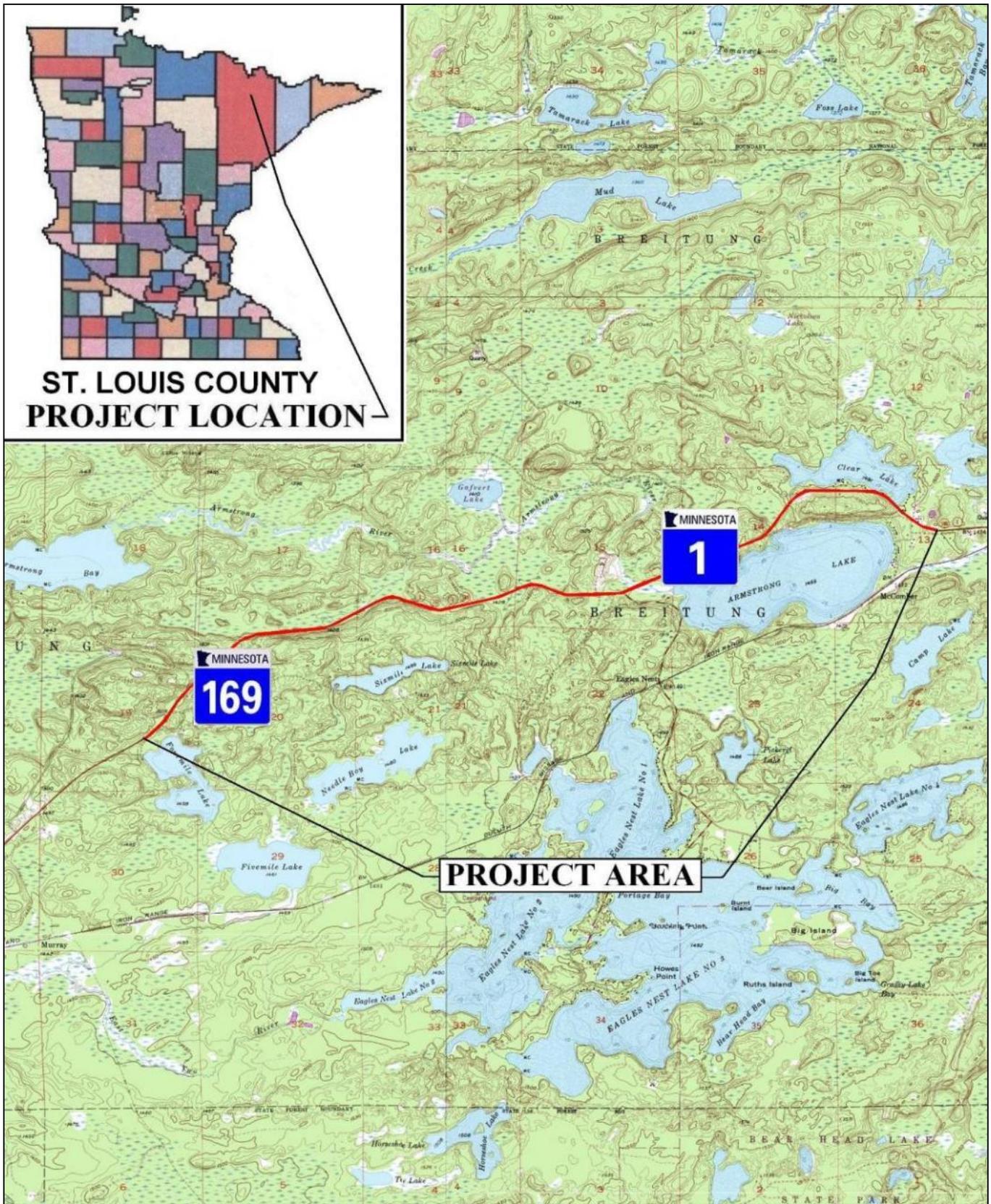
- Identification of Level 1 Alternatives
- Screening of Level 1 Alternatives
- Identification of Level 2 Alternatives
- Evaluation of Level 2 Alternatives
- Identification of Level 3 Alternatives
- Evaluation and Screening of Level 3 Alternatives
- Identification of Preferred Alternative

Identification of Level 1 Alternatives

A range of alternatives were developed to respond to the established purpose and need including addressing pavement maintenance and improving highway safety, and, to varying degrees, addressing vertical and horizontal curve deficiencies and maintaining mobility.

A safety audit of the project corridor was performed by MnDOT's Office of Traffic, Safety and Technology (OTST), to assess the existing roadway and recommend safety improvements that should be incorporated into the project to meet the primary safety needs. MnDOT's OTST reviewed crash data, geometric road design, clear zones, and other roadway characteristics and provided advice where design improvements can be best utilized to increase the safety for the travelling public.

Figure 1 – Project Study Area



Reviewing the crash data for 2004-2013, MnDOT's OTST noted that the largest issue is with lane departure type crashes. Although a large number of crashes occur at curves, they are not proportionally greater than the crash rate on other sections of Highway 1/169 (i.e. there are a number of lane departure crashes on tangent (straight) sections as well). Within the Eagles Nest Lake project area, lane departure crashes (run off the road, head-on, and sideswipes) represent over 84 percent of all crashes. The statewide average on two lane highways is closer to 33 percent of all crashes. From 2004-2013, there were 37 crashes in the project area. Of these, 30 crashes (81 percent) were overturn, rollover, and collisions with trees, shrubs, and ditch banks – all items associated with leaving the roadway.

MnDOT's OTST noted that these crash data strongly suggest that the improvements in the project area should be focused on keeping drivers within their lane of travel, and reducing the consequences when a lane departure has occurred. Recommended countermeasures within the roadway surface suggested by OTST include (1) widening and paving shoulders to the full 8 feet on each side, (2) providing a four foot striped center median buffer between the opposing lanes, (3) centerline and edge-line rumble strips, (4) 6" ground-in pavement markings. Recommended countermeasures outside of the roadway surface include (1) recoverable ditch slopes (4H:1V) where possible, (2) maximizing the clear zone from obstructions, (3) when clear zones and recoverable slopes cannot be provided, a guardrail type system should be considered to reduce the severity of crashes once lane departure has occurred, especially in areas where a crash history exists, (4) curves should be given advanced warning signs, and oversized chevron signing should be provided on all curves.

In order to minimize impacts to wetlands and forests, the OTST recommendations were reviewed further by MnDOT design and safety staff to determine what modifications could be made to minimize impacts while still improving corridor safety. Based on this review, the four-foot striped center median buffer was eliminated, and shoulders were modified to 6-foot paved plus 2-foot gravel, to provide an 8-foot vehicle pull off area. In summary, all the build alternatives include the following safety improvements:

- Horizontal and vertical curve corrections
- Widened shoulders
- Reduced ditch slopes
- Improved clear zones
- Enhanced intersection sight lines
- Guardrail systems (where required)
- Improved signage

All of the Level 1 alternatives developed for the project included these basic safety improvements, to address the primary need related to providing safety improvements. In addition, all Build alternatives included pavement reconstruction, to address deteriorating pavement condition.

Development of the range of Level 1 alternatives also included addressing the secondary needs to varying degrees – balancing addressing those needs against the potential for social, economic and environmental impacts. Efforts were made to address curvature deficiencies by realigning and/or re-grading roadway segments, especially in the 2 mile section of roadway at the west end of the project area that was identified in the Highway 169 Task Force report and in comments from the public as being a safety concern to roadway users. To address the need for maintaining mobility, the range of alternatives included varying levels of providing designated safe passing zones.

During initial screening, alternative alignments within two corridors (Existing and South) were considered to address the existing transportation concerns in the study area. The Existing corridor alignments closely follow the current roadway alignment. To address the primary and secondary needs of the project the Existing Corridor alignments include providing the basic recommended safety improvements, plus some minor realignments in segments of the existing corridor with substantial geometric deficiencies and/or to avoid impacts to adjacent natural features (wetlands, bedrock outcrops, etc.).

The South Corridor alignments include providing the basic recommended safety improvements, plus more substantial roadway realignments in portions of the corridor to provide improved geometric deficiencies – most substantially at the west end of the project area that has been identified as a concern in the Task

Force Report and in public comments. Due to environmental concerns about the South Corridor raised by property owners in the vicinity of Sixmile Lake, a third alignment corridor – the North Corridor – was assessed as an alternative to improve geometrics in the western end of the corridor. Figure 2 depicts the location of the three corridors considered.

Through the process of defining improvements within the three primary corridors, numerous conceptual alignments were defined and refined in an effort to balance the purpose and need objectives and minimize environmental impacts and costs. Approximately 20 different iterations of concept alignments were identified, reviewed, and refined, in an effort to balance meeting the project needs with avoiding and minimizing environmental impacts (including, but not limited to: wetlands, vegetation, noise, right of way acquisition, and rock excavation/potential for sulfide-bearing rock).

Ultimately, one alignment within each of the Existing, North, and South corridors were identified as the best representatives for an initial screening-level assessment. The alignments chosen within each of the three corridors were those with the least environmental impacts that met the primary needs and (to the extent possible) addressed secondary needs (see Figure 2). The No Build alternative was also assessed, as a basis for comparison of relative impacts and benefits. The Level 1 alternatives included the following:

Figure 2 – Level 1 Corridors



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- No-Build Alternate – The No-Build Alternative for this project would be limited to normal pavement maintenance along this segment of Highway 1/169. The No-Build Alternate is used as a basis of comparison, or benchmark for the Build Alternates, and includes the impacts associated with doing nothing (e.g., related to project needs).
- Existing Corridor – The Existing Corridor includes widening to 8 foot shoulders throughout the project area to provide a safe area for a vehicle to pull off the road if it becomes inoperable. Expanded clear zones are also included to improve safety, by providing a wider reaction zone at select locations. The Existing Corridor also includes other improvements such as adding turn/bypass lanes and passing lanes.
- North Corridor – An alignment that minimized wetland impacts to the extent possible while addressing an area with multiple horizontal curves was assessed for the North Corridor in a two mile section of roadway at the west end of the project area in the vicinity of Sixmile Lake. The North Corridor concept also includes other safety improvements such as adding turn/bypass lanes, passing lanes, and adding 8-foot wide shoulders. The North Corridor east of Mile Post 271.3 could then follow either the Existing or South Corridor.
- South Corridor – The South Corridor includes the greatest amount of realignment, with the majority of the western third of the study area being on a new southern alignment. However there are segments that are close to or use the existing corridor in the eastern portion of the study area. The South Corridor also includes recommended safety improvements such as adding turn/bypass lanes, passing lanes and adding 8-foot shoulders. The South Corridor also includes slight alignment shifts in the east portion of the project area in order to maximize mobility with a 60-mph design speed that was achieved with straighter horizontal and vertical curves.

Screening of Level 1 Alternatives

The initial screening process was conducted at a level of detail sufficient to determine if any of the corridors and associated alignments included impacts that would not allow an alternative to be permitted based on substantive environmental regulations (e.g., the wetland impacts associated with the North Corridor alternative, as described below). This corridor level analysis utilized geographic information system (GIS) datasets (e.g. aerial imagery, National Wetland Inventory data, vegetation/land cover), geologic field investigations for sulfide rock, other on-site investigations, and high level cost estimates.

The potential environmental impacts associated with the three primary corridors was vetted with federal and state resource agencies including the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (USACE), Minnesota Department of Natural Resources (MNDNR), and Minnesota Pollution Control Agency (MPCA). Input was also gathered from project stakeholders such as area residents, landowners, business owners, local governments and emergency service providers, and the Highway 1/169 Task Force.

Several issues were raised in this early screening phase including, but not limited to, natural resource and water quality concerns, safety concerns, and constructability concerns (construction staging, detours, emergency service access, etc.).

Corridors Dismissed From Further Consideration Following Level 1 Screening

The North Corridor was dismissed from further consideration primarily because it would result in substantially greater wetland impacts (32 acres compared to between 6.6 and 17.3 acres with the other corridors), most of which were considered having high wetland functions and values for water quality and wildlife habitat. Therefore, it is very unlikely that this corridor would meet the least environmental damaging practicable alternative (LEDPA) criteria for Section 404 permitting. The North Corridor was also determined to have a high likelihood of encountering large areas of poor/muck soils and would have moderate impacts on upland forested areas. Furthermore, the North Corridor does not result in substantially improved mobility and/or safety conditions over the other corridor alternatives being considered nor is the construction cost substantially lower (the construction cost estimate of North Corridor was \$17.5 million versus \$16.6 to \$20.3 million (2014\$) for the other corridor alternatives). Therefore, due to the anticipated high environmental impacts, the North Corridor has been dismissed from further consideration.

Identification of Level 2 Alternatives

Following the Level 1 screening process, additional coordination with resources agencies, the Highway 1/169 Task Force and other project stakeholders was conducted. As a result of these outreach efforts, further refining of the Existing Corridor and South Corridor occurred in an attempt to address concerns, avoid or minimize potential impacts, and control costs. For example, one of the primary public concerns with the Existing Corridor is the potential for social and economic impacts if construction on this corridor could not be accomplished without extensive road closures [e.g., see letters in Appendix A]. These further refinements resulted in the creation of two options for the Existing corridor plus more detailed alternative concept plans (including proposed right-of-way and preliminary construction limits) for the Existing Corridor and South Corridor options.

The two conceptual alignment options identified for further considered within the Existing Corridor in large part closely follow the current roadway alignment. However, to satisfy the needs of the project both of the Existing Corridor alignments include realigning segments of the existing corridor with design deficiencies and/or to minimize impacts to adjacent natural features (wetlands, bedrock outcrops, etc.). Constructability concerns including construction staging, detours, property access, and emergency service access during construction were important factors in defining the two Existing Corridor alignments. The primary difference between the two alignments is that one (Alternative 1 – Existing Corridor: Minimal Offset/Construct Under Traffic) shifts the alignment just enough north or south of the existing roadway to allow construction to occur while traffic is maintained on the existing roadway (although temporary/short-term detours would still likely be needed), while the other (Alternative 2 - Existing Corridor: Remain on Existing and Detour Traffic) requires extended closures of the highway during construction (requiring a long detour throughout much of construction).

Evaluation of Level 2 Alternatives

The alternatives included in the Level 2 evaluation include:

- Alternative 1 - Existing Corridor (Minimal Offset/Construct Under Traffic)
- Alternative 2 - Existing Corridor (Remain on Existing and Detour Traffic)
- Alternative 3 - South Corridor (Reconstruct on New Alignment)

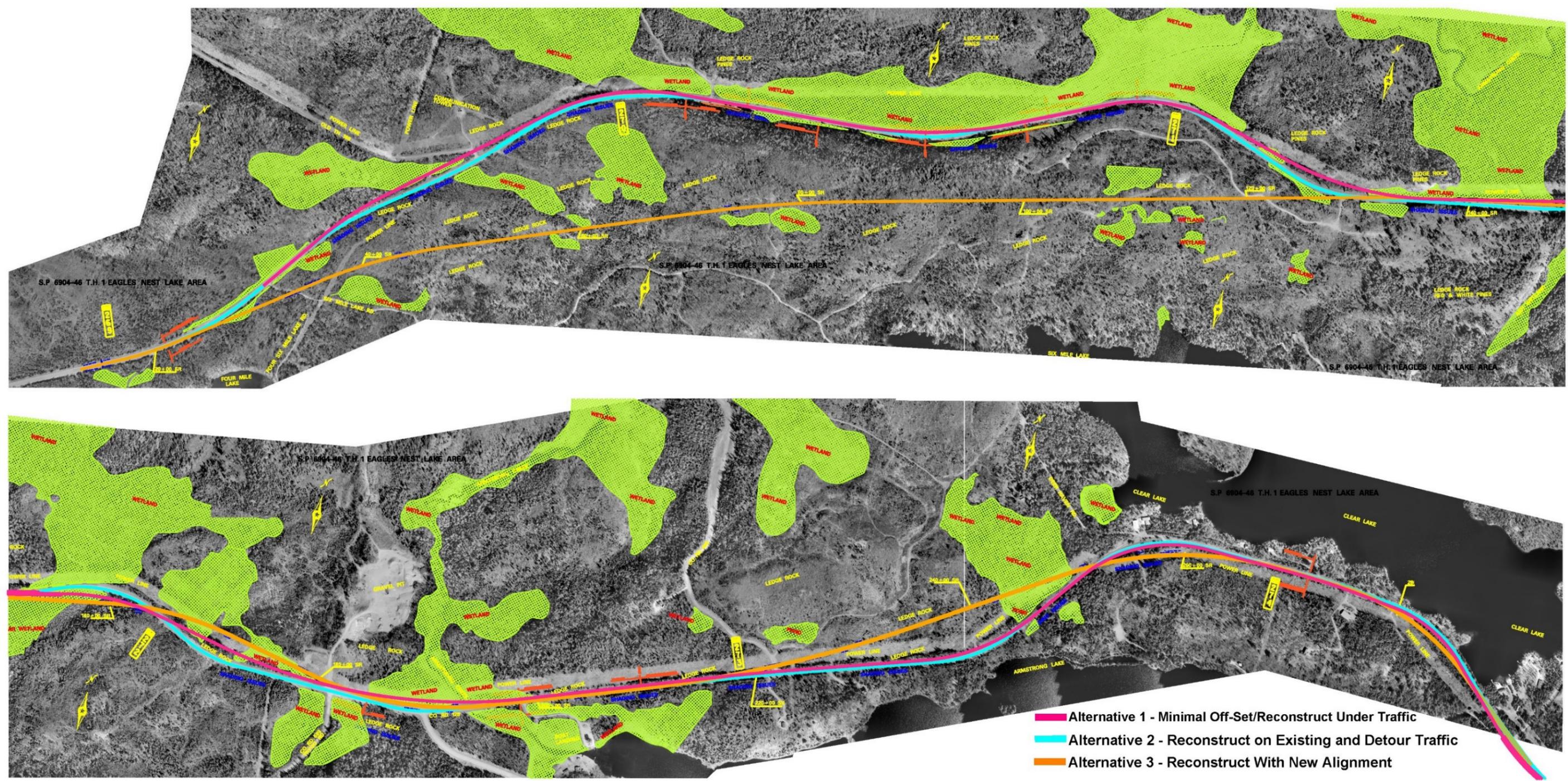
The alternatives are illustrated in Figure 3. The Level II evaluation process included consideration of refined social, economic, and environmental (SEE) impacts and a more detailed assessment of the alternatives ability to address the project's primary and secondary purpose and need objectives. While not used as a determining factor in whether or not an alternative is retained or dismissed, the alternatives evaluation process did consider ways to minimize both roadway construction costs and long-term maintenance costs. The more detailed Level 2 evaluation was based on a set of identified criteria. An evaluation matrix was developed to provide a side-by-side comparison of how the alternatives rank within the same criterion (see Table 1). Based on technical analysis, input from stakeholders and engineering assessments, the potential effects of the alternatives were assessed and the results are compiled in Table 1.

Existing Corridor Alternatives

Alternative 1 - Existing Corridor (Minimal Offset/Construct Under Traffic)

This Existing Corridor alternative shifts the highway slightly off the existing roadbed (up to 110 feet in some locations) to allow for construction of the proposed improvement while continuing to allowing traffic to utilize this segment of TH 1/169. These alignment shifts (both north and south) are needed to correct vertical and horizontal curve deficiencies on the existing corridor. Short term closures and detours may be necessary, but are not expected to last for extended periods of time. Alternative 1 includes additional safety and mobility improvements in the form of additional passing opportunities, new right turn lanes at two locations and a new shoulder bypass lane at one location. As shown in Table 1, the passing opportunities for the northbound lane increases by approximately 2,900-feet over the existing condition (No-Build Alternative) and the southbound lane gains an additional 3,000-feet of passing opportunity. Also, when compared to the other Build alternatives this alternative has a greater potential for wetland impacts than Alternative 2 (approximately 13.25 acres vs. 6.59 acres for Alternative 2) but lower estimated wetland impacts than Alternative 3 (17.27 acres). However, Alternative 1 has the least amount of bedrock excavation and therefore the least potential for issues associated with sulfides in the rock. The right of way and upland forest impacts are considered moderate with approximately 35 acres of new right of way needed and 48 acres of upland forest impacted. The construction cost estimate for this alternative is \$16.6 million (2014\$).

Figure 3 - Level 2 Alternatives
TH 1/169 Eagles Nest Lake Area



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Table 1 - Level 2 Alternatives Evaluation Matrix

EVALUATION CRITERIA		No-Build Alternative	Alternative 1 (Minimal Off-Set/ Construct Under Traffic)	Alternative 2 (Remain On Existing And Detour Traffic)	Alternative 3 (Reconstruct with New Alignment)
PRIMARY NEEDS					
Infrastructure Conditions	<i>Ability to Preserve or Enhance Infrastructure</i>	Poor (the existing pavement received a "poor" rating in a 2010 assessment)	Good (with new pavement)	Good (with new pavement)	Good (with new pavement)
Safety Improvements	<i>Ability to Implement Safety Features and Reduce Crashes</i>	Poor (existing narrow shoulders, steep slopes and inadequate clear zones remain)	Good (Enhanced safety features would be included)	Good (Enhanced safety features would be included)	Good (Enhanced safety features would be included)
SECONDARY NEEDS					
Maintain Mobility	<i>Total Length of Passing Zones (NB)</i>	NB = 3,200' (0.6 miles)	NB = 6,100' (1.2 miles)	NB = 5,300' (1.0 miles)	NB = 13,300' (2.5 mi.)
	<i>Total Length of Passing Zones (SB)</i>	SB = 3,400' (0.6 miles)	SB = 6,400' (1.2 miles)	SB = 5,500' (1.1 miles)	SB = 12,600' (2.4 mi.)
Geometric Design Deficiencies	<i>Number of Turn Lanes/Bypass Lanes</i>	2 existing RT Lanes 1 Existing Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane	4 new RT Lanes 1 new Shoulder Bypass Lane
	<i>Ability to address design deficiencies</i>	No	Yes	Yes	Yes
	<i>Shoulder Widths</i>	4'	8'	8'	8'
	<i>Minimum Design Speed (Horizontal)</i>	55 mph	55 mph	55 mph	60 mph
	<i>Minimum Design Speed (Vertical)</i>	45 mph	55 mph	55 mph	60 mph
SOCIAL, ECONOMIC & ENVIRONMENTAL IMPACTS					
Right-of-way impacts	<i>New Right-of-way Needed</i>	None	35 acres	20 acres	113 acres
Transportation: Maintenance of Traffic ¹	<i>Ability to maintain traffic through the project area during construction</i>	No impacts	No full closure required Low level of traffic disruptions, temporary construction detours likely	Full closure required. High level of traffic disruption, lengthy construction detours.	No full closure required. Low level of traffic disruptions, temporary construction detours likely.
Access to Bear Head Lake State Park	<i>Ability to maintain access to Bear Head Lake State Park via County Road (Cty Rd) 128 during construction</i>	No impact, existing access via Cty Rd 128 will be maintained	Minor impact; temporary detours may affect access via Cty Rd 128.	Major impact; Park access is from Cty Rd 128 via Hwy 1/169. Special constructing staging and detour signage would be required to maintain access from either the east (Ely) or west (Tower).	Minor impact; temporary detours may affect access via Cty Rd 128.
Section 106	<i>Adverse effects on historic properties</i>	No impacts	No impacts	No impacts	No impacts
Section 4(f) Compliance	<i>Section 4(f) impacts</i>	No impacts	No impacts	No impacts	No impacts
Floodplains	<i>Impact to existing floodplains</i>	No Impacts	No designated floodplain identified Armstrong Creek Crossing (new culvert needed)	No designated floodplain identified Armstrong Creek Crossing (new culvert needed)	No designated floodplain identified Armstrong Creek Crossing (new culvert needed)
Hazardous/Contaminated Materials	<i>Contaminated materials impacts</i>	None	No differentiating impacts anticipated – all identified properties are low risk	No differentiating impacts anticipated – all identified properties are low risk	No differentiating impacts anticipated – all identified properties are low risk

¹ Potential detours will depend on final design and construction staging

Blue shading = potentially more important differentiating factors among alternatives

Green shading = other differentiating factors

(Table 1 Continued)

EVALUATION CRITERIA		No-Build Alternative	Alternative 1 (Minimal Off-Set/ Construct Under Traffic)	Alternative 2 (Remain On Existing And Detour Traffic)	Alternative 3 Reconstruct with New Alignment
Air Quality	<i>Impacts to adjacent receptors</i>	No differentiating impacts anticipated	No differentiating impacts anticipated	No differentiating impacts anticipated	No differentiating impacts anticipated
Noise	<i>Proximity to Noise Receptors</i>	No change in proximity to receptors	Minor changes in proximity to receptors	Minor changes in proximity to receptors	Closer to receptors on Sixmile Lake
Visual Quality	<i>Change in visual environment</i>	No change	Moderate change with several minor realignments from the existing route	Minor change given less realignment from the existing route	More substantial change with new southern alignment.
Bedrock Excavation	<i>Volume of estimated rock removal</i>	None	69,000 cubic yards	127,000 cubic yards	266,000 cubic yards
Earthwork – Excavation	<i>Volume of estimated “cut” material</i>	None	278,000 cubic yards	214,000 cubic yards	212,000 cubic yards
Earthwork - Fill	<i>Volume of estimated “Fill” material</i>	None	694,000 cubic yards	539,000 cubic yards	1,266,000 cubic yards
Upland Forested Vegetation	<i>Estimated acres of clearing</i>	No impacts	48 acres	41 acres	84 acres
Wetlands	<i>Estimated acres of impact</i>	No impacts	13.25 acres (no temporary impacts)	6.59 acres (<1 ac. temp.)	17.27 acres (<1 ac. temp.)
Water Quality	<i>Accommodations to treat runoff and/or seepage from sulfide rock, if required</i>	No accommodations required	Yes	Yes	Yes
Business Impacts	<i>Impact of project on businesses in Tower and Ely</i>	No Impacts	No Impacts	Temporary impacts during construction associated with extended highway closure and lengthy detour routes.	No Impacts
Social/Community	<i>Community Disruption</i>	No impacts	Low Temporary detours would impact trip lengths and travel times between Tower and Ely for residents, school bus movements, and emergency service response	High Extended construction detours for the full project area would severely impact social and economic conditions due to longer trips and increased travel times between Tower and Ely for residents, school buses, and emergency service response.	Low Temporary construction detours would impact trip lengths and travel times between Tower and Ely for residents, school buses, and emergency service response.
	<i>Environmental Justice</i>	No impacts	No impacts anticipated; no populations identified; sparsely populated area	No impacts anticipated; no populations identified; sparsely populated area	No impacts anticipated; no populations identified; sparsely populated area
OTHER CONSIDERATIONS					
Municipal Support	<i>Local government support</i>	Low	Moderate	Low	High
Construction Cost Estimate ^{1/}	2016\$	N/A	\$17,300,000	\$18,500,000	\$21,600,000

^{1/} Includes estimated costs associated with rock excavation and wetland mitigation activities.

Blue shading = potentially more important differentiating factors among alternatives

Green shading = other differentiating factors

Alternative 2 - Existing Corridor (Remain on Existing and Detour Traffic)

This Existing Corridor Alternative follows the current roadway alignment to the greatest extent possible, while correcting existing clear zone and sight distance design deficiencies (e.g. horizontal and vertical curves). Alternative 2 provides additional passing lane opportunities as well as new right turn lanes at two locations and a new shoulder bypass lane at one location, similar to the other Build alternatives. As shown in Table 1, the passing opportunities for both the northbound and southbound lanes increase by approximately 2,100-feet each over the existing condition (No-Build Alternative). Several minor shifts in the alignment to both the north and south (ranging from approximately 0 to 70 feet) are required in order to meet a 55 mph design speed and all current highway design standards (vertical and horizontal curves and clearances). As shown in Table 1, when compared to the other Build alternatives, Alternative 2 – Existing Corridor (Close and Detour Traffic) has the lowest potential for impacts to wetlands and upland forests and the least amount of additional right-of-way needs. The estimated bedrock excavation is less than Alternative 3, but greater than Alternative 1. The construction cost estimate for Alternative 2 – Existing Corridor (Remain on Existing and Detour Traffic) is \$17.7 million (2014\$).

As part of the agency coordination and public outreach efforts, MnDOT received frequent input from stakeholders into the concerns associated with closing the highway to traffic during construction and detouring traffic on an alternative route as is proposed with Alternative 2. A summary of these concerns include:

- **Duration of Construction:** In order to substantially complete the proposed improvements, construction is anticipated to occur over two full construction seasons and since there is a lack of supporting roadways in the area the construction detour would need to close the highway through much of the project area. The identified detour route is the only viable option available to accommodate existing TH 1/169 traffic. In addition, the nature of the project improvements (vertical and horizontal curve and clear zone improvements) and the surrounding landscape of the study area and lack of other roadways limit the opportunities for shorter detours/minor bypasses or temporary closures.
- **Length of Detour:** Highway 1/169 is located in an area of northeastern Minnesota that is primarily rural with limited public infrastructure (roadway network). As a result, the only identified detour route would be lengthy as it would need to utilize segments of Highway 135, County Road 21 and County Road 26. Figure 4 shows the existing highway between the cities of Tower and Ely and the detour route needed if the roadway were to be closed during construction. Table 2 charts the additional vehicle miles traveled between representative origin/destination points.

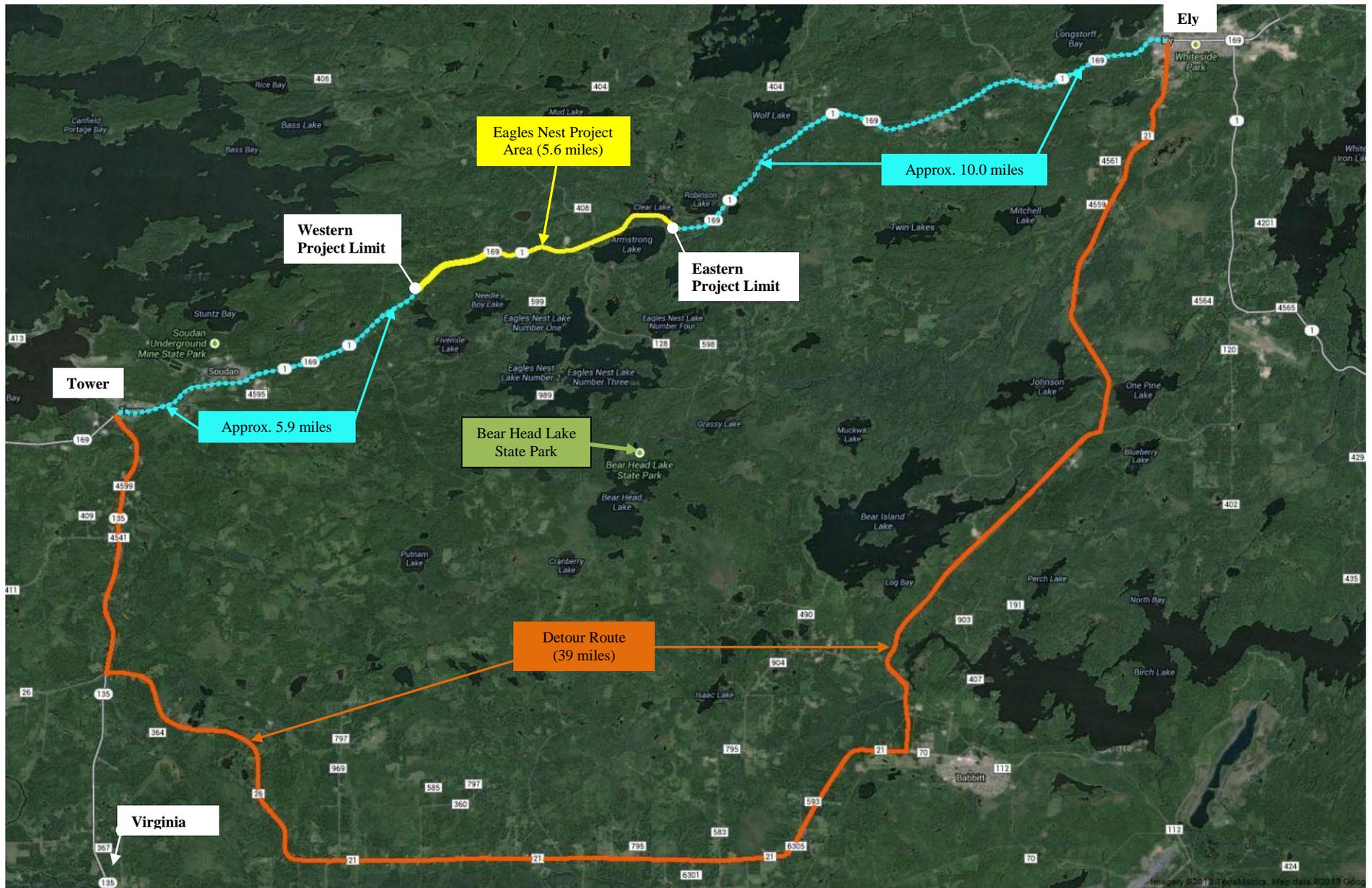
Table 2 – Alternative 2 Potential Detour Distances (One-Way)

Origin	Destination	Distance Under Existing Condition	Distance Under Detoured Condition	Increased Length Due to Detour
City of Tower	City of Ely	21.5 miles	39 miles	17.5 miles
City of Tower	East Project Limit	11.5 miles	49 miles	37.5 miles
West Project Limit	City of Ely	15.6 miles	44.9 miles	29.3 miles
City of Virginia/Twin Cities Traffic	City of Ely	47 miles	51 mi. (via Hwy 169 to Cty Rd 21)	4 miles

The additional vehicle miles traveled will create hardships on area residents, businesses, school districts (several bus routes currently utilize the highway for busing students), and impact emergency service response across the region.

The detour information presented in Table 2, was used as the basis for calculating the estimated associated travel time and travel cost impacts associated with the traffic detour. The details on the methodology and assumptions applied to generate travel time and cost impacts associated with the detour are included in the attached technical memorandum and are summarized as follows.

Figure 4- Existing Corridor Detour Route



The analysis for calculating changes in travel time and cost associated with the construction detour focused on travel between Tower and Ely because that is the only origin-destination pair that has daily traffic volume data readily available. As noted in Table 2, the total increase associated with the proposed detour is 17.5 miles. With an ADT of 2,500 vehicles making this trip on a daily basis that equals to a total of 43,750 additional vehicle miles per day. Of that total, 41,213 miles will be traveled by an automobile and 2,537 miles will be traveled by heavy commercial trucks. Assuming standard cost per mile factors for vehicles and heavy commercial trucks, the total daily vehicle miles cost related to the detour is approximately \$15,212.

In addition to increased vehicle miles travelled, at 55 mph, the additional travel time associated with the detour would be approximately 19.1 minutes. Applying an industry standard \$16.00 per hour user cost for vehicles, the daily cost associated with the detour would be approximately \$16,784. Similarly, applying a \$27.30 per hour user cost for heavy commercial trucks results in a \$1,338 daily impact. Therefore the total daily costs associated with increases in travel time is approximately \$18,122. Overall, the total estimated daily cost of a detour accounting for both increased travel distance and travel time is approximately \$33,334.

An estimate of required days of detour was generated based on preliminary design information and construction staging assumptions. A complete staging plan will be developed for the preferred alternative and closer to the project letting for construction. Below is an estimate of detour days and associated user costs by alternative:

- Alternative 1: 0-21 detour days = \$0 to \$700,014;
 - Alternative 2: 84-140 detour days = \$2,800,056 - \$4,666,760;
 - Alternative 2A: 50-70 detour days = \$1,666,700 to \$2,333,380;
 - Alternative 3: 0 detour days = \$0
 - Alternative 3A: 0-15 detour days = \$0 to \$500,010
- Community Disruption: The extended closure of the highway would severely disrupt traffic operations in the area and, for this reason, this type of long term closure is not typically used by MnDOT due to the extensive impacts to communities and the traveling public described below. Some of the adverse social and economic effects include disrupted and/or closed access to private properties, lengthy travel times and distances for residents living and working in the cities of Tower and Ely, limited access to local businesses, longer trips and added costs for school busing, as well as longer trips and added response time for emergency services/responders. Restricting access to County Road 128 (the only access road to Bear Head Lake State Park) is also a key concern.

The severity of community disruption and impacts from an extensive detour cannot be precisely quantified due to limited available data related to local economic conditions (sales receipts) travel patterns (origins/destinations), and frequency and location of emergency calls. However, the City of Tower has indicated that Highway 1/169 provides transportation system access to numerous businesses and that the local economy relies heavily on Highway 1/169 traffic passing through the community on the way to/from the City of Ely and the Boundary Waters Canoe Area Wilderness (BWCAW).

In addition, during a coordination meeting between MnDOT and the Bois Forte Band of Chippewa, tribal leaders indicated that a similar detour on a segment of TH 1/169 in the summer of 2013 resulted in substantial revenue reductions at their tribal businesses including gas stations/convenience store, casino, golf course, liquor store, etc.), which are all served directly or indirectly by the highway.

According to local officials, an extended closure of the highway through the project area, as proposed with Alternative 2, would substantially impact tourist traffic through Tower, which would severely impact local businesses and the regional economy. Appendix A includes correspondences from local governments, emergency service providers, and an area school district expressing concerns with an extended closure of the highway.

Alternative 3 – South Corridor (Reconstruct on New Alignment)

Alternative 3 utilizes a new alignment for the western 2.2 miles of the study area. This allows for construction of the proposed improvement while continuing to allow traffic to utilize the existing segment of Highway 1/169. The eastern portion of Alternative 3 also includes several alignment shifts to maximize mobility with a 60-mph design speed that was achieved with straighter horizontal and vertical curves through the eastern portion of the study area. Short term closures and detours may be necessary, but are not expected to last for an extended period. Construction of Alternative 3 would result in approximately 17.27 acres of wetland impacts. This alternative has the highest amount of right-of-way and upland forest impacts with 113 acres and 84 acres, respectively.

Bedrock excavation associated with Alternative 3 is more than double Alternatives 1 and 2 with approximately 266,000 cubic yards of rock excavation, which presents a higher potential for encountering sulfide intrusions in excavated rock, due to the large rock volume. This alternative includes additional safety and mobility improvements in the form of additional passing opportunities and new right turn lanes at two locations and a new shoulder bypass lane at one location. As previously shown in Table 1, the passing opportunities for the northbound lane increases by approximately 10,100-feet over the existing condition (No-Build Alternative) and the southbound lane gains an additional 9,200-feet of passing opportunity. The passing opportunities under Alternative 3 is the greatest among the three corridors under consideration. Alternative 3 would have greater costs associated with right-of-way acquisition, but lower costs associated with soil corrections and staging. The total estimated construction cost for the Alternative 3 is \$20.3 million (2014\$).

Identification of Level 3 Alternatives

West and East Corridor Division

With the detailed information compiled and presented in Table 1, the project team met to determine next steps in the alternatives development and evaluation process. First the team assessed what the 'differentiating' need and social, economic and environmental factors were (see the highlighted factors in Table 1). The factors identified include:

- Passing opportunities
- Wetland impacts
- Forestland impacts
- Rock excavation
- Detour length and duration

Then, through a review of where the most extensive environmental impacts occurred, it became evident to the team that there were opportunities for refinement of the remaining alternatives to address the purpose and need while further reducing environmental impacts. The project team identified that the most substantial environmental impacts (e.g., wetlands, rock excavation) occurred at the east end of Alternative 3, with minimal benefit in transportation system functions (safety or mobility). The social and economic impacts of Alternative 2 were also identified by stakeholders as being unacceptable. Options to decrease the length of detour, without increasing natural environment impacts, were also assessed. Based on these observations, the corridors were divided into east and west segments, with the dividing line located at the point where the western re-alignment (for Alternative 3) re-joins the existing highway corridor (see Figure 5). Options for re-combining the east and west segments into 'hybrid' alternatives to address the impacts of concern (described above) for Alternatives 2 and 3 were then assessed, by considering impacts associated with the east and west segments of the build corridors (see Alternatives 1, 2 and 3 east and west in Table 3).

To address the extensive detour associated with Alternative 2, hybrid options were considered that would decrease the length of corridor requiring closure during construction (i.e. combining a segment of Alternative 2 with a segment from one of the other alternatives that do not require closure for construction), without substantially increasing other environmental factors (especially wetlands, since Alternative 2 had the least wetland impacts of the three build alternatives). Wetland impacts were greater on the east segments of Alternatives 1 and 3, so the 'hybrid' options for Alternative 2 focused on use of the west portions of Alternatives 1 and 3 to allow for construction under traffic and reducing the number of days required for the construction detour. Wetland impacts for the west segment of Alternative 1 were greater than the impacts for the west segment of Alternative 3 (approximately 6.1 and 3.8 acres,

respectively). In addition, the transportation benefits of Alternative 1 west were substantially less than those for Alternative 3 west (6,100 feet and 16,600 feet of northbound and southbound passing opportunity, respectively). Therefore, hybrid Alternative 2A (consisting of the west segment of Alternative 3 and the east segment of Alternative 2) was determined to have greater transportation benefits and less wetland impacts, and was recommended for further assessment (see Table 3).

To decrease the substantial wetland and rock excavation at the east segment of Alternative 3, hybrid options using the eastern segment of Alternatives 1 and 2 combined with the western segment of Alternative 3 were assessed. The combination of Alternative 3 west and Alternative 2 east was already used to make hybrid Alternative 2A described above. Combining the west portion of Alternative 3 (no detour and low wetland impacts) with the east segment of Alternative 1 (no detour and fewer wetland impacts than Alternative 3 east) was determined to be a good hybrid alternative to be carried forward for further assessment/comparison. In summary, the re-assessment process concluded that there were two additional alternatives that could better address the differentiating factors of concern for Alternatives 2 and 3 (see Figure 5):

- Alternative 2A – Includes the western segment of Alternative 3 and the eastern segment of Alternative 2 (to decrease the length of detour, without substantially increasing wetland impacts).
- Alternative 3A – This alternative is comprised of the western segment of Alternative 3 and the eastern segment of Alternative 1 (to decrease wetland and rock excavation impacts compared to Alternative 3, while not substantially affecting the transportation benefits provided).

The two additional alternatives increased the total number of potential build alternatives to five (see Figure 5):

- Alternative 1 -- Minimal Offset/Reconstruct Under Traffic
- Alternative 2 -- Reconstruct on Existing and Detour Traffic
- Alternative 2A -- Reconstruct with Less Detour (Alt. 3-west/Alt. 2-east)
- Alternative 3 -- Construct on New Alignment
- Alternative 3A – Partial New Alignment plus Reconstruct Under Traffic

Evaluation and Screening of Level 3 Alternatives

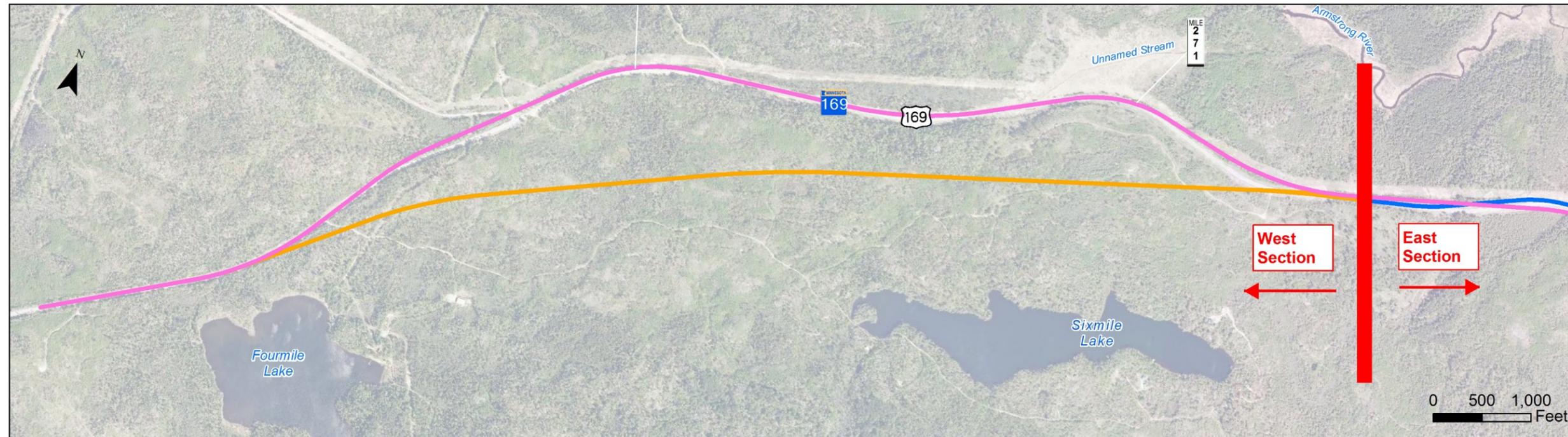
With five alternatives under consideration, the project team conducted a sequential evaluation and screening process. Figure 6 depicts the four-step process applied to the Level 3 alternatives. The first step included evaluating the attributes of each alternative. This process focused on consideration of the differentiating factors noted above:

- Passing opportunities
- Wetland impacts
- Forestland impacts
- Rock excavation
- Detour length and duration

Table 3 summarizes the quantifiable (passing opportunities, wetlands, forest vegetation, and rock excavation) differentiating factors for the five alternatives. These factors -- plus the relative detour impacts -- are described below and are summarized in the process diagram (Figure 6). Comparative rankings made by the project team (positive "+", neutral "o", and negative "-") are also included in Figure 6.

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Figure 5- Study Corridor – West and East Sections



- Legend**
- Alternative 1 - Minimal Off-Set/Reconstruct Under Traffic
 - Alternative 2A - Reconstruct With Less Detour (orange west/blue east)
 - Alternative 3A - Reconstruct Under Traffic Plus Partial New Alignment (orange west/ pink east)

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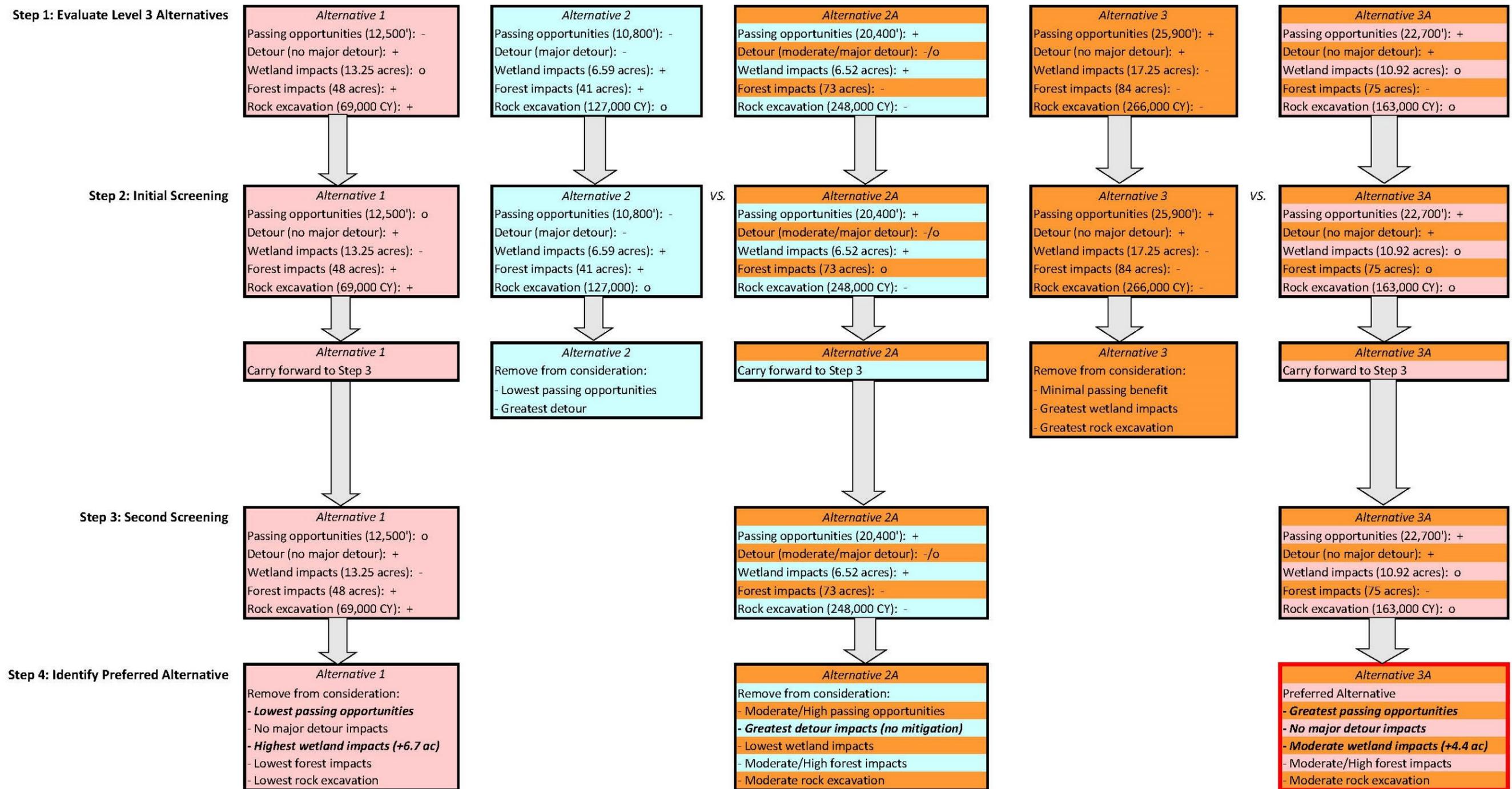
Table 3 - Level 3 Alternatives: Differentiating Factors

Category	Alternative 1 - Existing Route (Construct Under Traffic)			Alternative 2 - Existing Route (Close Route & Detour Traffic)			Alternative 3 - South Route (Maximize Mobility)			Alternative 2A - Alt. 3 west/Alt. 2 East			Alternative 3A - Alt. 3 west/Alt. 1 East		
	West	East	Total	West	East	Total	West	East	Total	West	East	Total	West	East	Total
Passing Opportunities															
Northbound Lengths (ft.)	3,100'	3,000'	6,100'	3,100'	2,200'	5,300'	8,800'	4,500'	13,300'	8,500' ^{1/}	2,200'	10,700'	8,800'	3,000'	11,800'
Southbound Lengths (ft.)	3,000'	3,400'	6,400'	2,100'	3,400'	5,500'	7,800'	4,800'	12,600'	7,200' ^{1/}	2,500' ^{1/}	9,700'	7,500' ^{1/}	3,400'	10,900'
Wetland Impacts (acres) ^{2/}	6.1 ac.	7.2 ac.	13.3 ac.	3.8 ac.	2.8 ac.	6.6 ac.	3.8 ac.	13.5 ac.	17.3 ac.	3.8 ac.	2.8 ac.	6.6 ac.	3.8 ac.	7.2 ac.	11.0 ac.
Forested Vegetation/Clearing (acres)	21.7 ac.	26.5 ac.	48.2 ac.	17.7 ac.	23.6 ac.	41.3 ac.	48.9 ac.	35.3 ac.	84.2 ac.	48.9 ac.	23.6 ac.	72.5 ac.	48.9 ac.	26.5 ac.	75.4 ac.
Rock Excavation	38,000 CY	31,000 CY	69,000 CY	11,000 CY	116,000 CY	127,000 CY	132,000 CY	134,000 CY	266,000 CY	132,000 CY	116,000 CY	248,000 CY	132,000 CY	31,000 CY	163,000 CY

Notes:

- 1) The Passing Sight Distances vary for Alternatives 2A and 3A compared to the East and West sections of Alternatives 1, 2 and 3 which they are comprised. The differences result from horizontal and vertical alignment adjustments required to link the East and West segments of each hybrid alternative.
- 2) Impact values rounded up to single decimal point.
- 3) Cell colors correlate to alignment colors in Figure 5

Figure 6 - Evaluation and Screening Sequencing for Level 3 Alternatives



Notes:

- Color shading correlates to the alignment colors on Figure 5.
- Wetland impacts in Step 4 reflect amount greater than least impact alternative (Alt. 2A).

Step 1: Evaluate Level 3 Alternatives

- Alternative 1 (Minimal Offset/Reconstruct Under Traffic)
 - lower level of passing opportunities (12,500 feet of passing zones) – “-” negative rating;
 - does not require a major construction detour – “+” positive rating;
 - moderate wetland impacts (13.25 acres) – “o” neutral rating;
 - lower forestland impacts (48 acres) – “+” positive rating;
 - lower rock excavation (69,000 cubic yards) – “+” positive rating
- Alternative 2 (Reconstruct on Existing and Detour Traffic)
 - lowest level of passing opportunities (10,800 feet of passing zones) – “-” negative rating;
 - requires a long duration construction detour – “-“ negative rating;
 - lower wetland impacts (6.59 acres) – “+” positive rating;
 - lowest forestland impacts (41 acres) – “+” positive rating;
 - moderate rock excavation (127,000 cubic yards) – “o” neutral rating
- Alternative 2A (Reconstruct with Less Detour: Alt. 3-west/Alt. 2-east)
 - more substantial passing opportunities (20,400 feet of passing zones) – “+” positive rating;
 - requires a moderate duration construction detour – “-/o” negative/neutral rating;
 - lower wetland impacts (6.52 acres) – “+” positive rating;
 - moderate forestland impacts (73 acres) – “o” neutral rating;
 - higher rock excavation (248,000 cubic yards) – “-“ negative rating
- Alternative 3 (Construct on New Alignment)
 - greatest passing opportunities (25,900 feet of passing zones) – “+” positive rating;
 - does not require a major construction detour – “+” positive rating;
 - highest wetland impacts (17.25 acres) – “-“ negative rating;
 - highest forestland impacts (84 acres) – “-“ negative rating;
 - highest rock excavation (266,000 cubic yards) – “-“ negative rating
- Alternative 3A (Partial New Alignment plus Reconstruct Under Traffic: Alt. 3-west/Alt. 1-east)
 - more substantial passing opportunities (22,700 feet of passing zones) – “+” positive rating;
 - does not require a major construction detour – “+” positive rating;
 - moderate wetland impacts (10.92 acres) – “o” neutral rating;
 - moderate forestland impacts (73 acres) – “o” neutral rating;
 - moderate rock excavation (163,000 cubic yards) – “o” neutral rating

Step 2: Initial Screening

Based on the Level 3 screening evaluation, Alternatives 2 & 3 were eliminated from further consideration given the following:

- Alternative 2 – provides the lowest amount of passing opportunities and has the most substantial construction period traffic detour;
- Alternative 3 – when compared to Alternative 3A it provides only slightly greater passing opportunities, it has the greatest wetland impacts, and it has the highest rock excavation quantities.

Step 3: Second Screening

Given the results of the initial screening, Alternatives 1, 2A, and 3A were retained and carried forward for additional evaluation and a second screening. Detailed mapping illustrating each alternative is included as an attachment to this memorandum. Similar to Step 2, the alternatives were compared against each other with the focus on the differentiating factors. The second screening is illustrated on Figure 6 and summarized below.

- Alternative 1 (compared against Alternatives 2A and 3A)
 - Least amount of passing opportunities;
 - does not require a major construction detour;
 - highest wetland impacts;
 - lowest forest impacts;
 - lowest rock excavation quantities
- Alternative 2A (compared against Alternatives 1 and 3A)
 - higher amount of passing opportunities compared to Alternative 1; slightly lower passing opportunities than Alternative 3A;
 - only alternative that requires a major construction detour;
 - lowest wetland impacts;
 - higher forest impacts than Alternative 1; slightly lower impacts compared to Alternative 3A;
 - highest rock excavation quantities
- Alternative 3A (compared against Alternatives 1 and 2A)
 - greatest passing opportunities;
 - does not require a major construction detour;
 - higher wetland impacts compared to Alternative 2A; lower wetland compared to Alternative 1;
 - highest forest impacts;
 - higher rock excavation compared to Alternative 1; lower rock excavation compared to Alternative 2A

Stakeholder/Agency Input for Step 3 Decision-Making: The results of the Step 3 screening assessment were presented to a number of stakeholder groups for comment during July 2014. The groups included the TH 169 Task Force; a public meeting held July 15; federal elected officials' staff; and the Bois Forte Band of Chippewa. Input from the stakeholders indicated that most agreed that Alternative 3A reduces environmental impacts compared to Alternative 3 while still providing substantial transportation safety and mobility benefits. Most meeting attendees were concerned about potential social/economic impacts from Alternative 2A. Local stakeholders with concerns about the potential water quality impacts from rock excavation¹ also voiced concern about the project, since all of the build alternatives require rock excavation. In addition to the stakeholder meetings,

In addition to the stakeholder meetings, MnDOT and FHWA staff also met with the cooperating agencies for the NEPA process (USEPA and USACE) on July 29, 2014 to discuss the alternatives evaluation and screening process.

Step 4: Identification of Preferred Alternative

Based on the comparison of Alternatives 1, 2A and 3A presented in the Step 3 screening, stakeholder input, and the information included in Tables 1 and 4 and Figure 6, MnDOT has identified Alternative 3A as the preferred alternative for the project. The rationale for this decision is described below:

The selection of Alternative 3A as the Preferred Alternative centered on the following key environmental factors:

- avoiding major/extended construction detours
- minimizing wetland impacts

These factors were deemed most important based on the analysis conducted and the substantial amount of stakeholder input received throughout the project development process. Based on this, the following conclusions were reached:

- In considering construction detours: The magnitude of this issue with respect to social and economic impacts was noted earlier in this memorandum in the Evaluation of Level 2 Alternatives section. This

¹ See a detailed discussion of issues related to rock excavation in Section V.A.10.a of this EA.

factor is especially important because of the length of the required detour [see Table 2]; the travel time impacts to emergency service providers [and, therefore, potentially to public safety]; time and cost impacts to school districts; the potential for economic impacts to area businesses; and the increased travel distance, time, and costs incurred by highway users (see Table 3). Appendix A includes letters received by jurisdictions in the study detailing the specifics of the concerns associated with the construction detour. The letter from the Bois Forte Band of Chippewa provides an economic impact estimate associated with a past roadway construction project and details their concerns associated with detouring TH 1/169 traffic for this project. Because there are no alternative detour routes (since there are few public roads in this area), no mitigation for these potential impacts has been identified. Alternative 3A and Alternative 1 do not require a long term construction detour which would be required with Alternative 2A.

- In considering wetland impacts: Consideration of wetland impacts is very important, since wetland regulations have specific requirements for consideration of avoidance and minimization of impacts, in addition to mitigation, as part of the wetland permitting process. Alternative 3A results in 10.92 acres of impacts. By comparison, Alternative 1 creates 13.25 acres of wetland impacts and Alternative 2A has 6.52 acres of impact. Though Alternative 2A has approximately 4.3 acres less wetland impact than Alternative 3A, it requires an extended construction period detour for which there is no mitigation. Therefore, since Alternative 1 would result in approximately 6.7 acres more impacts to wetland than Alternative 2A, Alternative 3A minimizes wetland impacts while avoiding the substantial social and economic impacts of the Alternative 2A detour.

Also, the transportation benefits of each alternative were important considerations when comparing alternatives in Step 4. All of the alternatives considered in the screening process address the primary project needs, so primary needs are not a differentiating factor. The alternatives do vary in their ability to improve mobility (a secondary need). It is not essential that the preferred alternative provides the highest level of mobility, especially if there are negative environmental impacts associated with the features that provide the additional mobility. However, since providing additional mobility by increasing the length of passing lanes also provides an incremental safety benefit, this factor was considered (in conjunction with the two environmental factors described above) in comparing the three alternatives in Step 4. Alternative 1 provides the least amount of passing opportunities (12,500 feet) and also has the greatest wetland impacts. Alternative 2A provides 20,400 feet of passing opportunities and has the lowest wetland impacts; but it is the alternative with the greatest social and economic impacts due to detour length. Alternative 3A provides the greatest passing opportunities (22,700 feet) with fewer wetland impacts than Alternative 1 and less detour impacts than Alternative 2A.

Other differentiating factors were considered in the assessment, but were not considered to be as key in the selection of the preferred alternative as the factors noted above:

- In considering rock excavation: Increased rock excavation increases the potential to encounter acid-producing (sulfide-bearing) rock, which has been identified as a potential environmental concern by local stakeholders. However, this issue has not been identified as being critical to the alternatives screening process, since discussions with state regulatory agency staff have identified a process for identifying the potential risk for encountering acid-producing rock and mitigation strategies/practices to avoid/minimize environmental harm. Since the potential impacts can be avoided, minimized and mitigated, the differences in rock excavation among alternatives was not considered to be a key deciding factor in the preferred alternative selection process.
- In considering forest vegetation impacts: Increased forest vegetation impacts could result in increased wildlife habitat impacts. However, no rare or unique ecosystems were identified in the project area and the project is located in an area of extensive forest cover of essentially the same types of forest as the forests affected by project alternatives. Since the forest types are not unique and since wildlife impacts could be mitigated (e.g., by limiting clearing activities to seasons that do not affect nesting), this impact was less of a deciding factor in the alternatives screening process.

Based on consideration of the items described above, Alternative 1 was eliminated from further consideration because it: 1) had the highest wetland impacts and 2) provided substantially less mobility and safety benefits – passing opportunity lengths of 12,500 feet vs. 22,700 feet for Alternative 3A. Alternative 2A was eliminated because: 1) the problematic logistics of the detour required result in unacceptable social and economic impacts; and 2) it provided approximately 10% less mobility/safety benefit from passing opportunities. Alternative 3A was identified as the preferred alternative because: 1) it does not result in extensive logistical issues from detouring; 2) it has lower wetland impacts than the other alternative that avoids extensive detouring; and 3) it provides the greatest transportation benefits, compared to the other two alternatives.

Conclusions and Next Steps

The alternatives evaluation and decision-making process presented in this memorandum is based on consideration of the Project's purpose and need and the potential social, economic, and environmental (SEE) impacts, which is consistent with the requirements of the National Environmental Policy Act (NEPA). The next step in the project development process will be to prepare an Environmental Assessment (EA) document. The document will summarize the alternatives development and evaluation process detailed in this memorandum and it will describe the social, economic, and environmental considerations and effects in greater detail for the preferred alternative (Alternative 3A) and for comparison, for Build Alternatives 1 and 2A.

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APPENDIX A

LOCAL GOVERNMENTAL UNIT LETTERS & RESOLUTIONS

- ELY INDEPENDENT SCHOOL DISTRICT #696
 - CITY OF BABBITT
 - BREITUNG TOWNSHIP
 - CITY OF ELY
 - CITY OF WINTON
- BOIS FORTE BAND OF CHIPPEWA

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INDEPENDENT SCHOOL DISTRICT NO. 696
Ely Public Schools

copy

LAURIE L. KESS
Interim 5-12 Principal

ALEXANDRA E. LEITGEB
Interim Superintendent

ANNE M. OELKE
Interim K-4 Principal/
Community Education Director

February 12, 2013

Independent School District No. 696, Ely, MN, has 22 bus students from Tower, Soudan and along Hwy. 169 between Tower and Ely.

If Hwy. 169 is closed for construction these students will have to be on our bus for an extra 45 minutes to one hour if detour is Hwy. 21. Besides the hardship on the students the school district will also have more transportation expenses. Bus driver wages will increase \$30.00 to \$40.00 per trip. If we use \$2.00 per mile as the bus expense it comes to \$224.00 per day at a minimum. At the very least it will cost the school district \$254.00 per day to detour on Hwy. 21 to Hwy. 135.

Driver wage = \$20.00 per hour – 1 ½-2 hours = \$30.00 - \$40.00

Bus mileage - \$2.00 per mile – 112 miles = \$224.00 per trip

Students:

Tower	4
Soudan	9
Bearhead	5
Clear Lake	4

Mileage – Babbitt to Soudan: 28 miles x 4 – 112 per day

600 East Harvey Street, Ely, Minnesota 55731-1614
Phone: 218-365-6166 Fax: 218-365-6138

Raymond L. Marsnik, Chairman
Scott C. Kellerman, Clerk
Paul M. Pengal, Treasurer

EQUAL OPPORTUNITY/ AFFIRMATIVE ACTION EMPLOYER

Amy Richter, Director
Bill Skradski, Director
Kathy Udovich, Director

March 5, 2013

Brian Larson
MNDOT, Duluth Headquarters
1123 Mesaba Ave.
Duluth, MN 55811

Dear Mr. Larson:

I am writing to voice a significant concern about construction project S.P. 6904-46 in the Eagles Nest Lakes area, MNDOT District 1. It regards the planned detour during construction, where traffic to and from Ely will be routed through Babbitt. We understand the necessity for re-routing general traffic while construction is underway. However, re-routing *local* traffic through Babbitt would be ill-advised.

If local traffic must detour through Tower and Babbitt during any part of the construction period, it will cause hardship as well as impair emergency response. Currently, it is 14 miles, about an 18-minute trip, from the Eagles Nest Town Hall to Ely. The detour through Tower and Babbitt to Ely would be a 49-mile trip, taking approximately 1 hour, 6 minutes. That poses serious problems for our residents.

- Fire fighters, medical professionals, and law enforcement officers will take a much longer time to respond to emergencies. This threatens our security.
- Some of our residents are medical professionals themselves who need to get to Ely quickly. The detour through Babbitt would hinder their ability to respond in a timely fashion.
- Many of our residents conduct daily business in Ely. A round trip of over 2 hours is unreasonable.

We would like your assurance that emergency personnel and our residents will have direct access to and from Ely at all times during construction.

Sincerely,

Richard P. Floyd
Chairman

TOWNSHIP OF BREITUNG

P.O. Box 56 Soudan, Minnesota 55782

March 26, 2013

Mike Kalnbach
MnDOT
Virginia, MN 55792

RE: Highway 169 Task Force and Road Improvements

Dear Mr. Kalnbach:

Highway 169 is an important route through our township for our citizens and visitors to our area. The importance of this highway will only increase in the future due to the development and improvements underway at Minnesota's newest State Park – The Lake Vermilion State Park.

We have had members from our Town Board and interested citizens on the Task Force and at tonight's meeting we went on record to support the work that the task force has been doing on a very public and open basis. Therefore we would urge you to review the recommendations of continuing to develop the Southern Route as proposed by the Task Force.

Safety is our utmost concern for our citizens and visitors as they access our area. Additionally, the southern route would prove to be less costly in the long run on the lives or people affected and the additional burdens an unsafe route would cause on our volunteer emergency responders.

Sincerely,

Valada McDonald, Clerk for Timothy Tomsich

Timothy S. Tomsich
Chairman

CC: Congressman Nolan
Bill Erzar – Committee member

INDEPENDENT SCHOOL DISTRICT NO. 696
Ely Public Schools

LAURIE L. KESS
Interim 5-12 Principal

ALEXANDRA E. LEITGEB
Interim Superintendent

ANNE M. OELKE
Interim K-4 Principal/
Community Education Director

March 11, 2013

Mr. Duane Hill, District Engineer
MN Department of Transportation
1123 Mesaba Ave.
Duluth, MN. 55811

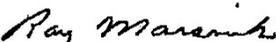
Dear Mr. Hill,

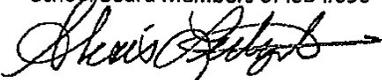
Recently a town meeting was conducted in Ely at Vermilion Community College and several concerns were voiced by residents at that time. We, as the School Board of ISD #696, would like to further express our concerns about the Highway 169 project.

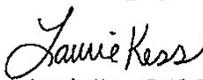
We continue to be very concerned about the curves at MP 271 and MP 272 as well as shaded areas caused by roadway alignment and proximity of trees that create black ice. Both of these areas continue to make the daily travel for our students extremely hazardous. The safety of our children is uppermost in our minds. This winter we have had two buses break down on that route, and there isn't any safe place for the driver to pull off the roadway while waiting for other transportation to remove our children from the disabled vehicle. Our drivers travel that route four times daily, risking their safety and the safety of our children because of the curves and black ice potential. As you are well aware, our driver can have the utmost control of his/her vehicle, but it only takes one other car in the area to cause a major accident.

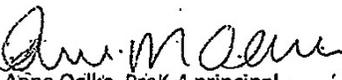
Please know that we hold this project, as everyone has for nearly a decade, in the highest priority for Northeast Minnesota, and especially for the safety of our families that must travel it daily. Please consider our concerns as you make final plans for the Highway 169 project.

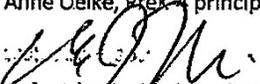
Sincerely,


School Board Members of ISD #696


Alexis Leitgeb, Interim Superintendent


Laurie Kess, 5-12 Principal


Anne Oelke, K-4 principal


Charles Jankowski, Director of Transportation

600 East Harvey Street, Ely, Minnesota 55731-1614
Phone: 218-365-6166 Fax: 218-365-6138

Raymond L. Marsnik, Chairman
Scott C. Kellerman, Clerk
Paul M. Pengal, Treasurer

EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Amy Richter, Director
Bill Skradski, Director
Kathy Udovich, Director

CITY OF ELY

**RESOLUTION IN SUPPORT OF THE HWY 169 NORTH TASK FORCE
EAGLES NEST RECOMMENDATIONS**

WHEREAS the Highway 169 North Task Force was formed in July of 2000.

WHEREAS the Highway 169 North Task Force has contributed to many improvements over the last twelve plus years on the highway.

WHEREAS the Highway 169 North Task Force has made recommendations to MnDOT for Highway Safety Improvements in the Eagles Nest Project Area of Highway 169, between Soudan and Ely.

NOW, THEREFORE BE IT RESOLVED, that the City Council of the City of Ely, Minnesota, does hereby adopt this resolution in support of the Highway 169 North Task Force recommendations to MnDOT for these Highway Safety Improvements.

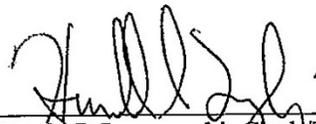
Upon vote taken thereon, the following voted:

For: Debeltz, Kess, Nikkola, Omerza, Polyner, Sheddy and Mayor Petersen
Against: None

Whereupon said Resolution No. 2013-007 was declared duly passed and adopted this 5th day of March, 2013



Ross Petersen, Mayor



Harold R Langowski, Clerk/Treasurer

**City of Winton
PO Box 163
Winton, MN 55796**

March 6, 2013

RESOLUTION

HIGHWAY 169 SAFETY IMPROVEMENTS

WHEREAS, there is a need to correct dangerous and unsafe areas on Highway 169, a corridor of travel leading directly to the City of Winton; and

WHEREAS, the Highway 169 North Task Force was formed in 2000 to study and recommend improvements to Highway 169; and

WHEREAS, the Highway 169 North Task Force has identified improvements to Highway 169 in the Eagles Nest Project Area between Soudan and Ely; therefore,

BE IT RESOLVED that the City of Winton supports the recommendations of the Highway 169 North Task Force for the Eagles Nest Project Area.

Adopted unanimously by the Winton City Council at the March 4, 2013 Regular Meeting of the Winton City Council.

Anders Nicholson, Mayor
Anne Jackson, City Clerk

Kathy Brandau, Council
Neil Weisinger, Council
Keith Aijala, Council



Bois Forte

TRIBAL GOVERNMENT

August 11, 2014

Mr. Duane R. Hill, P.E.
District Engineer, MnDot District 1
1123 Mesaba Avenue
Duluth, MN 55811

Dear Mr. Hill:

I am writing on behalf of the Bois Forte Reservation Tribal Council to express our concerns over some of the alternatives being considered for the T.H. 169 improvements in the Eagles Nest area. As you know, the Bois forte Band owns several businesses on and near the Vermilion Lake Reservation, which is located several miles west of Tower. These businesses include Fortune Bay Resort Casino, The Wilderness at Fortune Bay golf course, the Y-Store and Y-Express Lube, and the Ledge Liquor Store; and they are all accessed via T.H. 169. The Y-Store and its related businesses are located on T.H. 169.

These businesses provide jobs for approximately 500 people, including Bois Forte Band members and also many non-Indians. They also generate critical revenues that fund a wide variety of Tribal Government Services, such as Health, Education, Natural Resources, Law Enforcement, etc.

We are especially concerned about any alternatives that will require detours. In 2013 there was a detour on T.H. 169 in the area between the Y-Store and Virginia. This detour had a devastating impact on our businesses, due to the severe reduction in traffic during the peak tourism season. For the year of 2013 the Y-Store had a 25% reduction in customer count and a 24% reduction in gas sales. This impact was made even worse by the fact that it occurred during peak season, when customers are spending more money on various items. The net result was a 62% total decrease in revenue for the year. These negative impacts also extended to our largest businesses, Fortune Bay and the Wilderness at Fortune Bay. Those businesses suffered a 6% decrease in net income for the year, and we attribute that to lost traffic from the detour.

We are concerned that any detours resulting from the Eagles Nest improvement project would result in similar large losses in business. We also have a large number of employees who live in the Ely area that would be significantly impacted by any detours on that segment of T.H. 169.

In addition, we are concerned about the general safety of the highway in that area. So we support improvements to the highway, but believe those improvements need to address the serious problem of

5344 Lakeshore Drive | Nett Lake, MN 55772 | 218-757-3261 | 800-221-8129 | FAX 218-757-3312

Kevin W. Leecy
Chairman

David C. Morrison, Sr.
Secretary/Treasurer

Brandon Benner
District I Representative

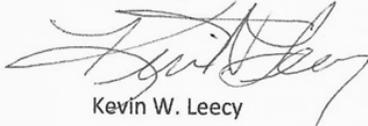
Karlene D. Chosa
District I Representative

Ray Toutloff
District II Representative

winter shading along the western segment of the project. For that reason, we strongly support the southern alignment alternative in that section of the project, as it would eliminate the problem of winter shading caused by the high ridge in that area. We believe that it is critical to address the shading issue, which causes dangerous icy conditions during the winter and early spring. Indeed, any alternative routing that does not address this issue would, in our view, be a poor use of public funds and would not address one of the core issues with that segment.

Thank you for considering our concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "Kevin W. Leecy", written in a cursive style.

Kevin W. Leecy
Chairman

APPENDIX B

HIGHWAY 1/169 EAGLES NEST LAKE AREA PROJECT – DAILY DETOUR COSTS

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MEMORANDUM

TO: Michael Kalnbach,
MnDOT District 1 Project Manager

FROM: Graham Johnson, PE
Chris Hiniker, AICP

DATE: August 28, 2014

RE: TH 1/169 Eagles Nest Lake Area Project - Daily Detour Costs
SEH No. MNT01 114996 14.00

This memorandum documents the methodology and results of a daily vehicle user cost of the proposed detour route along TH 1/169 which would be required as part of Alternatives 2 and 2A as defined in the Alternatives Development and Evaluation Memorandum dated July 31, 2014. The reconstruction of 5.6 miles of TH 1/169 extends from approximately 0.3 miles west of Sixmile Lake Road to Bradach Road in Nest Lake Township, St. Louis County. The closure of the 5.6 mile segment between the Cities of Tower and Ely would result in a 39 mile long detour route (existing distance using TH 1/169 is approximately 21.5 miles).

Economic Values

To determine a daily detour cost to users of the existing corridor, the vehicle miles traveled (VMT) and vehicle hours traveled (VHT) will be estimated on a daily level. Economic values from the MnDOT Office of Transportation System Management benefit-cost standard values will be used to convert the VMT and VHT data into an economic value.

MnDOT Office of Transportation System Management (July 2014 Values)

- Vehicle Operating Costs (VMT)
 - Auto is \$0.31 per vehicle mile
 - Heavy Commercial (Truck) is \$0.96 per vehicle mile
- Vehicle Travel Time Costs (VHT)
 - Auto is \$16.00 per person hour
 - Heavy Commercial (Truck) is \$27.30 per person hour
- Vehicle Occupancy; Rural is 1.31 persons per auto vehicle, persons per heavy commercial (truck) is negligible

Existing Conditions

Existing traffic volumes is estimated at 2,500 Annual Daily Trips (ADT) based on a 2011 traffic count. The ADT is an average value estimated over the full year and may be much lower than the summertime peak daily trips for this area. Of the 2,500, a total of 145 vehicles are considered heavy trucks, approximately 5.8%.

Detour Conditions

Due to limited destinations in the area along the corridor, it is assumed that all of these trips extend between the City of Tower and the City of Ely. As noted previously, the existing route between Tower and Ely is approximately 21.5 miles. The detour route between the two cities would extend that distance to approximately 39 miles; an increase of 17.5 miles.

Figure 1 depicts the anticipated detour route. Due to the rural nature of the project area, there is a limited local supporting roadway network.

From Tower, the detour route would extend south along TH 135 to CSAH 26 and make a left turn at the intersection; continuing along CSAH 26 to the T-intersection at CSAH 21 and make a left turn at the intersection; continuing along CSAH 21 into the western edge of the City of Babbitt. It then would continue north along CSAH CR 21 into the City of Ely and reconnect with TH 1/169. This detour route is assumed to be driven at posted speed of 55 mph; it includes 3 intersections that vehicles must make a left or right turn, depending on the direction of travel.

The three intersections would not impact the VMT calculations, but it will add additional travel time for vehicles. The Institute of Traffic Engineers (ITE) Traffic Engineering Handbook has average values for acceleration and deceleration rates. These rates were applied to a vehicle traveling from 55 mph to a full stop and from a full stop to 55 mph; the results are approximately 11.5 seconds to accelerate and approximately 8.5 to decelerate. Assuming an additional 5 seconds on average to make the turning movement adds approximately 25 seconds of travel time for each intersection.

Vehicle Miles

The total increase of the detour route is 17.5 miles as described above. With an ADT of 2,500 vehicles making this trip on a daily basis that equals a total a 43,750 vehicle miles per day. Of that total miles, 41,213 will be traveled by an automobile and 2,537 will be traveled by a heavy commercial truck.

At \$0.31 per mile, the vehicle trips would have an economic cost of approximately \$12,776.

At \$0.96 per mile, the commercial truck trips would have an economic cost of approximately \$2,436.

Total daily vehicle miles cost is approximately \$15,212.

Vehicle Hours

At 55 mph, the total travel time would be approximately 19.1 minutes. The three intersection would add a total of 1.25 minutes (25 seconds at 3 separate intersections). This has a total increase of 20.35 minutes to each vehicle trip; approximately 0.34 hours. Of the 2,500 daily trips, 2,355 are auto trips that have an estimated occupancy of 1.31 persons per vehicle; this results in user total of 1,049 hours for autos (2,355 cars at an occupancy of 1.31 and a trip time of 0.34 hours). Of the 2,500 daily trips, 145 are commercial truck trips that result in approximately 49 hours.

At \$16.00 per hour, the vehicle trips would have an economic cost of approximately \$16,784.

At \$27.3 per hour, the commercial truck trips would have an economic cost of approximately \$1,338.

Total daily vehicle miles cost is approximately \$18,122.

Conclusions

Based on the above assumptions and assumed economic values; the total daily detour costs to users would be \$33,334.

The total detour user costs for each alternative (listed below) were generated by applying the number of detour days estimated for each alternative to the daily user cost value.

- Alternative 1: 0-21 days = \$0 to \$700,014;
- Alternative 2: 84-140 days = \$2,800,056 to \$4,666,760;

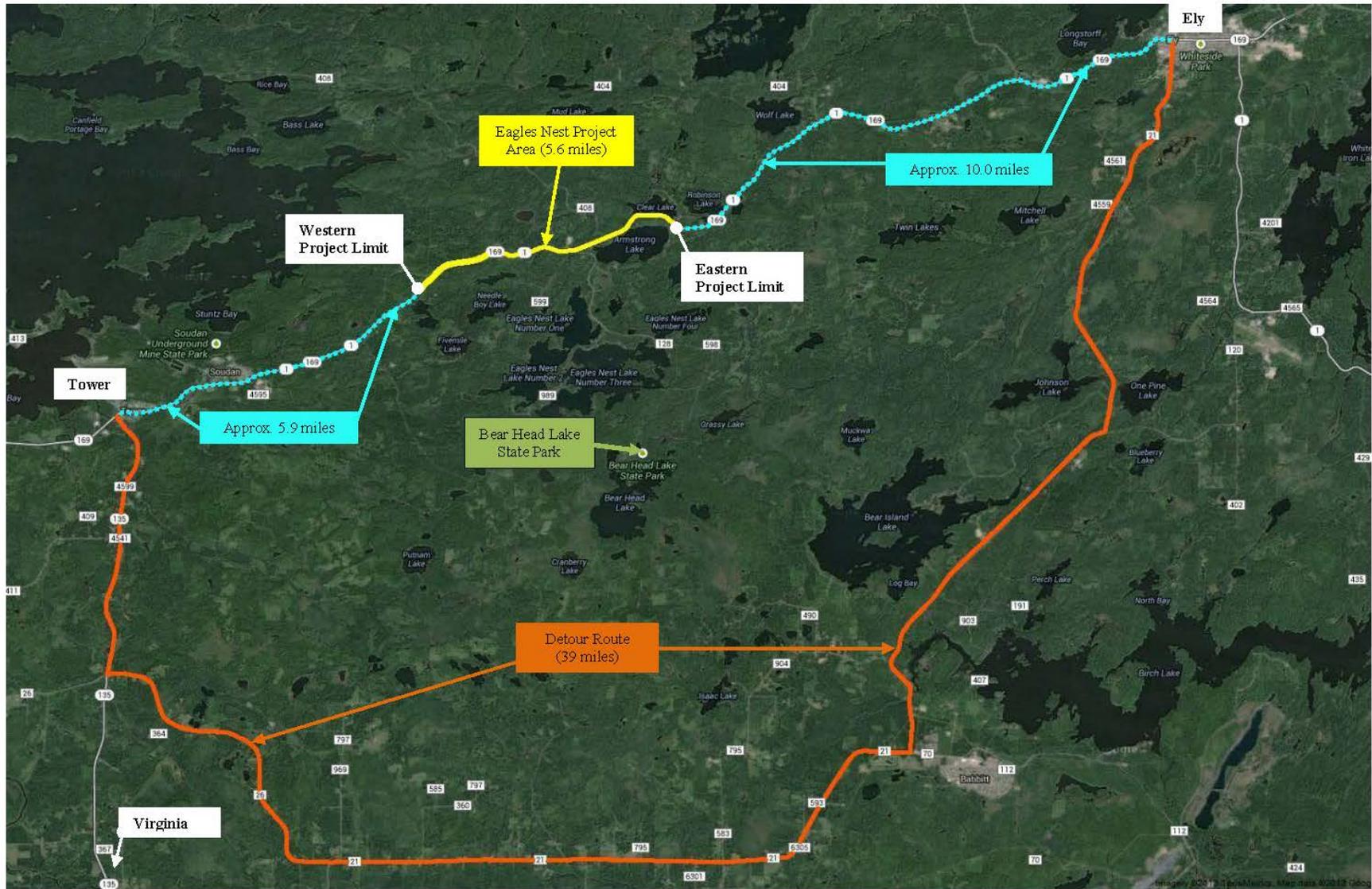
- Alternative 2A: 50-70 days = \$1,666,700 to \$2,333,380;
- Alternative 3: 0 days = \$0
- Alternative 3A: 0-15 days = \$0 to \$500,010

A key differentiator amongst the alternatives is that the closures estimated for Alternatives 1, 3, and 3A are temporary and short-term in nature and will occur sporadically as the construction process advances over the course of two construction seasons. In contrast, the closures for Alternatives 2 and 2A are expected to be continuous and long-term. It is expected that the closures associated with Alternative 2 will occur over two construction seasons while the closure for Alternative 2A would occur over one construction season. In addition to the user cost related impacts, Alternatives 2 and 2A have a much greater potential for other economic impacts, especially to area businesses in the Tower area reliant on commuters and recreational travel.

gtj

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Figure 1 – Highway 1/169 Eagles Nest Lake Area – Identified Construction Detour Route



Engineers | Architects | Planners | Scientists

Short Elliott Hendrickson Inc., 10901 Red Circle Drive, Suite 300, Minnetonka, MN 55343-9302

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