4.0 ALTERNATIVES EVALUATED FOR THE PROPOSED PROJECT

The analysis of alternatives for CR 595 focuses on the available routes within, or near, the four-mile wide corridor recommended by the Marquette County Board of Commissioners and adopted by MCRC. However, as explained below, additional information from the assessment of a larger study area has been provided in this document to demonstrate and verify to the extent possible the purpose and need for CR 595. The MCRC CR 595 study corridor is shown in the preceding Figure 2-1 and is also shown in Figure 4-1. The larger study area (utilized in the project assessment conducted for KEMC in the evaluation of the alternatives that were considered for the Woodland Road project) is shown in Figure 4-2.

After the withdrawal of the Woodland Road application for permit by the Woodland Road LLC in May of 2010, KEMC and its contractors continued to evaluate potential alternative routes to serve the Eagle Development Project. KEMC initiated a comprehensive evaluation of the CR 510-Red Road-Sleepy Hollow and the CR 550 routes (Figure 4-2). The additional environmental and engineering studies conducted for the CR 510-Red Road-Sleepy Hollow and the CR 550 routes considered in the Woodland Road project are referenced in this document for comparative or informational purposes. The pertinent information gathered by KEMC during its extensive analysis of these routes is provided in Appendix N. These additional studies were initiated in June 2010 and were completed in March 2011.

The CR 510-Red Road-Gold Mine Lake Road and the CR 510-Red Road-Callahan Road routes were also evaluated after the withdrawal of the Woodland Road application for permit, but were determined by MDEQ and EPA to not be feasible and prudent (Appendix F).

Although the CR 510 route that was evaluated during the Woodland Road application for permit review was not given further study for the CR 595 project assessment, it is also included in this document to provide a full presentation of the routes in the project study area.

Also included in this assessment for CR 595 are the Dishno and Peshekee routes (Figure 4-2). These routes are located west of the Silver Lake Basin and, as such, are located upstream of the dam system on the Dead River, which is an important consideration for the new primary county road as explained previously in this document.

The Mulligan Plains West-Sleepy Hollow and Mulligan Plains East-Sleepy Hollow routes are also included in the CR 595 assessment (Figure 4-2). These routes are located downstream of the Silver Lake Basin, and do not meet the purpose and need for a primary county road upstream of the Silver Lake Basin. The Mulligan Plains West-Sleepy Hollow route has been further assessed to determine whether it is a potentially feasible or prudent alternative route.

The nine routes that are presented in this assessment that are predominantly outside of the four-mile wide road study corridor are:

- Dishno
- Peshekee
- Mulligan Plains East-Sleepy Hollow
- Mulligan Plains West-Sleepy Hollow
- CR 510
- CR 550
- CR 510-Red Road-Sleepy Hollow
- CR 510-Red Road-Gold Mine Lake Road
- CR 510-Red Road-Callahan Road
4.01 Evaluation of the Dishno and Peshekee Routes

Two routes that were evaluated during the Woodland Road application for permit were also considered in the CR 595 project assessment. These routes are the Dishno to Peshekee Grade Road (aka CR 607 and also called the Huron Bay Grade) to US-41 (Dishno route); and the Triple A Road west to West Huron River Road to Peshekee Grade Road to US-41 (Peshekee route). These routes are shown on Figure 4-2. These are the only two feasible routes other than CR 595 that would meet the need for a primary county road upstream of the Dead River dams.

Although MDEQ agreed that the Dishno and Peshekee routes were not feasible or prudent during the Woodland Road review, they have been presented in this application for permit to provide a full presentation of routes considered for CR 595. However, due to the Dishno and Peshekee routes not being feasible or prudent according to MCRC as alternatives to CR 595, further detailed studies were not conducted during the preparation of the application for permit for CR 595, other than the Dishno route field review and estimation of cost to construct performed by Coleman Engineering Company (CEC).

Wetland delineations were not done for the Dishno or Peshekee routes. Wetland impacts for these routes as described below were estimated using the Final Wetland Inventory from the Michigan Geographic Data Library. However, in 2011 CEC conducted a general field verification of wetlands along these routes to more accurately define the approximate extent of wetlands that may be impacted by these routes, if upgraded. Stream crossing impacts were calculated using the Michigan Geographic Hydrography Framework that was also obtained from the Michigan Geographic Data Library. Comparison of the Final Wetland Inventory to actual field wetland delineation on the routes where actual wetland delineations have taken place has consistently resulted in more actual wetlands than shown on the Final Wetland Inventory. As such, it is likely that the actual acreage of wetland impact for the Dishno and Peshekee routes would be higher than the acreage estimated.

4.01.A. Dishno Route

The Dishno route utilizes the portion of the proposed CR 595 from the intersection with Triple A Road south to the point where the Dishno Road enters Trail 5 north of Voelkers Creek. Thus, approximately the northern 9.5 miles of the Dishno route is the same as the proposed CR 595. The Dishno route is about 28 miles in length and would have an estimated 47 acres of wetland impact and 29 stream crossings with over 3,000 feet of existing roadway where a stream is located immediately adjacent to the side of the road. This route also has the potential for a substantial amount of stream relocation; for example, the Woodland Road AFP estimated 800 lineal feet of stream relocation on Dishno Creek. The reason for the stream relocation is the presence of a substantial rock outcrop directly adjacent to the existing Dishno Road where it is adjacent to the creek. It is likely that the stream relocation would have to be avoided, necessitating a substantial amount of rock cut (blasting), which would significantly raise the cost of construction of this route.

Utilizing this route would require the reconstruction of the entire route until its confluence with US-41. Widening and revised alignments of the road would be necessary, as determined by preliminary construction plans prepared by A. Lindberg & Sons, Inc. during the Woodland Road planning and as reviewed by CEC during the CR 595 planning.
The road reconstruction may be problematic due to the number of private property owners on this route compared to the proposed route and the presence of Van Riper State Park, through which part of the route is located. The number of land owners involved would likely make obtaining additional right-of-way easements or acquisition for this route very difficult, even considering that MCRC has the power of eminent domain (i.e. condemnation). If key property owners are not willing to provide easements or sell all/part of their property to allow reconstruction of the road, then route planning would be protracted and possibly contentious, both of which MCRC would like to avoid.

Another important consideration with the Dishno route is the length of the road that travels along the Dishno Creek and the Peshekee River. The road was historically located along the streams to take advantage of the flatter terrain. However, upgrading the existing road where the road parallels the streams is determined to be undesirable due to road runoff directly entering the streams, wetland impacts in close proximity to streams that could negatively impact aquatic habitat, and the potential for accidents given the predicted amount of trucking on the route, along with the other traffic expected on the road. Widening the road near streams would also significantly affect the feasibility of this route from a cost perspective due to the presence of bedrock ridges/outcrops in some locations directly adjacent to the existing roads.

The reconstructed road for this alternative would be within 100 feet of the Peshekee River for a total distance of about 13,050 feet in 10 different sections. The sections where the road and river are in close proximity to each other vary in length from 100 feet to 4,000 feet. The road in this alternative would also be within 100 feet of the Dishno Creek for a total length of about 5,150 feet in eight segments varying in length from 100 feet to 2,200 feet. In total, the Dishno route would be within 100 feet of the Peshekee River and the Dishno Creek for a total of 18,200 feet, or almost 3.5 miles. The impacts to the streams and the aquatic life therein due to the road being in such close proximity is difficult to determine, but the noise, ground vibration, runoff of road salt, dust accumulation, emissions, and stormwater runoff are all likely to be negative effects.

As mentioned above, the Dishno route would either require the relocation of about 800 feet of the Dishno Creek or significant rock cuts in order to allow reconstruction of the road to provide a safe alignment. The presence of substantial areas of bedrock outcrops constrict the road design and necessitate either the stream being relocated or significant rock cuts in three areas in order to reconstruct the road. The estimated lengths of the three areas of potential stream relocations are 335 feet, 425 feet, and 40 feet. Stream relocations can be accomplished with minimal effects if done properly, but some impacts to fish and macroinvertebrates are unavoidable. Both the rock cuts and stream relocations are extremely expensive and would likely raise construction costs to make the route not feasible or prudent.

The Dishno route would not have the level of potential societal impacts associated with the CR 550 and CR 510-Red Road-Sleepy Hollow routes. Development in proximity to the existing road is relatively sparse. Although the Dishno route is approximately 32.5 miles shorter than the CR 550 alternative and approximately 13.3 miles shorter than the CR 510-Red Road-Sleepy Hollow route, there are significant undesirable effects to this route. The most significant detriments to the Dishno route are:
- The natural resources impacts, primarily to wetlands and streams, due to the reconstruction of the Dishno Road and Peshekee Grade Road would be more than other routes;

- Wetland impacts, estimated to be 47 acres, are the most of any available route (Peshekee is more wetland impact but is not available) and are approximately 21.4 acres more than the proposed CR 595 project;

- The number of stream crossings on the Dishno route (29) is more than the proposed CR 595 (22); the location of the Dishno Road and Peshekee Grade Road being within 100 feet of the Peshekee River and Dishno Creek for a distance of about 3.5 miles is a significant detriment; and,

- The need to either relocate about 800 feet of the Dishno Creek or perform significant rock cuts to allow the reconstruction of the road is an important consideration.

Although the Dishno route would provide a north-south access route to connect US-41 to northwest Marquette County, it would be about 6.1 miles longer than the proposed CR 595. More importantly, the intersection with US-41 would be about 3.5 miles further west than the proposed CR 595 intersection with US-41. This lengthens the route for emergency vehicles coming from Ishpeming (e.g. MDNR fire and Bell EMS) responding to northwest Marquette County. The south terminus of the Dishno route with US-41 moves the road too far west to be within the corridor where a new primary county road has been determined to be needed. It is an inefficient and more costly route.

For the reasons stated in the preceding paragraphs, the Dishno route is not feasible or prudent when compared to the proposed CR 595.

4.01.B. Peshekee Route

The Dishno route is the only route available entirely within Marquette County that is located west of the proposed CR 595. However, the Peshekee route was considered even though it extends into Baraga County (Figure 4-2).

The Peshekee route analysis was performed comparable to the analysis conducted for the Dishno route. The Peshekee route is 38.5 miles in length. The wetland impacts for the Peshekee route are estimated to be 68 acres, with an estimated 25 stream crossings. It should also be noted that a majority of the stream impacts on the Peshekee route would be major structures, including seven crossings of the Peshekee River.

Inquiries were made by MCRC to the Baraga County Road Commission (BCRC) about utilizing the Peshekee route. BCRC noted that the road improvements that would be made in Baraga County as a result of the Peshekee route being implemented would not have any physical connection with their existing public road system. It was also noted that significant improvements would have to be made, and right-of-way would have to be obtained to connect this road to the Baraga County road system. These factors make this improvement less than ideal for BCRC. Regardless of the BCRC position, there are also significant detriments to this route, as listed below.
• The Peshekee route, with an estimated 68 acres of wetland impact, is about 42.4 acres more wetland impact than the proposed CR 595;

• The route has three more stream crossing than the proposed CR 595 and involves larger streams;

• The Peshekee route is about 17.1 miles longer than the proposed CR 595 route. The additional road length is not prudent for the MCRC due to the additional construction and maintenance costs.

For these reasons listed above, the Peshekee route is not a feasible or prudent alternative and, in fact, is not desirable because of the disconnect with BCRC’s existing public road system.

4.02 Mulligan Plains East-Sleepy Hollow Route and Mulligan Plains West-Sleepy Hollow Route

The Mulligan Plains East and West routes were given preliminary consideration as potential alternatives to the proposed CR 595 route. Due to the potential of these routes to meet the purpose and need for CR 595, the discussion of these routes is included in Section 4.04.K.

4.03 Evaluation of the CR 550 and CR 510 Routes

The other routes that were evaluated as part of the preparation of the application for permit for CR 595 were CR 550 as well as three “CR 510-Red Road” routes: CR 510-Red Road-Sleepy Hollow, CR 510-Red Road-Gold Mine Lake Road, and CR 510-Red Road-Callahan Road.

The CR 550 route has been fully evaluated in a manner similar to the proposed CR 595 route. With respect to the CR 510-Red Road routes, during meetings with MDEQ and EPA following the withdrawal of the application for Woodland Road in May 2010, there were discussions regarding the alternatives that needed to be provided by the applicant in any subsequent application. MDEQ and EPA expressed the need to specifically have the use of the Red Road evaluated in order to determine if one of the several potential routes involving Red Road could be feasible and prudent for the project purpose of Woodland Road. The Red Road route considered for this purpose begins at the north terminus of the project, which is located at the Trail 5-Triple A Road intersection and proceeds easterly on Triple A Road to County Road 510, then southerly to Red Road, then generally westerly until the road crosses the AAO Road bridge over the Dead River. South of the Dead River, three alternative routes for the Red Road were considered, as recommended by MDEQ and EPA. These routes are shown in the document in Appendix E.

One of the three CR 510-Red Road routes, the Triple A Road to CR 510 to Red Road to Sleepy Hollow to Wolf Lake Road to US-41 route (CR 510-Red Road-Sleepy Hollow route) was evaluated in detail by conducting wetland delineations, stream surveys, and preliminary engineering design in order to allow an accurate and generally equal comparison to the proposed CR 595. Sub-alternatives for the CR 510-Red Road-Sleepy Hollow route to minimize wetland impacts and alignment issues were included in the evaluation, as described in this document.
The CR 510-Red Road-Sleepy Hollow route was originally designed to go south from the intersection of Sleepy Hollow Road and Wolf Lake Road, with a reroute to the east of Brocky Lake across what has been termed the “porcupine wetland”. The wetland and stream impacts for the CR 510-Red Road-Sleepy Hollow route that are discussed in this document are for this route. If the Sleepy Hollow Road route is implemented for this project, then the location of the southern portion of this route (i.e. to either go westerly to the Kipple Creek reroute west of Brocky Lake or to utilize the original route east of Brocky Lake) will have to be decided.

The other CR 510-Red Road alternative routes, i.e. the Gold Mine Lake Road route and the Callahan Road route, were evaluated using a more cursory evaluation in concurrence with MDEQ and EPA guidance. A report (Appendix E) addressing these routes was submitted to MDEQ for review in the fall of 2010. In a response letter dated November 18, 2010 MDEQ and EPA stated, “…the Sleepy Hollow route appears to be the best of the alternatives included with this evaluation…” (Appendix F). Gold Mine Lake Road and Callahan Road routes were not feasible due to various issues with these routes; primarily land ownership, proximity to a large number of private residences, and environmental concerns such as more potential impacts to wetland resources as compared to the Sleepy Hollow route.

With the advent of MCRC proposing a new primary county road (CR 595) in October 2010, the evaluation of the CR 510-Red Road-Sleepy Hollow route and the CR 550 route did not meet the project purpose and did not fulfill the purpose and need for a new primary county road. However, the results of the extensive amount of work conducted to evaluate these other routes (e.g. various detailed ecological studies, wetland delineation, stream evaluation, and detailed road design engineering plans, etc.) are included in Appendix N of this document for informational purposes and additional discussion is provided in the following sections.

4.03_A. CR 550

In addition to the CR 510-Red Road-Sleepy Hollow route, the CR 550 route has also been fully evaluated in a manner similar to the proposed CR 595 route. The CR 550 route includes a segment of Triple A Road and CR 510. The Triple A Road segment is also common to the CR 510-Red Road-Sleepy Hollow route. CR 510 is utilized from the intersection with Triple A Road north to CR 550.

The CR 550 route is approximately 60 miles in length as measured from the north terminus at the intersection of Trail 5 and Triple A Road to the south terminus at CR FY and US-41. The CR 550 route has only about one acre of wetland impact associated with upgrading the existing roadway, and would require the reconstruction of four existing stream crossings. In addition, a portion of the Triple A Road may be relocated and the three existing crossings of the East Branch Salmon Trout River may be replaced with one new crossing if this route is implemented.

MCRC believes that the CR 550 route is not a feasible and prudent alternative route to the proposed CR 595 and is therefore considered a “no-build” route for the following reasons:

- Although the natural resources impacts are the lowest of all routes, the CR 550 route has significant societal issues related to heavy truck travel. There is substantial public and local governmental opposition to upgrading CR 550 as a truck travel route.
• The CR 550 route is 37.5 miles longer than the proposed CR 595 and is not located in the area where the need for a new primary county road has been determined by the Marquette County Board of Commissioners and MCRC.

• CR 550 would not substantially meet the purpose and need for the proposed CR 595 for a new primary county road as explained in this document, including improving emergency services access, providing a second access route that is upstream of the Dead River dam system, improving recreational access, and improving efficiency of access for large acreage of timber company land holdings in northwest Marquette County.

4.03.B. CR 510-Red Road-Sleepy Hollow

The CR 510-Red Road-Sleepy Hollow route includes a segment of Triple A Road and CR 510. CR 510 is utilized from its intersection with Triple A Road south to Red Road, a distance of 11 miles. The route continues on Red Road along the north side of part of the Hoist Basin to Sleepy Hollow Road, generally westerly to Wolf Lake Road, and south to US-41 on the proposed CR 595 route. The CR 510-Red Road-Sleepy Hollow route is 41.3 miles in length and would have about 13.04 acres of wetland impact and 35 stream crossings. There would be significant stream relocations in portions of the route and relocation of the road in an area of steep terrain and bedrock outcrops in the vicinity of what is commonly called “the hairpin” curve required for the construction of this route, which would add substantial cost to construction of this alternative.

The CR 510-Red Road-Sleepy Hollow route is 19.9 miles longer than the proposed CR 595 route and is not located in the area where the Marquette County Board of Commissioners or MCRC have determined the necessity for a new primary county road. These governmental agencies, along with verification of the need by MDOT and FWHA, are responsible for determining the transportation needs of Marquette County.

CR 510-Red Road-Sleepy Hollow route does not meet the purpose and need for the proposed CR 595 and is therefore is considered to be a “no build” alternative by MCRC for the following reasons:

• The route is in close proximity to CR 550 (i.e. from 3 to 5 miles) down to the point where Red Road intersects with CR 510. To have two paved primary county roads (CR 510 is not paved) in this relatively undeveloped part of Marquette County is not prudent or necessary to serve the transportation needs of the county. The geographical service area where MCRC has determined the need for a new primary county road would remain without suitable county road service.

• The route is 41.3 miles in length, which is 19.9 miles longer than the proposed CR 595 (21.4 miles). For MCRC to maintain this excess length of primary county road through relatively undeveloped country is not prudent, given the tight road maintenance budget that MCRC has to operate under.

• The CR 510-Red Road-Sleepy Hollow route is almost twice as long a route as CR 595. As such, the cost to construct the CR 510-Red Road-Sleepy Hollow route would
likely to be approximately twice as much as CR 595, without the same benefits as CR 595.

- The CR 510-Red Road-Sleepy Hollow route would not substantially meet the purpose and need for a new primary county road as explained in this document, including improving emergency services access, providing a second access route that is upstream of the Dead River dam system, improving recreational access, and improving efficiency of access for large acreage of timber company land holdings.

4.03.C. Summary of MCRC Position on Other Routes

The Dishno, CR 550, and CR 510-Red Road-Sleepy Hollow routes are considered by MCRC to be “no-build” alternatives. The term “no-build” alternative in this application for permit refers to the MCRC analysis and its finding that improvements to existing roads would not meet the purpose and need for the proposed CR 595 as explained in this document. If existing roads are considered for improvement and CR 595 is not constructed, the needs for a new road remain.

In regard to the Eagle Development Project, the only alternatives for mine access and a haul route for ore to be transported to Humboldt Mill are CR 550 through Marquette and CR 510 to US-41 in Negaunee Township. Use of either of both of these routes by KEMC would require many more truck trips, as these routes are not entirely all-season roads and lighter loads would be required during the spring breakup period, which usually lasts about two months.

The timber industry likewise will have no option but to continue to utilize existing routes, many of which are unimproved roads. The opportunity for the timber industry to benefit from the more efficient and reliable all-season access provided by CR 595 would not be realized if existing routes must be used. Excess fuel usage, greenhouse gas emissions, and wear and tear on trucks and other vehicles would be manifested for the timber industry also if CR 595 is not allowed.

Emergency services, public safety, and recreational access to northwest Marquette County would also not be improved if CR 595 is not permitted. Existing routes will not meet the needs expressed in this document for upgrading access for emergency services in the County by EMS, law enforcement, and firefighting agencies.

The excess fuel usage and increased greenhouse gas emissions that would result from using existing routes over time just for the users described above could be minimized by construction of CR 595. In these times of rising fuel costs and public health concerns regarding greenhouse gas emissions identified by EPA, any action that reduces fuel consumption and greenhouse gas emissions should be favorably received. As such, implementation of any of the no-build alternatives would actually result in net negative impacts to air quality as compared to the CR 595 project.

4.04 Evaluation of the Alternatives within the CR 595 Road Study Corridor

Twenty alternative segments that either are within the four-mile wide by 21.4-mile long road study corridor, or those that are adjacent to the study corridor, were evaluated to determine the location for CR 595 that reduces impacts on wetlands and streams to the greatest extent
practical. These 20 alternative segments are shown on Figure 4-3 and are described in Table 4-1. Note that the alternative segments are not all numbered consecutively in order to avoid confusion with the numbering system that was previously used by the project team over the past months to identify various alternative segments. The segments omitted (Segments 8 and 15-28) are not included in this document because these segments were determined to not meet the project purpose for CR 595.

Table 4-1. Alternative Segments Evaluated for CR 595 Route within the Study Corridor (Revised 1/6/12).

<table>
<thead>
<tr>
<th>Segment Number</th>
<th>Segment Alternative</th>
<th>Alternative Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CR FY</td>
<td>From US-41 on CR FY and the north extension of CR FY to Wasie Cutoff.</td>
</tr>
<tr>
<td>2</td>
<td>Wasie Cutoff to CR AAD</td>
<td>From Wasie Cutoff on CR FY north across Second River and Koops Creek to CR AAD and Wolf Lake Road intersection.</td>
</tr>
<tr>
<td>3</td>
<td>Wasie Cutoff</td>
<td>From the north extension of CR FY then east through Wasie property to Wolf Lake Road.</td>
</tr>
<tr>
<td>4</td>
<td>Wolf Lake Road South</td>
<td>From US-41 north on Wolf Lake Road to Wasie Cutoff.</td>
</tr>
<tr>
<td>5</td>
<td>Wolf Lake Road</td>
<td>Wolf Lake Road from Wasie Cutoff to CR AAD intersection.</td>
</tr>
<tr>
<td>6</td>
<td>Wolf Lake Road North</td>
<td>Wolf Lake Road from CR AAD intersection to Sleepy Hollow Road (uses the &quot;porcupine&quot; reroute east around Brocky Lake)</td>
</tr>
<tr>
<td>7</td>
<td>Wolf Lake Road/Trail 5</td>
<td>On Wolf Lake Road and Trail 5 from Sleepy Hollow Road to Triple A Road</td>
</tr>
<tr>
<td>9</td>
<td>Kipple Creek Reroute</td>
<td>From Wolf Lake Road south and west around Brocky Lake to Trail 5 northeast of Wolf Lake.</td>
</tr>
<tr>
<td>10</td>
<td>Brocky Lake East Bypass</td>
<td>From Wolf Lake Road east of Brocky Lake around to the east and north back to Wolf Lake Road.</td>
</tr>
<tr>
<td>11</td>
<td>Brocky Lake Road</td>
<td>From just south of the Dishno Road intersection south of Brocky Lake, north on a private road section of what is locally called Wolf Lake Road past the camps on the east side of Brocky Lake.</td>
</tr>
<tr>
<td>12</td>
<td>Mulligan Plains East</td>
<td>From Red Road just north of the CR AAO bridge westerly to the Mulligan Plains Truck Trail and northerly across the Yellow Dog River to Triple A Road.</td>
</tr>
<tr>
<td>12A</td>
<td>Mulligan Plains West</td>
<td>Generally the same as above, but with a westerly route across the Yellow Dog River.</td>
</tr>
<tr>
<td>13</td>
<td>Red Road-Dead River</td>
<td>From Sleepy Hollow Road northerly on Red Road (CR AAO) to just north of the AAO Bridge over the Dead River.</td>
</tr>
<tr>
<td>14</td>
<td>Sleepy Hollow</td>
<td>From Wolf Lake Road just north of Brocky Lake on Sleepy Hollow Road then easterly to Red Road (CR AAO).</td>
</tr>
<tr>
<td>28</td>
<td>Clowry-Dyno Nobel</td>
<td>From US-41 north on CR FN then on an abandoned railroad grade to CR AAD then east to Wolf Lake Road.</td>
</tr>
<tr>
<td>29</td>
<td>Grapevine Road East Bypass</td>
<td>From Wolf Lake Road north of Brocky Lake around to the east, then north and back west to intersect with the Grapevine Alternate segment.</td>
</tr>
<tr>
<td>30</td>
<td>Grapevine Road</td>
<td>From Wolf Lake Road north of Brocky Lake northerly and then westerly back to Trail 5 snowmobile trail west of Silver Lake Basin.</td>
</tr>
<tr>
<td>31</td>
<td>West Yellow Dog River Crossing</td>
<td>From Trail 5 just south of the Yellow Dog River north across the Yellow Dog River at a new crossing location about 400’ upstream of the existing bridge to Triple A Road.</td>
</tr>
<tr>
<td>32</td>
<td>Yellow Dog River North</td>
<td>From just north of the Yellow Dog River at the present bridge location on Trail 5, then easterly and then northerly to Triple A Road.</td>
</tr>
<tr>
<td>33</td>
<td>North Slope Trail 5</td>
<td>From north of Mulligan Creek on Trail 5 to the Yellow Dog plains ending just westerly of the existing bridge over the Yellow Dog River.</td>
</tr>
</tbody>
</table>

The characteristics and findings regarding each of the 20 alternative segments for the location of the proposed CR 595 within the four-mile wide study corridor are presented in the following sections.
4.04.A. Alternative Segment 1. CR FY

The CR FY alternative segment begins at the intersection of CR FY and US-41 and proceeds northerly to the end of CR FY and then continues north across the Middle Branch Escanaba River to the Wasie Cutoff. The proposed road would be entirely within the right-of-way of CR FY where it passes through the Humboldt Wetland Mitigation Bank property. This road segment is 1.02 miles in length.

Alternative Segment 1 Wetland Impacts

Wetland impacts for the CR FY alternative segment have been determined to be 1.31 acres.

Alternative Segment 1 Stream Impacts

There is one stream crossing on the CR FY alternative; a new clear-span bridge over the Middle Branch Escanaba River is proposed.

4.04.B. Alternative Segment 2. Wasie Cutoff to CR AAD

This segment extends from the Wasie Cutoff on the extended CR FY north across Second River and Koops Creek to CR AAD and Wolf Lake Road intersection (this was the proposed Woodland Road route). This alternative segment is 2.5 miles in length.

Alternative Segment 2 Wetland Impacts

Wetland impacts for Alternative Segment 2 have been determined to be 1.35 acres.

Alternative Segment 2 Stream Impacts

Stream impacts in this alternative segment involve two new stream crossings; one over Second River and one over Koops Creek. The Second River crossing would involve substantial wetland fill. The Second River crossing would be a clear-span box beam bridge and the Koops Creek crossing would be a Conspan® bridge and is at a place where the stream often dries up during the summer.

4.04.C. Alternative Segment 3. Wasie Cutoff

This segment extends from the north extension of CR FY east through the Wasie property to Wolf Lake Road. This alternative segment was investigated for the purpose of avoiding the wetland and stream impacts associated with Alternative Segment 2 across Second River and Koops Creek and also to avoid the impacts to the residential area along Wolf Lake Road just north of US-41. The length of the Wasie Cutoff segment is 1.25 miles.

Alternative Segment 3 Wetland Impacts

There are no wetland impacts for the Wasie Cutoff alternative segment.

Alternative Segment 3 Stream Impacts

There are no stream impacts for the Wasie Cutoff alternative segment.
4.04.D. Alternative Segment 4. Wolf Lake Road South

The Wolf Lake Road South (WLRS) alternative segment would begin at the intersection of US-41 and Wolf Lake Road and proceed north on a realignment needed to provide a US-41 intersection design acceptable to MDOT. The realignment would be through a portion of the Humboldt Wetland Preserve property that is not in a Conservation Easement and then back onto the existing Wolf Lake Road south of the Middle Branch Escanaba River. The segment on Wolf Lake Road continues north to a point where the Wasie Cutoff alternate segment intersects Wolf Lake Road. The Wolf Lake Road South alternative segment is 1.7 miles in length.

Alternative Segment 4 Wetland Impacts

Wetland impacts for the WLRS alternative segment have been determined to be 1.55 acres.

Alternative Segment 4 Stream Impacts

The WLRS segment would require the construction of a new bridge over the Middle Branch Escanaba River. Due to the relatively sharp curve in Wolf Lake Road at the river crossing, the alternative alignment would need to be just upstream (west) of the existing bridge to provide a better horizontal alignment of the road. Also, the need to keep the road open to traffic during construction makes the new bridge location a requirement. Two culvert replacements would be required at existing stream crossings of tributaries to the Middle Branch Escanaba River.

4.04.E. Alternative Segment 5. Wolf Lake Road

The Wolf Lake Road alternative segment begins at the intersection of Wolf Lake Road with the Wasie Cutoff segment and extends northerly on Wolf Lake Road to the intersection with CR AAD. This section of Wolf Lake Road is gravel surface. The road crosses Second River in this segment. The length of the Wolf Lake Road alternative segment is 1.3 miles in length.

Alternative Segment 5 Wetland Impacts

Wetland impacts for the Wolf Lake Road alternative segment have been determined to be 4.14 acres.

Alternative Segment 5 Stream Impacts

The Wolf Lake Road alternative segment would require the reconstruction of the existing Wolf Lake Road crossing of Second River, including a realignment of the existing roadway. Presently Wolf Lake Road is located either directly adjacent to Second River or is within a very close distance to the river for a distance of about one mile. The maintenance and operation of the road is assumed to have impacts on Second River and the aquatic organisms in the river. This alternative segment would relocate about 875 feet of Wolf Lake Road further from Second River.
4.04.F. Alternative Segment 6. Wolf Lake Road North

This segment is Wolf Lake Road from CR AAD to Sleepy Hollow Road, using a proposed reroute east around Brocky Lake camps. Wolf Lake Road as a county road ends just south of Brocky Lake at/near the Dishno Road intersection, but the road continues as a private road northerly past Brocky Lake to Wolf Lake and is literally in the back yard of some camps on Brocky Lake. The intent of the reroute to the east of Brocky Lake was to minimize direct and indirect impacts from the proposed CR 595 on the landowners on Brocky Lake. Alternative Segment 11 has more explanation about the existing road. The Wolf Lake Road North segment is 4.7 miles in length.

Alternative Segment 6 Wetland Impacts

Wetland impacts for the Wolf Lake Road North alternative segment have been determined to be 6.40 acres.

Alternative Segment 6 Stream Impacts

The Wolf Lake Road North alternative segment would require a new stream crossing over a tributary to Barnhardt Creek at the outlet of what has been called the “Porcupine Swamp”. A 53-foot long clear-span box beam bridge would be proposed at that location to minimize indirect impacts on the wetland groundwater hydrology and allow free passage of wildlife in the wetland. Four other stream crossings would also be required on this route segment.


This segment is Wolf Lake Road (as locally called but not a designated county road at this location) from Sleepy Hollow to near Wolf Lake where Trail 5 then courses northerly to Triple A Road. This segment is a combination of existing roads, logging roads, and new routes on the best alignment as discerned by field surveys and evaluation conducted over several years. The Wolf Lake Road/Trail 5 alternative segment is 14.4 miles in length.

Alternative Segment 7 Wetland Impacts

Wetland impacts for the Wolf Lake Road/Trail 5 alternative segment have been determined to be 15.59 acres.

Alternative Segment 7 Stream Impacts

There are 16 stream crossings proposed in the Wolf Lake Road/Trail 5 alternative segment. Only one of the major stream crossings is a new crossing location (Mulligan Creek).


The Kipple Creek Reroute segment extends from Wolf Lake Road south of the Dishno Road intersection west and north around Brocky Lake to Trail 5 just east of Wolf Lake. This segment was investigated during the application preparation for the Woodland Road as a potential route around Brocky Lake to minimize direct and indirect impacts to camps in that area. The segment is not located entirely on existing roads or trails.
During the public information meetings held by the MCRC on August 30 and 31, 2011, some landowners from the Brocky Lake area expressed a desire to have the proposed CR 595 located west of Brocky Lake. As a result, MCRC authorized the investigation of the potential route with road alignment changes to provide a safe road design and wetland delineation and stream surveys conducted to determine the natural resources impacts. The revised Kipple Creek Reroute segment is 3.4 miles in length.

**Alternative Segment 9 Wetland Impacts**

Wetland impacts for the revised Kipple Creek Reroute alternative segment have been determined to be 4.50 acres.

**Alternative Segment 9 Stream Impacts**

The Kipple Creek segment involves four stream crossings; three unnamed tributaries to Kipple Creek and the main stem of Kipple Creek. All of these crossings will be new.


The Brocky Lake East Bypass segment is an eastward loop from the proposed CR 595 route east of Brocky Lake and terminates on what is locally called Wolf Lake Road north of Brocky Lake (although the actual county road ends south of Brocky Lake). This segment was evaluated for the purpose of trying to locate a route around areas of steep topography. The Brocky Lake East Bypass segment would move the road location further east and would be located around the base of the hill to reduce grade change in this road location. However, the East Bypass segment was determined to have more horizontal and vertical alignment issues than the proposed CR 595 route and was therefore not selected as the best alternative segment. The East Bypass reroute segment would add 1.2 miles to the route.

**Alternative Segment 10 Wetland Impacts**

Wetland impacts for the Brocky Lake East Bypass alternative segment have been determined to be 4.30 acres.

**Alternative Segment 10 Stream Impacts**

There are no stream crossings on the Brocky Lake East Bypass segment.


The existing segment on what is termed for this document as “Brocky Lake Camps Access Road” (a segment of what is locally called Wolf Lake Road and is located on the east side of Brocky Lake) was evaluated as an alternative segment for this portion of the proposed CR 595. The existing Wolf Lake Road that is a public road ends just south of Brocky Lake at the Dishno Road intersection. The road that continues northerly to Wolf Lake is locally called Wolf Lake Road but the portion of the road along the east side of Brocky Lake is a private road with seven separate parcel owners. Prior contacts with these property owners resulted in one property owner refusing to consider any agreement that would allow Brocky Lake Road to be reconstructed, which at that time was part of the proposed Woodland Road. Due to the fact that permission from the private property owners that own the road is necessary to
utilize this alternative segment unless condemnation is invoked, the alternative segment is not available and was not given further consideration. In addition, the direct and indirect impacts to these property owners on Brocky Lake from a new road is not desirable and can be avoided or minimized with an alternate road location.

**Alternative Segment 11 Wetland and Stream Impacts**

Due to the lack of feasibility for this alternative segment, the wetland and stream impacts were not determined.

**4.04.K. Alternative Segment 12, Mulligan Plains East and Alternative Segment 12A, Mulligan Plains West**

Although the Mulligan Plains Segments 12 and 12A extend beyond the road study corridor, they were evaluated in order to determine whether these segments would be acceptable alternative segments for CR 595. The Mulligan Plains East alternative segment is 9.5 miles in length. As shown in Figure 4-2, the segment that would include the Mulligan Plains East alternative begins at the intersection of Wolf Lake Road and US-41, continues to the intersection of Sleepy Hollow Road and Wolf Lake Road, then to Sleepy Hollow Road to Red Road, then north on Red Road across the AAO Bridge over the Dead River, then westerly across Mulligan Creek and then generally northerly through the Mulligan Plains and across the Yellow Dog River to Triple A Road. The Red Road-Dead River and Sleepy Hollow Road alternative segments that are part of this segment are explained in the following sections (i.e. 4.4.L and 4.4.M).

The substantial difficulty with the Mulligan Plains East alternative segment would be an extremely difficult crossing of the Yellow Dog River, requiring a significant amount of bedrock cut and fill over a very deep gorge (i.e. over 200 feet). Such a crossing renders this alternative to not be prudent.

**Alternative Segment 12 Wetland and Stream Impacts**

The wetland impacts have been estimated for the Mulligan Plains East segment to be about 25.20 acres and stream crossings estimated at 12. Wetland delineation has not been conducted for this segment. Preliminary engineering evaluations have been conducted regarding the crossing location on the Yellow Dog River to determine feasibility and estimated cost for the bridge over the deep gorge.

**Alternative Segment 12A, Mulligan Plains West**

The Mulligan Plains West Segment 12A would cross the Yellow Dog River about 1.5 miles upstream of Pinnacle Falls. The river crossing would not appear to be a significant issue because there is no deep gorge at this location, but the road segment would pass through an existing Conservation Easement held by The Nature Conservancy. This segment would require a modification of the Conservation Easement to allow the construction of the road.

The Mulligan Plains West Segment 12A evaluation was initiated in September 2011 with preliminary engineering evaluations performed to locate a suitable road alignment. Wetland delineation, stream assessments, MiRAM evaluation, preliminary field surveying, and aerial
topographic mapping were also conducted to obtain information for engineering design. Preliminary engineering of the Mulligan Plains West route has not been completed.

The Mulligan Plains West route meets the project purpose, as indicated in Table 4-3 of the October 6, 2011 AA/PA, however having the new road upstream of Silver Lake Basin to ensure road access during a flood event on the Dead River is a critical road location factor as documented in the Purpose and Need for CR 595 in section 3.0 of the AA/PA. An excellent description of the damage caused by the 2003 Silver Lake Basin berm failure and resultant flood on the Dead River and the public safety, environmental, and economic impacts from the flood was presented by U.S. Senator Carl Levin to the U.S. Senate on September 16, 2003. A copy of Senator Levin’s address is provided in Appendix I. Photographs of the washout of the bridge over the Dead River on CR AAO and the washout of the bridge on CR AAT over the Mulligan Creek are provided in Appendix K to depict the power of the flood in 2003.

Being upstream of the uppermost dam on the Dead River is important, but two other factors weigh in against the Mulligan Plains West route. These other two factors are: 1) the route traverses through nearly one mile of a Conservation Easement held by The Nature Conservancy (Appendix O) near and along the Yellow Dog River where the Mulligan Plains West route would have to be located; and, 2) the fact that the road for this route would be located in close proximity (parallel) to the Yellow Dog River for a distance of about one mile. A map is provided in Appendix O that depicts the location of the proposed CR 595, the Mulligan Plains West route, and the location of the Conservation Easement.

The Recitals in the Conservation Easement held by The Nature Conservancy provide some explanation of the natural values of the property. Recital B, Conservation Values, states, in part, “The Protected Property, in its present state, has significant natural, aesthetic, scientific and educational values as a “relatively natural habitat of fish, wildlife, or plants or similar ecosystem,” …..These values are of great importance to the Grantor, to the people of Marquette County, Champion Township, and the people of the State of Michigan.” Recital B goes on to state, “Over 12 rare plant species have been found in the area including several state rare species of grape ferns or moonworts (Botrychium) on the specific property to be placed under easement.”

On page two of the Conservation Easement, under the Grant of Conservation Easement, item 1 in the Purpose states, “It is the purpose of this Easement to assure that the Protected Property will be retained forever substantially undisturbed in its natural, scenic, and wild condition and to prevent any use of the Protected Property that will significantly impair or interfere with the Conservation Values of the Protected Property (“Purpose”). Grantor intends that this Easement will confine the use of the Protected Property to activities that are consistent with the Purpose of this Easement.” Roads are listed in the Prohibited Uses/Restrictions on page 2 of the Conservation Easement.

Although the Conservation Easement recognizes on page 9 that the Easement may be extinguished by certain actions (“….if the restrictions of this Easement are extinguished by judicial proceedings (including, but not limited to, eminent domain proceedings)….”). MCRC is opposed to initiating eminent domain (i.e. condemnation) proceedings to construct a primary county road on the property within the Conservation Easement. The likely public opposition to such proceedings, and the negative publicity that would result to both MCRC and MDEQ, would likely be substantial.
The importance of having the proposed road upstream of the Dead River dam system cannot be over-emphasized. Admittedly a flood event like that which occurred in May 2003 is a rare event, but dams are not fail-safe and failures are not uncommon. Having a community (Big Bay), county residents, businesses, and a major mining facility isolated from emergency services, law enforcement, access to work, and critical supplies is a significant public concern. The proposed CR 595 would provide a reliable access route during a flood event or other natural catastrophic event. As long as significant private funding is available to build the proposed CR 595, it is prudent to build it in a location that would provide reliable access above the dam system.

The decision to locate the road above the Dead River dam system is a community decision and was based upon public hearings, public meetings, resolutions of local governmental agencies, including the Marquette County Board of Commissioners and Marquette County Road Commission. These agencies are assigned the responsibility to determine the need for county road locations and they followed a public process in making their decisions.

It is the applicant’s position, for the reasons stated in the preceding response, that the Mulligan Plains West alternative route meets the project purpose, is feasible to construct, but is not prudent.

*Alternative Segment 12A Wetland and Stream Impacts*

The wetland impacts for Alternative Segment 12A have not yet been determined, but are estimated to be about 12 acres for the entire route from US-41 to Triple A Road. Preliminary engineering design must be completed in order to determine the wetland impacts and stream crossings for this segment.

*4.04.L. Alternative Segment 13. Red Road-Dead River*

This alternative segment is the second segment of the Mulligan Plains segments presented above. The Red Road-Dead River alternative segment begins at the intersection of Sleepy Hollow Road and Red Road, then north on Red Road to just north of the AAO Bridge over the Dead River. At this point, the Mulligan Plains Alternative Segments 12 and 12A begin.

The Red Road-Dead River segment is located on the existing improved county gravel roadway and is 1.1 miles in length.

*Alternative Segment 13 Wetland Impacts*

Wetland impacts for the Red Road-Dead River alternative segment have been determined to be 0.02 acre.

*Alternative Segment 13 Stream Impacts*

There are no new stream crossings on the Red Road-Dead River alternative segment (the AAO Bridge over the Dead River was reconstructed in 2003 after the Silver Lake dam failure destroyed the bridge).
4.04.M. Alternative Segment 14, Sleepy Hollow

The Sleepy Hollow alternative segment begins with the intersection of Wolf Lake Road and Sleepy Hollow Road and ends at the intersection of Sleepy Hollow Road and Red Road (aka CR AAO). The length of the Sleepy Hollow alternative segment is 3.6 miles. The segment generally follows the existing Sleepy Hollow Road, which is an unimproved road/trail, but some realignment was considered to improve horizontal and vertical alignments and to avoid wetlands.

Alternative Segment 14 Wetland Impacts

Wetland impacts for the Sleepy Hollow alternative segment have been determined to be approximately 0.60 acres.

Alternative Segment 14 Stream Impacts

There are no stream crossings on the Sleepy Hollow alternative segment.

4.04.N. Alternative Segment 28, Clowry-Dyno Nobel

The Clowry-Dyno Nobel alternative segment starts near CR AAD on Alternative Segment 2 (the former Woodland Road route) then proceeds southwesterly past the former location of the Clowry Station on an abandoned railroad grade, then across the Middle Branch Escanaba River to CR FN through the Dyno Nobel property and across the existing railroad to US-41. The segment is 3.9 miles in length. This alternative segment was investigated to avoid crossing Second River and reduce wetland impacts.

The Clowry-Dyno Nobel segment is dependent upon the implementation of the east portion of the CR AAD (Segment 2), which would require a new crossing of Koops Creek. The Clowry segment would also require a new crossing of the Middle Branch Escanaba River. This segment is approximately 1.5 miles longer than the proposed CR 595.

Alternative Segment 28 Wetland Impacts

Approximately 4.40 acres of wetlands would be impacted by the Clowry-Dyno Nobel alternative segment.

Alternative Segment 28 Stream Impacts

There is one stream crossing in Alternative Segment 28; a crossing of the Middle Branch Escanaba River between CR FN and Clowry Station.

4.04.O. Alternative Segment 29, Grapevine Road East Bypass

The Grapevine Road East Bypass alternative segment was an alternative segment investigated for the Grapevine Road segment (Alternative Segment 30) and is 1.1 miles in length. The Grapevine Road East Bypass segment was evaluated in an effort to reduce steep grades present at other locations on the Grapevine alternative segment. The Grapevine Road East Bypass alternative segment begins near Wolf Lake Road north of Brocky Lake and goes east and south around the base of the large hills and intersects the
Grapevine Road alternative segment. While minimizing the vertical grades to some extent, the Grapevine Road East Bypass segment adds a new crossing of Connors Creek, which would also impact wetlands.

*Alternative Segment 29 Wetland and Stream Impacts*

Due to the lack of feasibility for this alternative segment, the wetland and stream impacts were not determined.

*4.04.P. Alternative Segment 30. Grapevine Road*

The Grapevine Road alternative segment begins at the intersection of Wolf Lake Road and Grapevine Road north of Brocky Lake and follows Grapevine Road in a northerly and westerly direction to where Grapevine Road joins Trail 5 south of the Dead River. The Grapevine Road alternative segment is 7.0 miles in length. Grapevine Road has substantial vertical grade and horizontal alignment issues which would create problems for heavy trucks and would add about 1.6 miles to the length of the proposed road.

*Alternative Segment 30 Wetland Impacts*

Wetland delineation for the Grapevine Road alternative was conducted, however due to the difficulties with this segment mentioned in the preceding paragraph, an alignment was not prepared and wetland impacts were not determined.

*Alternative Segment 30 Stream Impacts*

The Grapevine Road alternative segment has five stream crossings; a crossing of Voelkers Creek, an unnamed creek, and three crossings of Connors Creek or its tributaries.

*4.04.Q. Alternative Segment 31. West Yellow Dog River Crossing*

This segment begins on Trail 5 just south of the Yellow Dog River and then proceeds north across the Yellow Dog River and associated wetlands about 400 feet upstream of the existing bridge and then north to Triple A Road. This alternative segment was evaluated as a potential segment to avoid private and State of Michigan lands on the north side of the Yellow Dog River to the east of this alternative segment.

*Alternative Segment 31 Wetland Impacts*

The wetland impacts of the West Yellow Dog River Crossing alternative segment were determined to be 3.50 acres, part of which is a bog. The wetland impacts on the proposed CR 595 in this segment are only 0.60 acre, which is 2.90 acres less than the Alternative Segment 31 impacts and does not impact any bogs or other peatlands.

*Alternative Segment 31 Stream Impacts*

This alternative segment would have one stream crossing; a new bridge would have to be constructed over the Yellow Dog River.
4.04.R. Alternative Segment 32. Yellow Dog River North

This alternative segment starts at the existing Yellow Dog River Bridge on Trail 5 and then proceeds easterly and northerly to Triple A Road, which is the north end of the proposed CR 595 project. This segment is primarily located on Trail 5 and has no wetland impacts. The crossing of the Yellow Dog River is the only stream crossing. This alternative segment is about 0.9 mile in length.

4.04.S. Alternative Segment 33. North Slope Routes

This segment begins at Mulligan Creek and then proceeds north to Trail 5 south of the Yellow Dog River and is 2.3 miles in length. Various alternatives for traversing the steep grades north of Mulligan Creek down to the Yellow Dog Plains were evaluated to determine the best horizontal and vertical alignment to avoid wetlands and provide a safe road alignment down this very steep grade.

Alternative Segment 33 Wetland Impacts

Wetland impacts for this 2.3-mile long alternative segment are approximately 3.54 acres. The efforts to avoid and minimize wetland impacts in this alternative segment resulted in over one acre of wetland impact reduction.

Alternative Segment 33 Stream Impacts

There are no stream crossings in this alternative segment but there are numerous runoff culverts proposed under the roadway to allow passage of seasonal runoff down the steep grade.

4.05 Evaluation of CR 595 Design Features Implemented to Avoid and Minimize Natural Resources Impacts

In addition to the extensive evaluation of the alternative route segments within/near the four-mile wide road study corridor presented in the preceding section, the design of the proposed CR 595 itself was carefully evaluated. The accepted design standards for a primary county road are either a 40-foot wide or 46-foot wide road section (with guardrail where appropriate and necessary) and 55 mile-per-hour (mph) design speed.

County primary road design standards are specified by American Association of State Highway and Transportation Officials (AASHTO). For example, a primary county road crown section without a guardrail as specified by AASHTO consists of two 12-foot wide paved lanes along with 8-foot wide shoulders with 3 feet paved and 5 feet gravel (40-foot total top width). Road embankment side slopes are specified as 1 on 3 grades or flatter. Crown sections with a guardrail have two 12-foot wide paved lanes along with 8-foot wide paved shoulders up to the guardrail, and 3 feet of gravel shoulder extending beyond the guardrail (46-foot total top width). Side slopes are 1 on 2 grades. These Typical AASHTO sections are provided in Appendix C. In addition, the design for a primary county road is typically performed to safely allow 55 mph speeds.

Given the need to avoid and minimize wetland impacts to the greatest extent practicable, MCRC decided that the design of CR 595 would have to be reduced to provide a 32-foot...
road section (as compared to the AASHTO standards) and design speed down to 35 mph where necessary. In addition to the horizontal alignment of the proposed road, the vertical alignment was carefully scrutinized by MCRC and CEC to minimize wetland impacts by reducing the depth of fill in key areas.

One redesign feature of the proposed road that resulted in some increase in wetland impacts is the passing lanes. Passing lanes are recommended in AASHTO standards to allow for the safe flow of traffic around trucks or other slow traffic climbing steep or long grades. On new primary county roads, MCRC requires passing lanes where appropriate; therefore such passing lanes are incorporated on road sections where necessary. In areas of steep or long grades, passing lanes are proposed for safety purposes even though such lanes occasionally result in wetland impacts. MCRC determined that the proposed CR 595 should have passing lanes where appropriate to minimize traffic safety concerns.

Locations where passing lanes are appropriate are determined from MDOT Michigan Road Design Manual, Volume 3, Section 3.09.05(C). The passing lane selection criteria are:

- Long, continuous grade where the length of the passing lane is a minimum of one mile in length;
- Directional spacing of passing lanes of approximately five miles;
- Locate in areas to avoid environmental impacts to the extent feasible;
- Vertical grades are present to enhance passing opportunities between slow and fast traffic.

The net result, when taking into account each of the factors discussed in this section, is that CR 595 will have less wetland impact than a typical, AASHTO-designed, 55 mph, roadway.


Safety is the number one design criteria for CR 595, as it is for all roadways. In general, the flatter and straighter a road, the safer it is. Design speed modifications have been made throughout the CR 595 roadway corridor to provide safe travel while minimizing environmental impacts. In designing CR 595, the project engineers analyzed the potential wetland impacts associated with the proposed route and exercised professional engineering judgment in specific areas which in certain instances results in slightly higher wetland impacts in order to provide for greater roadway safety. The location and design of this road has been ongoing for many years and many alternatives, large and small, have been considered. The goal of MCRC is to present a road design that offers an appropriate balance between safety and environmental protection in the CR 595 design methodology.

MCRC evaluated sections of the proposed project where the proposed CR 595 deviates from an existing road in order to demonstrate that the realignment either has less wetland impact or provides for a safer road design. MCRC also considered several possible alternative routes over certain stretches of the proposed CR 595 where wetland impacts were notable and further explanation/evaluation was necessary, even though there was not necessarily an existing roadway corridor to evaluate as an alternative.
Specific Design Issues

In this narrative, some of the “micro” road alignment adjustments that were considered for the purpose of avoiding or minimizing wetland and stream impacts within the CR 595 corridor are described.

Horizontal curve radius and the associated design speed are also shown on these drawings. The vertical curves have been designed to meet the horizontal design speed. Where possible and practical, roadway elevations have been designed to minimize wetland impacts. Side slopes in wetlands have been increased in most areas to a 1 on 2 slope (standard road side slopes are 1 on 3) to reduce the roadway footprint in wetlands. In accordance with MDOT and MCRC basic design standards, road side slope may not be steeper than 1 on 3 unless guardrail is provided.

Exceptions to the use of 1 on 2 side slopes are fill areas less than 5 feet in depth in wetlands less than 100 feet in length along the roadway. In areas where wetland impact is less than 100 feet along the roadway, side slopes are maintained at 1 on 3 so that short segments of guardrail can be avoided, due to safety concerns. Details of the road side slopes are provided on Sheet D in the plan and profile drawings.

In low-lying areas (typically wetlands), the height of a roadway needs to be raised substantially above existing grade in order to provide positive drainage needed to protect the structure of the roadbed from saturation. If the roadbed is not properly drained, the road will be subject to frost heaving; thereby severely compromising the road structure.

As an example, at Station 333+50 (Plan Sheet 8 – Trembath Lake Outlet, see below), a 30-inch culvert would need to be proposed for cross drainage, with approximately 3½ feet of cover to protect the culvert and to meet the vertical design speed, resulting in a 6-foot overall road height. At this specific location the existing Wolf Lake Road is 28 feet wide. The proposed CR 595 roadway would be 32 feet wide (two 12-foot wide paved lanes plus one foot paved shoulders and three-foot unpaved shoulders per the MCRC specification). This would result in a road footprint at the toe of slope of approximately 60 feet (32-foot wide roadbed plus 28 feet to accommodate the side slopes). In this stretch, wetlands run approximately 700 feet along the sides of the existing roadway. Over this length of roadway, the anticipated necessary construction would impact approximately 19,600 square feet (0.45 acres) of wetlands.

Table 4-2A. Plan Sheet 8 (Trembath Lake Outlet) - between Station 327+00 to 341+00

<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>55 mph</td>
<td>0.7 acres</td>
</tr>
<tr>
<td>Existing Road Alignment</td>
<td>&lt;30 mph design speed</td>
<td>0.4 acres</td>
</tr>
</tbody>
</table>

Constructing CR 595 along the existing Wolf Lake Road alignment in this area would impact 0.3 acres of wetland less than the proposed CR 595 alignment, but would result in three low-speed curves in a span of about 1,200 feet. One curve would be rated at 30 mph and two of them would be less than 30 mph. The northerly two curves would create an S-curve situation with a very short straight section between them. Creating sharp S-curves in which the road before and after is designed for at least 50 mph for a mile in each direction is a very unsafe condition. This alternative to the proposed CR 595 alignment was therefore not given further consideration by the applicant.
Table 4-2B. Plan Sheet 9 (North Wolf Lake Road) between Station 347+00 to 365+00

<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>55 mph</td>
<td>0.4 acres</td>
</tr>
<tr>
<td>Existing Road Alignment</td>
<td>&lt;30 mph</td>
<td>0.7 acres</td>
</tr>
</tbody>
</table>

In this stretch of roadway, the proposed CR 595 alignment impacts less wetland area than following the existing Wolf Lake Road. The proposed CR 595 road will provide a safer vertical alignment and will be widened for increased safety. The proposed CR 595 alignment impacts a relatively short distance of Wetland A58 compared to the length of the wetland crossing on the existing Wolf Lake Road. Following the existing Wolf Lake Road includes four horizontal curves, all of them having design speeds less than 30 mph in relatively close proximity to each other, which is considered an unsafe road design. If the existing Wolf Lake Road is widened and the horizontal curves realigned, much more wetland impact would result.

Table 4-2C. Plan Sheet 10 (North Wolf Lake Road) between Station 371+00 to 390+00

<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>45 mph</td>
<td>0.4 acres</td>
</tr>
<tr>
<td>Existing Road Alignment</td>
<td>&lt;30 mph</td>
<td>0.6 acres</td>
</tr>
</tbody>
</table>

The evaluation of this section of Wolf Lake Road shown on plan sheet 10 shows that the proposed CR 595 alignment impacts less wetlands than following the existing Wolf Lake Road. Constructing CR 595 following the existing Wolf Lake Road as the alignment would include six horizontal curves, all of them having design speeds of 30 mph or less and in relatively close proximity to each other. As in the Station 347 – Station 365 location described above, widening and realigning the curves on Wolf Lake Road would result in even more wetland impact.

The proposed CR 595 alignment minimizes wetland impacts, especially to Wetland A54, and creates a much safer road alignment.

Table 4-2D. Plan Sheet 22 (Voelkers Creek) between Station 1236+00 to 1265+00

<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>55 mph</td>
<td>0.8 acres</td>
</tr>
<tr>
<td>Reroute to the West</td>
<td>55 mph</td>
<td>0.9 acres</td>
</tr>
</tbody>
</table>

A reroute to the west of the proposed CR 595 alignment was investigated in this area in an attempt to minimize the impact to Wetland E14 at Station 1250+00 by crossing this wetland to the west at a narrow section of the wetland. There are not any substantial topographic features that would make a reroute in this area difficult. The curves for the proposed CR 595 and a potential reroute are both rated for 55 mph. However, the proposed reroute alignment in this area would result in a slight increase in overall wetland impacts even though impacts to Wetland E14 would be reduced.

Table 4-2E. Plan Sheet 24 (Trail 5 South) between Station 1293+00 to 1323+00

<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>40 mph</td>
<td>1.4 acres</td>
</tr>
<tr>
<td>Existing Trail 5</td>
<td>&lt;30 mph</td>
<td>0.8 acres</td>
</tr>
</tbody>
</table>
A reroute following the existing Trail 5 alignment in this area was investigated. Following the Trail 5 alignment would result in a reduction of 0.6 acres of wetland impact as compared to the proposed CR 595 alignment here, but would include six horizontal curves in a span of about 3,000 feet, each having a design speed of less than 35 mph. This location is adjacent to a long, steep hill. The proposed designed road grade of CR 595 at this location is already at the maximum grade of 8% to descend this hill. Having a curve rated at less than 30 mph design speed at the bottom of a hill that is over a mile long, with the last portion of it at maximum grade, is an extremely dangerous situation and was therefore not given further consideration by the applicant.

Table 4-2F. Plan Sheet 29 (Trail 5) between Station 1438+00 to 1465+00
<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595</td>
<td>55 mph</td>
<td>1.3 acres</td>
</tr>
<tr>
<td>Reroute to the West</td>
<td>&lt;30 mph</td>
<td>1.0 acres</td>
</tr>
</tbody>
</table>

A reroute to the west of the proposed CR 595 alignment was investigated in this area. It was hoped that by bypassing Wetland B40 and Wetland BBB1 to the west, it would reduce overall wetland impacts. The potential reroute in this area would result in the reduction of the total wetland impact; however there are safety issues that would make a reroute in this area undesirable. The proposed CR 595 alignment has a horizontal curve that is rated at 55 mph, but two vertical curves in this area are rated at 50 mph, including a crest vertical curve. Moving the alignment to the west where the top of the hill is higher would result in an unsafe hill crest condition. The reroute would also add three horizontal curves; two with design speeds of 40 mph and one with a design speed of less than 30 mph, significantly decreasing the safety of this section of road. Therefore this reroute was not given further consideration by the applicant.

Table 4-2G. Plan Sheet 34 (Trail 5 North) between Station 1600+00 to 1617+00
<table>
<thead>
<tr>
<th>Road Alignment</th>
<th>Design Speed</th>
<th>Wetland Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR 595 (800’ curve)</td>
<td>40 mph</td>
<td>0.5 acres</td>
</tr>
<tr>
<td>Reroute to the West (1200’ curve)</td>
<td>45 mph</td>
<td>0.6 acres</td>
</tr>
<tr>
<td>Reroute to the West (1600’ curve)</td>
<td>50 mph</td>
<td>0.7 acres</td>
</tr>
</tbody>
</table>

A reroute to the west of the proposed CR 595 alignment was investigated in this area. The horizontal curve as currently proposed for CR 595 is a radius of 800 feet (40 mph design speed). In evaluating reroute alternatives, the radius of this curve was increased to 1,200 feet and 1,600 feet in hopes of reducing the overall wetland impact. While wetland impact in each of the cases reduced the impact in Wetland M11, increasing the radius of this curve simultaneously increased the impacts of Wetland M9, Wetland M10, and Wetland M200; with the overall wetland impacts increased. Therefore this alternative was not given further consideration by the applicant.

4.05.B. Comparison of the Proposed CR 595 to the Previously Proposed Woodland Road

The proposed CR 595 route was evaluated with the intent of revising the road alignment and design to further reduce wetland impacts from the Woodland Road to the greatest practicable extent. Hundreds of revisions were made to the originally-proposed Woodland Road route.
as a result of that evaluation. The major proposed revisions to the CR 595 route as compared to that proposed in the 2009 permit application for Woodland Road include:

- The south end of the proposed route has been relocated to stay on Wolf Lake Road to a point south of Second River in order to avoid new crossings of Second River and Koops Creek and associated wetlands. This segment provides for the replacement of the existing Second River crossing (3 culverts) with a proposed 58 foot span bridge, which will be a needed improvement.

- A new segment (i.e. the “Wasie Cutoff”) is located westerly from Wolf Lake Road south of Second River, which allows the proposed road to avoid the residential area along Wolf Lake Road. This segment joins the originally-proposed Woodland Road route just north of the proposed crossing of the Middle Branch Escanaba River.

The route around Brocky Lake was revised from the eastern (aka “Porcupine”) route to a route located west of Brocky Lake. This change was made at the request of landowners in the Brocky Lake area that preferred the proposed road to be west of Brocky Lake so as to not impede recreation access, which is apparently mostly to the east of Brocky Lake.

- The north end of the proposed road between Mulligan Creek and the Yellow Dog River was redesigned to avoid and minimize wetland impacts.

- Overall design of the proposed road was changed to lower the grade of the road where possible in order to minimize the need for borrow pits as well as to minimize wetland and stream impacts.

- Other revisions to the proposed CR 595 for the purpose of avoiding and minimizing wetland impacts involved the following:
  - Lowering the grade of the road in rock cut sections, which reduced the amount of fill needed for the grade of the road in adjacent sections, but increased costs.
  - Increasing certain wetland fill slopes from 1 on 3 to 1 on 2 and proposing guardrail.
  - Designing sharper curves where possible without compromising road design safety standards; i.e. reduced road design speed.
  - Designing reroutes of the proposed road to avoid or minimize wetland impact, even if the reroute involved higher costs, e.g. rock blasting.

4.05.C. Comparison of CR 595 with Woodland Road - Design Considerations Summary

The following is a brief summary of the differences in the alignments of CR 595 and Woodland Road and the resulting wetland fill areas/amounts within the relevant corridor of each alignment. Overall, the CR 595 footprint coincides with all or a portion of the Woodland Road footprint for approximately 12.3 miles (approximately 65,000 lineal feet) and completely deviates from the Woodland Road project footprint for approximately 9.1 miles (approximately 48,000 lineal feet). Wetland impacts of approximately 27.3 acres were
proposed on Woodland Road. The current CR 595 plan would impact approximately 25.45 acres.

Both roads have been designed according to the standards of American Association of State Highway and Transportation Officials (AASHTO), the Michigan Department of Transportation (MDOT), and the Marquette County Road Commission (MCRC). According to those standards, safety is the number one design criteria, with criteria such as roadway radius, sight distance and stopping distance also being given consideration. Marquette County Road Commission desires to maintain a 55 mph design speed throughout the project; however, this is not possible in certain areas within the corridor due to steep grades, the presence of large rock formations, and bodies of water and wetlands. Where the existing topography dictates that a less than 55 mph design speed be used, it is intended that the posted speed along these portions will be also be the design speed. As a function of sound and accepted road engineering practices, long stretches of 55 mph design speeds interrupted by short lengths of a lesser design speed would create unsafe driving conditions due to frequent acceleration and deceleration situations; therefore those situations have been avoided as much as possible in the design of CR 595.

Vertical and horizontal alignment changes have been made on CR 595 (as compared to the original Woodland Road) in order to avoid/minimize wetland impacts while maintaining safe driving conditions. For example, guardrails have been added in selected wetland areas where it was feasible to allow for steeper side slopes in fill sections; these measures result in a smaller footprint and less wetland impact.

The following tables compare CR 595 wetland impacts to formerly proposed Woodland Road wetland impacts as well as provide an explanation of the design factors that were considered in each reference section:

Table 4-3A. US 41 to 4,000 feet north of Middle Branch Escanaba River (approximately 1.2 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 136+49 to 198+00)</td>
<td>1.3 acres</td>
<td>0 acres</td>
</tr>
<tr>
<td>CR 595 (Station 100+00 to 162+00)</td>
<td>1.3 acres</td>
<td></td>
</tr>
</tbody>
</table>

CR 595 generally follows the same alignment as Woodland Road in this section, with one exception. CR 595 follows the alignment of CR FY near wetland R4 just north of the substation. This results in a curve slower than 55 mph, but since it is near the intersection of US-41, speeds will be slower in this area due to braking for a stop sign for southbound vehicles with northbound vehicles not quite up to full speed out of the intersection. Woodland Road alignment has a larger radius and the result of this shift in alignment for CR 595 is a savings of 0.2 acre of wetland in R4. For the crossing of Middle Branch Escanaba River, guardrails added to CR 595 allow the road to have a smaller footprint with steeper side slopes in fill areas. Overall, the wetland impacts of the proposed Woodland Road and the proposed CR 595 in this section are the same (i.e. 1.3 acres).
Table 4-3B. 4,000 feet north of Middle Branch Escanaba River to the intersection of Wolf Lake Road and CR AAD (approximately 2.3 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 198+00 to 297+70, 314+15 to 328+00)</td>
<td>1.2 acres</td>
<td>-0.1 acres</td>
</tr>
<tr>
<td>CR 595 (Station 162+00 to 283+00)</td>
<td>1.1 acres</td>
<td></td>
</tr>
</tbody>
</table>

CR 595 diverges from the proposed route of Woodland Road at this southern point of this section. CR 595 veers to the east and connects with Wolf Lake Road north of the railroad grade and south of Second River. The alignment of CR 595 follows Wolf Lake Road until the intersection of CR AAD, where the alignment of Woodland Road meets up with Wolf Lake Road. The CR 595 alignment avoids a new crossing of Second River and a crossing of Koops Creek as was proposed in the Woodland Road project. The CR 595 routing allows the opportunity to improve on the poor existing conditions of the Wolf Lake Road crossing of the Second River with a new 58 foot span bridge, as compared to the existing road crossing which consists of one 66 inch diameter culvert and two 36 inch diameter culverts, all in rather poor condition. Although the alignments between CR 595 and Woodland Road and completely different in this section, due to the elimination of a new Second River crossing and complete elimination of the Koops Creek crossing and their associated floodplains/wetlands, CR 595 would result in approximately 0.1 acres less wetland impact.

Table 4-3C. Intersection of Wolf Lake Road and CR AAD to the intersection of Wolf Lake Road and Kipple Creek Trail (approximately 2.2 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 328+00 to 445+00)</td>
<td>3.4 acres</td>
<td>-0.4 acres</td>
</tr>
<tr>
<td>CR 595 (Station 283+00 to 402+12)</td>
<td>3.0 acres</td>
<td></td>
</tr>
</tbody>
</table>

CR 595 generally follows the Woodland Road alignment for the most part during this stretch. There are a few areas where the CR 595 alignment has been moved to the east or west to minimize the impacts to wetlands along the route. An example of this is on the north end of wetland A61. The Woodland Road alignment increased the radius on the east side of Wolf Lake Road, resulting in 1.2 acres of wetland disturbance. CR 595’s alignment was shifted slightly to the west without compromising the safety of the curves in this location. CR 595 has a wetland disturbance of 0.3 acres in this area. In addition, the shift in alignment allowed a more perpendicular crossing of Trembath Creek Outlet.

Table 4-3D. Intersection of Wolf Lake Road and Kipple Creek Trail to the intersection of Wolf Lake Road and Trail 5 (approximately 3.6 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 445+00 to 699+50)</td>
<td>3.8 acres</td>
<td></td>
</tr>
<tr>
<td>CR 595 (Station 402+12/3000+00 Station Break to 3191+57)</td>
<td>4.1 acres</td>
<td>+0.3 acres</td>
</tr>
</tbody>
</table>

This section is a new alignment from both the original Woodland Road and from that shown on the August 15, 2001 Draft AA/PA. This route runs west of Brocky Lake to avoid residences, and represents a change made based on public input received by MCRC.
Table 4-3E. Intersection of Wolf Lake Road and Trail 5 to Dead River Crossing (approximately 4.3 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 699+50 to 760+60, 763+00 to 924+00)</td>
<td>5.5 acres</td>
<td>-1.1 acres</td>
</tr>
<tr>
<td>CR 595 (Station 3191+57/1090+00 Station Break to 1352+00)</td>
<td>4.4 acres</td>
<td></td>
</tr>
</tbody>
</table>

The alignments for CR 595 and Woodland Road for this segment generally follow Trail 5 to avoid large wetland complexes. One location where the alignments are different is near Wetland E21. The proposed CR 595 alignment was shifted approximately 350 feet to the west of the Woodland Road alignment. This shift avoided Wetland E21 completely and reduced the overall wetland impact by 0.6 acres. One other notable CR 595 shift compared to the Woodland Road alignment was near Wetland AA8. The Woodland Road alignment has an 800 foot radius curve that impacts a sizable portion of Wetland AA8 (0.8 acres). By changing this curve to a 600-foot radius and moving the alignment to the east, Wetland AA8 was avoided.

Table 4-3F. Dead River Crossing to Mulligan Creek Crossing (approximately 4.0 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 924+00 to 1007+51, 1008+50 to 1116+47, 1119+50 to 1141+00)</td>
<td>5.9 acres</td>
<td>+1.5 acres</td>
</tr>
<tr>
<td>CR 595 (Station 1352+00 to 1563+00)</td>
<td>6.4 acres</td>
<td></td>
</tr>
</tbody>
</table>

The alignments for CR 595 and Woodland Road for this segment generally follow Trail 5 to avoid large wetland complexes. Some minor deviations from the Woodland Road alignment were explored where possible. Due to the presence of rock formations, extreme grade changes, bodies of water, and wetlands; drastic changes between the proposed CR 595 alignment and the Woodland Road alignment are not feasible. It should be noted that recent reexamination of wetlands throughout this section (A13, A15, BBB1, B37B, B34A, B34B, B31A, B6, B5, and B3) either expanded or delineated new wetlands that did not exist during the time of the Woodland Road design. This resulted in a 0.2 acre increase in impact. Please note that had these newly delineated areas been included in the original Woodland Road impact quantities, the overall impacts in this section would be virtually the same.

Table 4-3G. Mulligan Creek Crossing to Triple A Road (approximately 3.8 miles).

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road (Station 1141+00 to 1335+00)</td>
<td>6.2 acres</td>
<td>-1.1 acres</td>
</tr>
<tr>
<td>CR 595 (Station 1563+00 to 1762+00)</td>
<td>5.1 acres</td>
<td></td>
</tr>
</tbody>
</table>

The alignment for CR 595 generally follows the Woodland Road alignment from Mulligan Creek to the bottom of the large hill on the south side of the Yellow Dog Plains. From the bottom of this hill to the Yellow Dog River, the alignment for CR 595 is very different than Woodland Road. Numerous alignments and profile designs were attempted to reduce the wetland impact for Wetland L2 to the extent practicable.
Table 4-3H. Summary of Woodland Road/CR 595 Wetland Impacts

<table>
<thead>
<tr>
<th>Route</th>
<th>*Wetland Impact</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woodland Road</td>
<td>27.3 acres</td>
<td>-1.8 acres</td>
</tr>
<tr>
<td>CR 595</td>
<td>25.5 acres</td>
<td></td>
</tr>
</tbody>
</table>

* Rounded to the nearest 0.1 acre

4.06 Comparison of Alternative Segments Evaluated for the Proposed CR 595

The comparison of the 20 alternative segments evaluated for the proposed CR 595 project is provided in Table 4-4. The proposed CR 595 route was determined based upon the assessment of the alternative segments within the four-mile wide road study corridor, but also included the Mulligan Plains East-Red Road-Sleepy Hollow segment and the Mulligan Plains West-Red Road-Sleepy Hollow Road segment that are actually partly outside of the four-mile wide corridor.
**Table 4-4. Comparison of Wetland Impacts for the Proposed CR 595 Alternative Segments**  
(Segments selected for the CR 595 route are shaded).

<table>
<thead>
<tr>
<th>Alternative Number</th>
<th>Alternative Name</th>
<th>Wetland Impacts (Acres)</th>
<th>Reason(s) to Select or Reject Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CR FY</td>
<td>1.37</td>
<td>Selected as the start of the proposed CR 595 on the south due to intersection location and low wetland impact.</td>
</tr>
<tr>
<td>2</td>
<td>Wasie Cutoff to CR AAD</td>
<td>1.35</td>
<td>Rejected due to two new stream crossings (Second River and Koops Creek); has similar wetland impact as the Wasie Cutoff and Wolf Lake Road alternative segments.</td>
</tr>
<tr>
<td>3</td>
<td>Wasie Cutoff to Wolf Lake Road</td>
<td>0.13</td>
<td>Selected due to no wetland impact and no streams.</td>
</tr>
<tr>
<td>4</td>
<td>Wolf Lake Road South</td>
<td>1.55</td>
<td>Rejected due to the higher wetland impact than the combination of the CR FY and Wasie Cutoff segment combined (1.0 acre). Also would impact 12 residences on the existing road and would have a less-desirable intersection location on US-41.</td>
</tr>
<tr>
<td>5</td>
<td>Wolf Lake Road</td>
<td>3.90</td>
<td>Selected as the segment (combined with the Wasie Cutoff) with less wetland impact for this segment than Alternative 2 but no new stream crossings. The existing Second River crossing will be improved.</td>
</tr>
<tr>
<td>6</td>
<td>Wolf Lake Road North</td>
<td>6.40</td>
<td>Not selected as the segment from the AAD intersection with Wolf Lake Road to Sleepy Hollow Road around Brocky Lake. The Kipple Creek reroute was selected by MCRC as the preferred route alignment in this area of the project. This segment has 0.60 acres less wetland impact than the Kipple Creek segment and only one new stream crossing compared to four for the Kipple Creek segment. Landowners in the Brocky Lake area preferred the Kipple Creek route.</td>
</tr>
<tr>
<td>7</td>
<td>Wolf Lake Road/Trail 5</td>
<td>15.47*</td>
<td>Selected as the best segment from the north end of the Kipple Creek reroute and north to Triple A Road. Topography is the primary design location challenge in this segment combined with avoiding/minimizing wetland impacts. (This segment also includes Alternative 33 below)</td>
</tr>
<tr>
<td>9</td>
<td>Kipple Creek Reroute</td>
<td>4.58</td>
<td>Selected as the segment to bypass Brocky Lake to the west. Wetland impact is only 0.60 acre higher and has four new stream crossings compared to one new crossing on Segment 6 east of Brocky Lake. Overall natural resources impacts are expected to be minimized with the Kipple Creek reroute; construction of a 60-foot span bridge over the Porcupine wetland on the east route around Brocky Lake is avoided.</td>
</tr>
<tr>
<td>10</td>
<td>Brocky Lake East Bypass</td>
<td>4.30</td>
<td>Rejected as the segment to bypass Brocky Lake to the east due to substantial horizontal and vertical alignments of the segment, added length of road.</td>
</tr>
<tr>
<td>11</td>
<td>Brocky Lake Road</td>
<td>NA</td>
<td>Rejected as not available due to the road being private past the Brocky Lake camps.</td>
</tr>
<tr>
<td>12</td>
<td>Mulligan Plains East</td>
<td>25.20</td>
<td>Rejected due to the presence of a conservation easement on property generally west of Pinnacle Falls; the segment east (downstream) of Pinnacle Falls is a very deep gorge that is not feasible or prudent to cross with the roadway.</td>
</tr>
<tr>
<td>12A</td>
<td>Mulligan Plains West</td>
<td>NA</td>
<td>At the time of the filing of the application for permit to the MDEQ, Segment 12A was being evaluated. One item to be resolved is the presence of a conservation easement that would have to be revised to allow the construction of the road. The potential road location is more than two miles upstream of Pinnacle Falls where the vertical alignment for crossing of the Yellow Dog River would be feasible.</td>
</tr>
<tr>
<td>13</td>
<td>Red Road-Dead River</td>
<td>0.02</td>
<td>Rejected due to the lack of feasibility of the Mulligan Plains segment and the Red Road-CR 510-Triple A Road segment being not meeting the project purpose for a new primary county road.</td>
</tr>
<tr>
<td>14</td>
<td>Sleepy Hollow</td>
<td>0.60</td>
<td>Rejected due to the segment being part of the Red Road alternative segment to Mulligan Plains and that segment is not feasible or prudent.</td>
</tr>
</tbody>
</table>
### Table 4-4 (continued). Comparison of Wetland Impacts for the Proposed CR 595 Alternative Segments (Segments selected for the CR 595 route are shaded).

<table>
<thead>
<tr>
<th>Alternative Number</th>
<th>Alternative Name</th>
<th>Wetland Impacts (Acres)</th>
<th>Reason(s) to Select or Reject Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Clowry-Dyno Nobel</td>
<td>4.40</td>
<td>Rejected due to higher wetland impacts, the need to construct a new crossing of Koops Creek to implement this segment, and the additional length of road as compared to the selected segment of the CR FY, Wasie Cutoff and Wolf Lake Road alternative segments.</td>
</tr>
<tr>
<td>29</td>
<td>Grapevine Road East Bypass</td>
<td>NA</td>
<td>Rejected due to new crossings of Connors Creek and significant horizontal and vertical grade issues with the Grapevine Road alternative, of which this alternative segment would be a part.</td>
</tr>
<tr>
<td>30</td>
<td>Grapevine Road</td>
<td>NA</td>
<td>Rejected due to significant horizontal and vertical grade issues and the fact that this segment would add 1.6 miles to the road segment.</td>
</tr>
<tr>
<td>31</td>
<td>West Yellow Dog River Crossing</td>
<td>3.50</td>
<td>Rejected due to the increase in wetland impacts compared to the proposed segment (which only has a wetland impact of 0.6 acre to cross the Yellow Dog River and associated wetlands combined with Alternative 32 below) and this alternative crosses the Yellow Dog River in a new location 400 feet upstream of the existing bridge.</td>
</tr>
<tr>
<td>32</td>
<td>Existing Yellow Dog River Crossing-West/North Segment</td>
<td>0</td>
<td>Selected as the segment from the Yellow Dog River to Triple A Road due to no wetland impact or stream crossings.</td>
</tr>
<tr>
<td>33</td>
<td>North Slope Segments</td>
<td>3.54*</td>
<td>Selected as a part of the Alternative 7 segment; wetland impacts were avoided and minimized by selecting the alternative segments down the steep slopes from the Mulligan Creek to the base of the hill south of the Yellow Dog Plains. Note that these wetland impacts are included in the 15.59 acres of wetland impacts listed for Alternative 7.</td>
</tr>
<tr>
<td></td>
<td>Total Wetland Impacts for CR 595 Segments</td>
<td>25.45</td>
<td>This wetland impact total does not include the Trail 5 relocation impacts or the East Branch Salmon Trout River stream mitigation project wetland impacts. The total wetland impact with these impacts included is 25.81 acres.</td>
</tr>
</tbody>
</table>

*Segment 33 impacts are included in Segment 7 impacts.

#### 4.07 Summary of Routes Evaluated

In addition to the 20 alternative segments evaluated or considered for the proposed CR 595 route, the CR 550, CR 510, CR 510-Red Road-Sleepy Hollow, and Dishno routes were evaluated, even though the first three routes are considered by MCRC as “no-build” routes (Table 4-5). Although the Dishno route is not considered a “no-build” route, the natural resources impacts make this route undesirable compared to CR 595.
**Table 4-5. Routes Evaluated or Considered for the Proposed CR 595 Project.**

<table>
<thead>
<tr>
<th>Route Name</th>
<th>Approximate Length of the Route (miles)</th>
<th>Wetland Impacts (acres)</th>
<th>Stream Crossings</th>
<th>Does the Route Meet the Project Purpose?</th>
<th>Primary Reasons the Route Was/Was Not Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed CR 595</td>
<td>21.4</td>
<td>25.81</td>
<td>22</td>
<td>Yes</td>
<td>Proposed in 2011 Application for Permit including the Trail 5 relocation impacts and the East Branch Salmon Trout River stream mitigation</td>
</tr>
<tr>
<td>CR 550</td>
<td>60</td>
<td>1</td>
<td>4</td>
<td>No</td>
<td>Longest route; does not meet the purpose and need for the proposed CR 595; therefore is a “no-build” alternative.</td>
</tr>
<tr>
<td>CR 510</td>
<td>51</td>
<td>29^2</td>
<td>56</td>
<td>No</td>
<td>Highest level of emissions; wetland and stream impacts are high. Length of route is not prudent; does not meet the purpose and need for the proposed CR 595.</td>
</tr>
<tr>
<td>Dishno</td>
<td>28</td>
<td>47</td>
<td>29</td>
<td>Yes</td>
<td>High wetland impacts: estimates of wetland impacts are using NWI and about 10 acres of additional wetland impacts are expected if delineation is done. Lineal feet of stream relocation and other stream impacts are high. DEQ and EPA agreed this alternative should not be further evaluated.</td>
</tr>
<tr>
<td>Mulligan Plains East-Red Road-Sleepy Hollow</td>
<td>26.4</td>
<td>25</td>
<td>12</td>
<td>Yes</td>
<td>Environmental sensitivity and very high construction costs for crossing the Yellow Dog River valley downstream of Pinnacle Falls.</td>
</tr>
<tr>
<td>Mulligan Plains West-Red Road-Sleepy Hollow</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Yes</td>
<td>The Mulligan Plains West route has been determined to be feasible but is not prudent, as explained in section 4.04.K.</td>
</tr>
<tr>
<td>CR 510-Red Road-Callahan Road-US-41</td>
<td>44</td>
<td>Not determined.</td>
<td>Not determined.</td>
<td>No</td>
<td>Would directly or indirectly impact many private properties, is likely to have more wetland impact than the proposed alternative based on the wetlands in the corridor evaluated with GIS, and is therefore not feasible or prudent. DEQ and EPA agreed this alternative should not be further evaluated (verified by letter dated 11/18/10).</td>
</tr>
<tr>
<td>CR 510-Red Road-Gold Mine Lake Road-US-41</td>
<td>42.5</td>
<td>Not determined.</td>
<td>Not determined.</td>
<td>No</td>
<td>Would directly or indirectly impact many private properties, is likely to have more wetland impact than the proposed alternative based on the wetlands in the corridor evaluated with GIS, and is therefore not feasible or prudent. DEQ and EPA agreed this alternative should not be further evaluated (verified by letter dated 11/18/10).</td>
</tr>
<tr>
<td>CR 510-Red Road-Sleepy Hollow-Wolf Lake Road-US-41</td>
<td>41.3</td>
<td>13.04</td>
<td>35</td>
<td>No</td>
<td>Wetland delineation and preliminary design plans were prepared to accurately compare this alternative to the proposed CR 595. The 19.9 miles of additional length make this alternative not feasible or prudent due to excessive capital and maintenance costs.</td>
</tr>
</tbody>
</table>

1 Denotes the number of existing stream crossings that must be replaced if the CR 550 route is implemented, not including the three East Branch Salmon Trout River crossings on Triple A Road.

2 Wetland impacts were estimated in the 2009 application for the CR 510 alternative using NWI data.