



October 30, 2019

To: David Navecky
Office of Environmental Analysis
Surface Transportation Board
395 E Street SW
Washington, D.C. 20423-0012

From: Brian Lindamood, Alaska Railroad Corporation

Subject: Port MacKenzie Rail Extension (STB Docket No. FD 35095)
Quarterly Report July 2019 through September 2019.

This quarterly progress report is submitted in accordance with Mitigation Measure #98 of the November 21, 2011 Surface Transportation Board (STB) final decision (Docket No. FD 35095) authorizing the Alaska Railroad Corporation (ARRC) to construct and operate approximately 35 miles of new rail line connecting Port MacKenzie to ARRC's existing main line near Houston, Alaska. This is the first quarterly report for 2019, covering the period from July 2019 through April 2019.

PROJECT PROGRESS

Key activities/milestones conducted during the reporting period are summarized below.

General

- Maintained and updated a project website with current information: <http://www.portmacrail.com/> (**Mitigation Measure No. 72**)
- A Construction Status exhibit (dated March 2019) is attached that shows the current status of each segment (Attachment 1).
- Embankment construction is completed for Segments 1, 3, 4, 5 and 6. Track and signal construction is complete for Segment 6. The scheduled completion for Segment 2 will be determined once additional funding is secured.
- All necessary project right-of-way has been secured.
- The project continues to be funded by existing state capital fund appropriations. No new state funds have been allocated.
- The Diagnostic Team has completed the Diagnostic Team Report (MM #60). A signed copy is included with this report.

Cultural Resources

- There are no key activities or milestones to report at this time.

Permitting (See attached permit list)

- There are no key activities or milestones to report at this time. The project is in full compliance with the terms and conditions of all permits issued to date

Planned activities – Next Reporting Period

- Bi-annual inspections of drainage features (e.g. bridges, culverts, ditches and swales) and side slopes was completed in October, 2019. There were no issues identified that require correction at this time.

DISCUSSION

- The PMRE project requires additional construction funding to advance Segments 2, 7, and 8.

SCHEDULE

- Segment 1: This 4.7-mile segment begins at the embankment of the Bi-Modal Bulk Facility and related port facility and proceeds northwest, crossing under the Chugach Power transmission lines (where the ARRC right-of-way will begin) to a quarter mile south of Baker Farm Road, where it turns and heads directly north. It stops shortly after crossing the Baker Farm Creek 3-span bridge at MP (Milepost) K5.48.
 - Embankment construction is complete.
- Segment 3: This 7.7-mile segment begins southeast of the intersection of Ayrshire Avenue and Guernsey Road. This segment crosses Ayrshire Avenue and continues northwest around the northeast end of My Lake, then curves back northeast, crossing the 5-span bridge at the outflow of Diamond Lake and the historic Iditarod Trail 3-span bridge. It intersects the Iditarod Race Trail 3-span bridge at MP K17.95, loop northwest and then northeast before heading straight north across the Susitna Parkway at grade crossing, ending near Papoose Twins Road.
 - Embankment construction is complete.
- Segment 4: This 7.4-mile segment begins at Papoose-Twins Road and continues northeasterly, ending northeast of Little Horseshoe Lake.
 - Embankment construction is complete.
- Segment 5: This 4.5 mile segment connects segments 4 and 6 between little Horseshoe Lake and Millers Reach Road. Embankment construction is complete.
- Segment 6: This segment begins at Miller's Reach Road and ties into the ARRC Mainline near Houston without crossing the Parks Highway. This connection will facilitate the movement of trains both northbound and southbound in a Y configuration. Proposed work involves construction of approximately 1 mile of new track, installation of a new bridge over the Little Susitna River, a fish passage culvert extension at Teddy Creek, and several drainage structures within the existing right-of-way.
 - Embankment construction is complete.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
1: The Applicant shall design project-related rail line and associated facilities in accordance with engineering criteria related to permafrost, seismic events, and other geologic hazards to comply with applicable design codes. For example, the Applicant shall design the project in accordance with the latest applicable seismic codes taking into account the region's potential for earthquake activity to mitigate potential damage to bridges and tracks. (V)	Review design criteria	Before construction	No permafrost has been found in the project area. Project has been designed to meet applicable standards and recommended practice of various organizations were applicable, to include: AREMA, AASHTO, AKDOT&PF, FEMA, and the Alaska Railroad
2: The Applicant shall be subject to Alaska Department of Environmental Conservation (ADEC) jurisdiction under the Alaska Pollutant Discharge Elimination System (APDES) for storm water discharges resulting from project-related construction activities. Requirements that are commonly part of a Stormwater Pollution Prevention Plan associated with a APDES Stormwater Construction Permit include the following: • Ground disturbance shall be limited to only the areas necessary for project-related construction activities. • During earthmoving activities, topsoil shall be reused wherever practicable and stockpiled for later application during reclamation of disturbed areas. • Appropriate erosion control measures shall be employed to minimize the potential for erosion of soil stockpiles until they are removed and the area is restored. • Disturbed areas shall be restored as soon as practicable after construction ends along a particular stretch of rail line, and the goal of restoration shall be the rapid and permanent reestablishment of native ground cover on disturbed areas to prevent soil erosion. • The bottom and sides of drainage ditches shall be revegetated using natural recruitment from the native seed sources in the stockpiled topsoil or a seed mix free of invasive plant species. • If weather or season precludes the prompt reestablishment of vegetation, temporary erosion control measures shall be implemented. (V)	SWPPP approval by ADEC	Before construction	Each contractor awarded work is responsible for preparing a SWPPP and submitting it to ADEC. To date, Bristol Environmental Remediation (Segment 1 and 4), Quality Asphalt Paving (Segment 3 and 5), and Granite Construction (Segment 6) have submitted SWPPP's to ADEC, along with a notice of intent for coverage under the ACGP. Segment 1, 3, 4, 5, and 6 construction is complete and the SWPPP for Segments 1, 3, 4, 5 & 6 have been terminated with ADEC. The clearing work on Segment 2 did not require an SWPPP.
3: The Applicant shall obtain Federal permits required by section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act from the U.S. Army Corps of Engineers (USACE) prior to initiation of project-related construction activities in wetlands and waterbodies. The Applicant also agrees to obtain necessary state permits and authorizations (e.g., Alaska Department of Fish and Game (ADF&G) Fish Habitat Permit, Alaska Department of Natural Resources (ADNR) Land Use Permit, and an Alaska Department of Environmental Conservation section 401 water quality certification). The Applicant shall incorporate stipulations into construction contract specifications. (V)	Permits issued; stipulations added to contract specifications	Before construction	A permit status list is attached to this report.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
4: The Applicant shall avoid and minimize impacts to waters of the U.S., including wetlands, to the extent practicable. The Applicant shall provide compensatory mitigation for unavoidable impacts to wetlands as part of the USACE section 404 permit, to the extent practicable in accordance with the reasonable requirements of the Clean Water Act. (V)	Section 404 Permit is issued	Before construction	A Section 404 permit application (POA-2007-1586) was issued for the project on September 10, 2012; subsequent modifications to that permit have been issued (POA-2007-1586-M1, M2, M3, M4, and M5). A copy of the permit is available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
5: The Applicant shall design and construct the proposed rail line in such a way as to maintain natural water flow and drainage patterns to the extent practicable. This shall include installing bridges or placing equalization culverts through the embankment as necessary, preventing impoundment of water or excessive drainage, and maintaining the connectivity of floodplains and wetlands. (V)	Review design criteria and Section 404 permit	Before construction	Condition conforms to project design standards and permit requirements. Specifically, as mandated in Special Condition No. 3 of the PMRE Section 404 Permit (POA-2007-1586): <i>Natural wetland drainage and inundation patterns shall be maintained through the incorporation of adequately sized (diameter and length), sloped and spaced culverts and/or bridges. The ARRC shall be responsible for annual monitoring, maintenance, and/or repair, and/or replacement of all culverts and bridges for the life of the project to insure that natural wetland drainages and inundation patterns are maintained. The presence of upslope ponding, erosion, flooding scour, obstruction to aquatic organisms, as a result of failing or poorly installed culverts, shall be evidence of non-compliance with this condition. ARRC shall immediately notify the Corps of any non-compliance with this special condition. Obstruction caused by beaver dams or debris, and their removal does not require notification to the Corps. The notification shall include for Corps review and approval ARRC plans for restoration of the natural drainage.</i>
6: The Applicant shall disturb the smallest area practicable around any streams and, as soon as practicable following project-related construction activities, revegetate disturbed areas using native vegetation.	Review design criteria and Section 404 permit	Before, during, and after construction	Condition conforms to project design standards and permit requirements. Specifically, as mandated in Special Condition No. 5 of the PMRE Section 404 Permit (POA-2007-1586): <i>All riparian areas disturbed during construction, must be restored to pre-project conditions as soon as possible. If construction is not complete prior to the end the same growing season, all disturbed riparian areas shall be stabilized appropriately and effectively, such as with jute matting, to satisfactorily withstand erosion from heavy rain during the fall and the next year's spring breakup. Site shall be restored to pre-project conditions during the growing season following construction (year immediately following disturbance). Revegetation shall be considered successful when percent live cover of native wetland vegetation is similar to adjacent wetlands. Evidence of erosion and sloughing from disturbed areas will be considered non-compliance with this condition.</i>
7: The Applicant shall minimize the number of temporary stream crossings constructed to provide access for contractors, work crews, and heavy equipment to the extent practicable. Where needed, temporary structures shall be placed to avoid overly constricting active channels and shall be removed as soon as practicable after the crossing is no longer needed. (V)	Review design criteria, Section 404, and Title 16 permits	Before and during construction	Condition conforms to project design standards and permit requirements.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
8: The Applicant shall coordinate with the Matanuska-Susitna Borough (MSB) Floodplain Administrator to ensure that new project-related stream and floodplain crossings are appropriately designed. For crossings within the mapped 100-year floodplain, drainage crossing structures shall be designed to pass a 100-year flood. (V)	Permit Issued	Before construction	A MSB Floodplain Development Certificate of Completion has been issued by MSB. Construction of the Little Susitna Bridge is complete. A copy of the permit is available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
9: The Applicant shall evaluate project-related construction water needs in relation to stream flow rates and groundwater recharge rates, as appropriate, and shall minimize effects on surface water and groundwater. Water withdrawals shall be subject to prior written approval by the ADNDR Division of Mining, Land and Water, and also from the ADF&G Division of Habitat for withdrawals from fish-bearing waters. (V)	Permit Issued	Before construction	Temporary Water Use Permits have been authorized for the project. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
10: For all project-related crossings of fish-bearing waters that incorporate bridges or culverts, the Applicant shall design, construct, and maintain the conveyance structures in accordance with the National Marine Fisheries Service (NMFS) 2008 publication, “Anadromous Salmonid Passage Facility Design” (National Marine Fisheries Service. 2008. Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon) or equivalent and reasonable requirements. (V)	Review design criteria and Title 16 permits	Before construction	All ADF&G Title 16 Fish Habitat permits have been acquired and are in accordance with this measure. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits.
11: The Applicant shall time project-related construction in anadromous streams to minimize adverse effects to salmon during critical life stages when practicable. The Applicant shall incorporate timing windows (i.e., those time periods when salmon are least vulnerable to disturbances) as specified by the ADF&G Division of Habitat, into construction contract specifications for in-stream work. The Applicant shall design and construct stream crossings so as not to impede fish passage or impair the hydrologic functioning of the water body. (V)	Review design criteria and Title 16 permits	Before construction	All ADF&G Title 16 Fish Habitat permits have been acquired. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits.
12: When project-related activities, such as culvert and bridge construction, require work in stream beds, the Applicant shall conduct activities, to the extent practicable, during either summer or winter low-flow conditions. (V)	Review Title 16 permits	During construction	All ADF&G Title 16 Fish Habitat permits have been acquired and are in accordance with this measure. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
13: The Applicant shall design, construct, and operate the rail line and associated facilities, including bridge abutments, to maintain existing water patterns and flow conditions and provide long-term hydrologic stability by conforming to natural stream gradients and stream channel alignment and avoiding altered subsurface flow to the extent practicable. Project-related supporting structures (e.g., bridge piers) shall be designed to minimize scour and increased flow velocity, to the extent practicable.	Review design criteria	Before construction	Condition conforms to project design standards and permit requirements. Specifically, as mandated in Special Condition No. 3 of the PMRE Section 404 Permit (POA-2007-1586): <i>Natural wetland drainage and inundation patterns shall be maintained through the incorporation of adequately sized (diameter and length), sloped and spaced culverts and/or bridges. The ARRC shall be responsible for annual monitoring, maintenance, and/or repair, and/or replacement of all culverts and bridges for the life of the project to insure that natural wetland drainages and inundation patterns are maintained. The presence of upslope ponding, erosion, flooding scour, obstruction to aquatic organisms, as a result of failing or poorly installed culverts, shall be evidence of non-compliance with this condition. ARRC shall immediately notify the Corps of any non-compliance with this special condition. Obstruction caused by beaver dams or debris, and their removal does not require notification to the Corps. The notification shall include for Corps review and approval ARRC plans for restoration of the natural drainage.</i>
14: Prior to project-related construction, the Applicant shall complete jurisdictional delineations of wetlands and other surface waters that are subject to section 404 of the Clean Water Act for all associated facilities proposed outside of the right-of-way.	Review 2010 Wetland Report	Before construction	Permit-level wetland and waterbody delineations are complete and have been submitted to the USACE. This 2010 delineation served as the basis for the Section 404 permit (POA-2007-1586), issued for the project on September 10, 2012. A wetland delineation reevaluation for Segment 2 was completed in August 2015 and confirmed by USACE in December 2015 (see attached USACE Permit Modification 5).

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
15: The Applicant shall implement all reasonable best management practices imposed by the USACE under section 404 of the Clean Water Act to minimize project-related impacts to waters of the U.S., including wetlands. Standard best management practices are specified in the USACE Alaska District's Nationwide Permits General Best Management Practice Guide (U.S. Army Corps of Engineers, 2007. "Nationwide Permits: General Best Management Practice." Alaska District, Regulatory Program. Online at: http://www.poa.usace.army.mil/reg/NWPs.htm) and could include the following: • Containing sediment and turbidity at the work site by installing diversion or containment structures. • Disposing of dredge spoils or unusable excavated material not used as backfill at upland disposal sites in a manner that minimizes impacts to wetlands. • Revegetating wetlands as soon as possible, preferably in the same growing season, by systematically removing vegetation, storing it in a manner to retain viability, and replacing it after construction to restore the site. • Using fill materials that is free from fine material. • Stockpiling topsoil and organic surface material, such as root mats, separately from overburden and returning it to the surface of the restored site. • Dispersing the load of heavy equipment such that the bearing strength of the soil (the maximum load the soil can sustain) would not be exceeded. Suitable methods could include, but are not limited to, working in frozen or dry ground conditions, employing mats when working in wetlands or mudflats, and using tracked rather than wheeled vehicles. • Using techniques such as brush layering, brush mattresses, live siltation (a revegetation technique used to trap sediment), jute matting, and coir logs to stabilize soil and reestablish native vegetation	Permit Issued	Before, during, and after construction	A Section 404 permit (POA-2007-1586) was issued for the project on September 10, 2012. The permit complies with this measure. A copy of the permit is available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
16: Prior to initiating project-related construction activities, the Applicant shall mark all stream channels and existing culvert locations in the project construction area before snowfall obscures their location to avoid damage to these areas.	Review design criteria, Section 404, and Title 16 permits	Before and during construction	This measure has been completed for Segments 1, 3, 4, 5 and 6.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
17: During project-related design, the Applicant shall align road and track crossings of waterbodies perpendicular or near perpendicular to water bodies, where practicable, to minimize crossing length and potential bank disturbance.	Review design criteria, Section 404, and Title 16 permits	Before construction	Condition conforms to project design
18: During project-related construction, the Applicant shall remove all project-related construction debris (including construction materials, soil, or woody debris) from water bodies, including wetlands, as soon as practicable during the open-water period, or prior to break-up for debris on top of or within ice or snow crossings.	Review contract specifications	Before, during, and after construction	Condition conforms to contract stipulations and permit requirements
19: The Applicant shall construct project-related water crossings in a manner that minimizes disturbances to stream beds, stream banks, and flow. Measures to meet these goals could include installing bridge piers during the winter, and initially constructing permanent project-related crossing structures, when practicable, to avoid the need to construct both temporary and permanent crossing structures.	Review design criteria, Section 404, and Title 16 permits	Before and during construction	Condition conforms to project design
20: During project-related construction, the Applicant shall perform all off-road travel and clearing in a manner that maintains existing surface and subsurface hydrology and water quality, to the extent practicable. Project-related off-road construction activities beyond the 200-foot right-of-way shall be approved by the land owner. Project-related wintertime off-road travel beyond the right-of-way shall be limited to areas where snow and ice depth are sufficient to protect the ground surface and vegetation. Summertime off-road travel beyond the right-of-way shall occur only if it can be accomplished without damaging vegetation or the ground surface, including stream banks that may be crossed.	Review design criteria, ADNR overland land use permit, Section 404, and Title 16 permits	Before and during construction	Condition conforms to stipulations under the ADNR overland land use permit, Section 404 permit and ADF&G Title 16 Fish Habitat permits. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
21: The Applicant shall design, construct, and use winter roads in performing project-related construction so as to avoid degradation of water quality and to protect the road bed from significant rutting, ground disturbance, or thermal erosion of permafrost areas.	None at this time	Before and during construction	The measure has been adhered to during project development.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
22: The Applicant shall not mine gravel required for project-related construction within the limits of ordinary high water of water bodies unless otherwise authorized by the ADNDR, Division of Mining, Land, and Water, and the ADF&G. The Applicant also shall consult with the USACE prior to conducting these activities. Mine-site development and restoration within the limits of ordinary high water of waterbodies shall be performed in accordance with the reasonable requirements of the ADNDR, ADF&G, and USACE.	None at this time	Before construction	The Project will not mine gravel in water bodies.
23: The Applicant shall abandon project-related geotechnical boreholes in compliance with the reasonable requirements of ADEC requirements (Alaska Administrative Code 18 § 80.015(e), Well protection, source water protection, and well decommissioning).	Review geotechnical reports and permit conditions	Before, during, and after construction	Condition conforms to geotechnical drilling standards, contract specifications, and permit stipulations
24: The Applicant shall follow all applicable Federal regulations and standard protocols for transporting hazardous substances and other deleterious compounds to minimize the potential for a spill occurrence.	SWPPP approval by ADEC	Before construction	Each contractor awarded work is responsible for preparing a SWPPP and submitting it to ADEC. To date, Bristol Environmental Remediation (Segment 1 and 4), Quality Asphalt Paving (Segment 3 and 5), and Granite Construction (Segment 6) have submitted a SWPPP to ADEC, along with a notice of intent for coverage under the ACGP. Segment 1, 3, 4, 5 and 6 construction is complete and the SWPPP for Segments 1, 3 4, 5 & 6 have been terminated with ADEC. The clearing work on Segment 2 did not require an SWPPP.
25: The Applicant shall comply with the reasonable requirements of the ADEC in the design, construction, operation, and maintenance of project-related tank storage facilities.	None at this time	Before and during construction	Any storage tanks required by contractors during construction will be permitted according to this measure. To date, tank storage facilities have been unnecessary.
26: The Applicant shall direct the operators of project-related construction vehicles not to drive in or cross streams other than at crossing points reasonably established by the ADEC and USACE and, in the case of fish-bearing streams, the ADF&G.	Review contract specifications, Section 404, and Title 16 permits	Before and during construction	Required under the projects ADF&G Title 16 Fish Habitat permits. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
27: During project-related construction, the Applicant shall minimize to the extent practicable, the duration and extent of activity at temporary construction facilities, such as staging areas, and provide surface treatments to minimize soil compaction (e.g., break up compacted soils during reclamation to promote infiltration) and promote vegetation regrowth after the facilities are no longer needed to support construction.	Review contract specifications, Section 404, and Title 16 permits	During and after construction	Required under the projects ADF&G Title 16 Fish Habitat permits. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
28: The Applicant shall ensure that all project-related culverts and bridges are sufficiently clear of debris to avoid blockages to free-fish passage (where applicable), stream-flow alteration, and increased flooding. The Applicant shall inspect all project-related bridges and culverts semi-annually (or more frequently, as seasonal flows dictate) for debris accumulation and remove and properly dispose of debris promptly.	Review inspection reports as necessary	After construction	Since SWPPP inspections are no longer required and occurring, inspections of culverts and bridges will occur twice each year during break-up (thawing) and prior to freeze-up conditions.
29: The Applicant shall use contaminant-free embankment and surface materials in project-related construction.	Review design criteria	During construction	Condition conforms to project design standards
30: The Applicant shall return all project-related stream crossing points to their preconstruction contours to the extent practicable.	Review contract specifications, Section 404, and Title 16 permits	During and after construction	Required under the project's ADF&G Title 16 Fish Habitat permits. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).
31: During project-related construction, the Applicant shall use temporary barricades, fencing, and/or flagging in sensitive habitats to contain project-related impacts to the construction area. The Applicant shall locate staging areas in previously disturbed sites to the extent practicable, rather than in sensitive habitat areas.	Review contract specifications, Section 404, and Title 16 permits	During construction	Required under the Section 404 permit and ADF&G Title 16 Fish Habitat permits. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Specifically, as mandated in Special Condition No. 7 of the PMRE Section 404 Permit (POA-2007-1586): <i>The limits of clearing, within wetlands, shall be staked and flagged on the ground prior to any work. No ground disturbing activities shall occur in WOUS, including wetlands, beyond limits of clearing or temporary impacts identified on project plans.</i>
32: The Applicant shall restrict its project-related workers from (1) hunting or fishing while stationed at work camps; (2) harassing wildlife, including winter or calving concentrations of moose (cows with yearling calves can be particularly defensive); (3) approaching known occupied bear dens; and (4) feeding wildlife. (V)	Review contract specifications	During construction	This measure is included in the construction contract specifications.
33: The Applicant shall obtain project-related state permits and authorizations, including the ADF&G Fish Habitat Permit. (V)	Permit Issued	Before construction	All ADF&G Title 16 Fish Habitat permits have been acquired. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits.
34: The Applicant shall implement Essential Fish Habitat (EFH) conservation measures as agreed upon with the NMFS during the EFH consultation process for this project. (V)	Permit Issued	Before and during construction	Completed under the Section 404 permit decision and consultation process.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
35: The Applicant shall clear vegetation in preparation for project-related construction before or after the typical migratory bird nesting season as identified by the U.S. Fish and Wildlife Service (USFWS) (typically May 1 to July 15), to the extent possible to ensure compliance with the Migratory Bird Treaty Act. If clearing is required during the nesting season, the Applicant shall conduct a nest survey and consult with the USFWS, prior to clearing the vegetation, to identify additional appropriate compliance measures. (V)	Review contract specifications	During construction	Clearing for Segments 1, 2, 3, 4, 5 and 6 are complete. Clearing occurred outside of U.S. Fish and Wildlife's (USFWS) recommended time period from avoiding vegetation clearing (May 1-July 15) for Segments 1, 3, 4, and 6. Clearing for Segment 5 was conducted within the bird nesting window; ARRC's contractor contracted trained biologists to conduct a bird nest survey of the segment prior to clearing. No nests were identified and clearing commenced immediately after the survey. ARRC will continue to work with the contractors and set bid dates to try and avoid the bird nesting window; however, as the funding schedule for the project is largely unknown, an exact construction schedule cannot be set and certain project activities may interfere with the bird nesting window. ARRC recognizes this and is ready take the necessary precautions to avoid impacts to nesting birds.
36: During the bald eagle nesting season (typically March through August), the Applicant and its contractor(s) shall use their best efforts to avoid bald eagle disturbance during project-related construction. Nests shall be protected in accordance with USFWS guidelines.	Review contract specifications	During construction	Raptor nest surveys were completed for the entire project alignment on March 15, 2013, April 21, 2014, and April 15, 2015 by an ARRC consultant. To date, three eagle nests have been located (one on Segment 4 and two on Segment 6). Each nest was monitored by ARRC in 2014 and construction activities were adjusted to minimize impacts to the nests. Construction of Segment 6 is now complete and USFWS has stated that future monitoring activities associated with the Segment 6 nests are unnecessary. The Segment 4 nest was inactive in 2015 and construction for that segment is now complete. A formal raptor nest survey was not completed in 2016 for Segment 2 since construction activities did not occur. However, the PMRE Corridor was flown August 29, 2016, for engineering purposes and no eagle nests were noted in Segment 2. Clearing for Segment 2 is complete and occurred outside of U.S. Fish and Wildlife's (USFWS) recommended time period to avoid vegetation clearing (May 1-July 15). Raptor nest surveys were not conducted in February 2017 as previously planned because funding for Segment 2 is not secured and construction is not occurring.
37: Subject to consultation with the ADF&G and ADNR, the Applicant shall work with adjacent land managers to develop alternative preferred habitat away from the proposed rail line and construct a widened embankment to allow moose a place to retreat on one side when a train passes in an effort to reduce the potential for moose strikes. (V)	None at this time	After construction	ARRC has finalized the Moose Mitigation Strategy Plan with input from ADF&G and USFWS. The development of alternative preferred habitat away from the proposed rail line is currently an alternative mitigation measure in the Plan that may be implemented if maximum moose-train collision rates are exceeded. The embankments on Segments 1, 3, 4, 5, and 6 are 40 feet wide, except at bridges and at-grade crossings, where this was not feasible. Segment 2 is currently designed (90% plan set) with 40 foot wide embankments where feasible. Embankments of this width are thought to be sufficient to allow moose to retreat to one side when a train passes.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
38: The Applicant shall use appropriate methods to handle, store, and dispose of waste generated during project-related construction activities. Food and garbage shall be secured and disposed in a manner to prevent bears from gaining access to such materials and in accordance with applicable and reasonable Federal, state, and local regulations.	Review Plan	During construction	A Bear Interaction Plan was submitted to STB, DNR, and ADF&G in 2012. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
39: In conjunction with developing a final engineering design for the project, the Applicant shall consult with the USFWS and the ADF&G to locate project-related facilities to minimize the size and degree of impacts to highly sensitive habitat areas. Disturbed areas shall be restored in accordance with a reclamation plan developed by the Applicant in cooperation with the USFWS, ADF&G, and/or other appropriate agency staff. The Applicant shall submit the reclamation plan for areas to be disturbed by project construction to the Surface Transportation Board's (Board) Office of Environmental Analysis (OEA), USFWS, and ADF&G. The reclamation plan shall be developed in conjunction with final engineering design and clearly designate: (1) areas to be reclaimed; (2) reclamation materials, methods, and timing; and (3) monitoring schedule and contingency plans.	Review Plan and reclamation activities as necessary	During and after construction	A Reclamation Plan was submitted to STB, DNR, USFWS, and ADF&G in 2012. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
40: To reduce potential collision and electrocution impacts to birds resulting from project-related power lines and communication towers, the Applicant shall: - Consult with the U.S. Fish and Wildlife Service for current guidelines on tower siting, marking, and guy lines. - Incorporate standard, raptor-proof designs, as outlined in "Suggested Practice for Avian Protection on Power Lines: The State of the Art in 2006" (Avian Power Line Interaction Committee. 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA. Online at http://www.aplic.org/), into the design of electrical distribution lines in areas of identified bird concerns to avoid electrocution of eagles, owls, and other smaller raptors, including: - Use of marking techniques such as balls or flappers to increase transmission line visibility, especially in areas where sandhill cranes and bald eagles are likely to roost, forage, or nest. - Maintain a minimum 60-inch separation between conductors and/or grounded hardware and potentially use insulation materials and other applicable measures, depending on line configuration. - Incorporate standard raptor-proof designs (as outlined in "Avian Protection Plan Guidelines." Avian Power Line Interaction Committee and U.S. Fish and Wildlife Service. 2005. Online at http://www.aplic.org/) into the design of the electrical distribution lines to reduce bird collisions.	Review design criteria	Before and during construction	According to the USFWS Revised (2013) Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting and Decommissioning https://www.fws.gov/migratorybirds/pdf/management/usfwscommunicationtowerguidance.pdf "The service considers less than 200 ft. AGL option the "gold standard" and suggests that this is the environmentally preferred industry standard for tower placement, construction and operation – i.e. towers that are unlit, un-guyed, monopole or lattice at less than 200 ft. AGL." Construction of the Houston Tower was completed in accordance with FAA, state, and local regulations. The Port MacKenzie tower, when constructed, will also be in accordance with this measure. The communication tower constructed at Houston meets the USFWS Communication Tower Guidelines based on the following criteria: the communication tower constructed near Segment 5 is 154 ft. AGL to the top of the whip antenna, the tower is unlit, and constructed of a lattice design. The tower is sited in an open upland area that is largely unvegetated, with relatively flat topography and is in an area not known to support a significant number of breeding, feeding, and roosting birds. Security lighting for on-ground facilities is an industry standard "Steady On" photocell operated light.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
41: To the extent practicable, the Applicant shall minimize project-related ground disturbance, clearing of established vegetation, and removal of wildlife habitats and riparian vegetation during project-related construction. The Applicant shall also minimize the reestablishment of vegetation near the rail bed that would be attractive to moose.	Review contract specifications, Section 404, and Title 16 permits	During construction	Required under the Section 404 permit and Title 16 Fish Habitat Permits. . Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). ARRC has completed a Moose Mitigation Strategy Plan with input from ADF&G and USFWS. The development of alternative preferred habitat away from the proposed rail line is currently an alternative mitigation measure in the Plan that may be implemented if maximum moose-train collision rates are exceeded.
42: Prior to any project-related construction, the Applicant shall consult with the ADNR and develop and implement a mitigation plan to address the spread and control of nonnative invasive plants during project-related construction. The Applicant shall submit this plan to OEA and ADNR. This plan shall designate appropriate: (1) planned seed mixes; (2) weed prevention and eradication procedures; (3) equipment cleaning protocols; (4) revegetation methods; and (5) protocols for monitoring revegetation.	Review Plan and monitor revegetation as necessary	During and after construction	An Invasive Species Control and Management Plan was submitted to STB, DNR, USFWS, and ADF&G in 2012. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
43: Unless otherwise approved by the Alaska Department of Fish and Game, project-related detonation of explosives within, beneath, or in proximity to fish-bearing waters shall not result in overpressures exceeding 2.7 pounds per square inch unless the waterbody, including its substrate, is frozen solid. Peak particle velocity stemming from explosive detonation shall not exceed 0.5 inch per second during the early stages of egg incubation.	None at this time	During construction	Explosives will not be used in or near water bodies.
44: The Applicant shall comply with the reasonable requirements of Alaska Statutes (Alaska Stat. § 16.05.841, Fishway Required, and Alaska Stat. § 16.05.871, Protection of Fish and Game) regarding project-related winter ice bridge crossings and summer ford crossings of all anadromous and resident fish streams. If necessary for winter ice bridge crossings, natural ice thickness could be augmented (through snow removal and water to increase ice thickness, or other techniques) if site-specific conditions, including water depth, are suitable for a crossing that would protect fish habitat and maintain fish passage.	Review design criteria and Title 16 permits	During construction	All ADF&G Title 16 Fish Habitat permits have been acquired and are in accordance with this measure. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits. Specifically, as mandated in Special Condition No. 4 of the PMRE Section 404 Permit (POA-2007-1586): <i>All culverts and bridges shall be designed, installed, and maintained so they do not interfere with free and unobstructed passage of all life states of fish (both anadromous and resident) present in the stream under reasonably expected flow levels.</i>
45: The Applicant shall not narrow an anadromous waterbody between its mean high water lines for the project, unless authorized in writing by the ADF&G prior to project-related construction.	Review design criteria and Title 16 permits	During construction	All ADF&G Title 16 Fish Habitat permits have been acquired and are in accordance with this measure. Copies of these permits are available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK). Future ADF&G permit actions will be done as amendments to the currently held permits.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
46: The Applicant shall ensure that project-related culverts in fish-bearing waters (as identified at the time of final design) function properly and continue to accommodate fish passage. The Applicant shall inspect all project-related culverts on fish-bearing waters annually for perched, submerged, or other conditions that could prevent fish passage. A wetland scientist, fisheries biologist, or other qualified individual shall perform the inspections. If perched, submerged, or other conditions that prevent fish passage are identified, the Applicant shall notify the ADNR and ADF&G, and develop and implement a correction action plan in consultation with ADNR and ADF&G.	Review inspection reports as necessary	After construction	Since there is no active construction activity and there are not active SWPPP's associated with the project, inspection frequency has been reduced to twice each year, once at breakup (spring thaw) and again prior to freeze up. Fall/Winter 2018 Culvert inspection memo is attached to this report.
47: The Applicant, in consultation with the ADF&G, ADNR and other appropriate stakeholders shall evaluate, implement, and monitor various aspects of project-related rail design, maintenance, and operation to document moose mortality from collisions with trains, and to develop a strategy to reduce the moose-train collision mortality rate. The Applicant shall document the strategy in a Moose Mitigation Strategy Plan. A draft of the plan shall be prepared and submitted to ADF&G, ADNR, and OEA for review and comment prior to completing final design and before the start of project-related construction. The strategy could include: • Maintaining vegetation along the right-of-way in primary (e.g., grasses/sedges) or late (e.g., old-growth spruce) successional (developmental) stages. If vegetation is allowed to progress to the secondary successional stage (i.e., shrubs), maintaining it at the shortest possible height, not to exceed 0.5 meter, encouraging shrubs of non-preferred moose browse species (e.g., alder, dwarf birch), and minimizing re-growth of willow, paper birch, and aspen. • Mowing vegetation in late summer before energy stores are transferred to the roots. • In winter, plowing snow back from the track to the outer edge of the trackside clearing to allow moose easy access away from the tracks when a train approaches. • Developing a plan in conjunction with the ADF&G to catalog all strikes (not just confirmed or suspected deaths) in a timely manner that shall include, but is not necessarily limited to: precise location (latitude and longitude), date and time; weather and other environmental conditions at the time and location of strike; and attributes associated with the train, such as horn use, speed, and track characteristics. • Designing, constructing, and operating all aspects of the rail line to minimize significant alteration of moose and other wildlife movement and migration patterns.	Plan is submitted and approved	Before, during, and after construction	ARRC has finalized Moose Mitigation Strategy Plan with input from ADF&G and USFWS. The development of alternative preferred habitat away from the proposed rail line is currently an alternative mitigation measure in the draft Plan that may be implemented if maximum moose-train collision rates are exceeded. The embankments on Segments 1, 3, 4, 5, and 6 are 40 feet wide, except at bridges and at-grade crossings, where this was not feasible. Segment 2 is currently designed (90% plan set) with 40 foot wide embankments where feasible. Embankments of this width are thought to be sufficient to allow moose to retreat to one side when a train passes.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
48: The Applicant shall prepare and implement a bear interaction plan to minimize conflicts between bears and humans. In consultation with the ADF&G, the Applicant shall develop appropriate educational programs and management plans when project-related construction and operation plans are being prepared.	Review plan	During construction	A Bear Interaction Plan was submitted to STB, DNR, and ADF&G in 2012. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
49: The Applicant shall not conduct project-related construction and land clearing activities within 0.5 mile of known occupied bear dens, unless alternative mitigation measures are approved by the ADF&G. The Applicant shall obtain a list of known den sites from the ADF&G Division of Wildlife Conservation prior to commencement of any project-related construction activities and shall report occupied dens encountered.	If a bear den is discovered or identified, ARRC will comply with this condition	During construction	ADF&G was contacted in fall 2012, 2013, 2014, and 2015. No bear dens are known to occur within the project corridor. Based on information from the previous four (4) years of contacting ADF&G regarding the potential for bear den locations in the project area, ADF&G has continually informed ARRC that ADF&G does not maintain a list of bear den locations in the area nor do they have a monitoring program in the area to document bear den locations. Since there is not a list of known bear den sites or monitoring program to document bear den locations, this information is unavailable. However, the Bear Interaction Plan for the project was included as an attachment to the PMRE Segment 2 Clearing bid contract and in accordance with the Mitigation Measure any bear encounters during the clearing activity would have been reported to ADF&G Division of Wildlife Conservation Program. It is important to note that no bear dens or bears were encountered during the recent clearing activities.
50: Prior to initiating project-related construction activities, the Applicant shall consult with the local offices of the Natural Resource Conservation Service and the Palmer Plant Center to develop an appropriate plan for restoration and revegetation of disturbed areas (including appropriate seed mix specifications). This would apply to areas that cannot be revegetated using natural recruitment from the native seed sources in the stockpiled topsoil. Development of the plan shall include consideration of the use of a variety of native grasses and wildflowers appropriate to the surrounding habitat to provide visual interest in areas where vegetation height must be limited due to safety or maintenance considerations.	Review plan	During construction	A Reclamation Plan was submitted to STB, DNR, USFWS, and ADF&G in 2012. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
51: The Applicant shall develop protocols to inform and prepare project-related construction supervisors of the importance of protecting archaeological resources, graves, and other cultural resources and how to recognize and treat the resources. (V)	Verify training has taken place	During construction	This measure is a requirement under the Programmatic Agreement with SHPO. ARRC has developed a training curriculum that was provided to contractors and is being conducted annually or as needed. The most recent training was held for contractors on December 8, 2016. Previous trainings occurred on March 18 and 19, 2014; the annual 2015 training was held on June 23, 2015.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
52: The Applicant shall comply with the Programmatic Agreement developed through the section 106 process under the National Historic Preservation Act. (V)	Verify PA has been complied with	Before, during, and after construction	Section 106 PA compliance is currently taking place.
53: To minimize fugitive dust emissions created during project-related construction activities, the Applicant shall implement appropriate fugitive dust suppression controls, such as spraying water or other established measures. The Applicant shall also operate water trucks on haul roads as necessary to reduce dust. (V)	Approved Erosion and Sediment Control Plan, review contract specifications	During construction	Each contractor awarded work is responsible for preparing a SWPPP and submitting it to ADEC. To date, Bristol Environmental Remediation (Segment 1 and 4), Quality Asphalt Paving (Segment 3 and 5), and Granite Construction (Segment 6) have submitted a SWPPP's to ADEC, along with a notice of intent for coverage under the ACPG. Segment 1, 3, 4, 5, and 6 construction is complete and the SWPPP for Segments 1, 3, 4, 5 & 6 has been terminated with ADEC. The clearing work on Segment 2 did not require an SWPPP.
54: To limit project-related construction emissions, the Applicant shall work with its contractor(s) to ensure that construction equipment is properly maintained and that required pollution-control devices are in working condition. (V)	Review contract specifications	During construction	Condition conforms to contract specifications
55: The Applicant shall work with its construction contractor(s) to minimize, to the extent practicable, project-related construction noise disturbances near residential areas. Construction and maintenance vehicles shall be in good working order with properly functioning mufflers to control noise. (V)	Review contract specifications	During construction	Condition conforms to contract specifications
56: The Applicant shall consult with affected communities regarding its planned construction schedule to minimize, to the extent practicable, project-related construction noise and vibration disturbances in residential areas during evenings and weekends. (V)	Review contract specifications	During construction	Condition conforms to contract specifications
57: Prior to initiating construction activities, the Applicant shall establish a Community Liaison to consult with affected communities, landowners, and agencies. Among other responsibilities, the Community Liaison shall assist communities or other entities with the process of establishing quiet zones, if requested.(V)	Interview the community liaison	During construction	The Community Liaison has contacted all of the appropriate parties for Segment 1, 2, 3, 4, 5, and 6. No quiet zones were identified or requested for these segments.
58: The Applicant shall not conduct pile driving associated with bridge construction on the Mac East Variant Segment during nighttime hours.	Review contract specifications	During construction	Condition conforms to contract specifications

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
59: The Applicant shall not conduct construction activities in the vicinity of West Holstein Avenue on the Mac East Variant Segment during nighttime hours.	Review contract specifications	During construction	Condition conforms to contract specifications
60: The Applicant shall establish a Diagnostic Team comprised of Applicant staff, community members, representatives of the Alaska Department of Transportation and Public Facilities (ADOT&PF) and other appropriate entities regarding project-related roadway/rail line crossings, in consultation with Federal Railroad Administration safety officials. This process shall result in appropriate safety measures for every roadway/rail line crossing. (V)	None at this time	After construction	Diagnostic Team Report has been completed for the entire project.
61: The Applicant shall coordinate with Federal, state and local emergency management officials in the project area. The Applicant shall provide, upon request, applicable hazardous-materials training and/or project-related information to enhance readiness. The Applicant shall incorporate the proposed rail line into its existing emergency response process and shall update its Oil Spill Contingency Plan to include the proposed rail line. (V)	None at this time	After construction	To be completed at a later date; likely following completion of construction
62: During construction of project-related tracks across existing roads, the Applicant shall notify road users of temporary road closings and other construction-related activities. The Applicant shall provide for detours and associated signage, as appropriate, or maintain at least one open lane of traffic at all times to allow for the quick passage of emergency and other vehicles. The Applicant shall display signs providing the name, address, and telephone number of a contact person onsite to assist the public in obtaining immediate responses to questions and concerns about project activities. (V)	Review contract specifications	During construction	Access is provided during construction and in accordance with this measure. A Project Office (327 W, Ship Creek Ave., Anchorage, AK), website (www.portmacrail.com), and hotline (907-892-6000) are available for the public to access information.
63: To the extent practicable, the Applicant shall confine all project-related construction traffic to project-specific roads within the right-of-way or established public roads. Where traffic cannot be confined to these roads, the Applicant shall make necessary arrangements with landowners to gain access. The Applicant shall remove and restore upon completion of project-related construction any temporary access roads constructed outside the rail line right-of-way unless otherwise agreed to with the landowners. (V)	Review contract specifications	During construction	Access is provided during construction and in accordance with this measure. A Project Office (327 W, Ship Creek Ave., Anchorage, AK), website (www.portmacrail.com), and hotline (907-892-6000) are available for the public to access information.
64: The Applicant shall consult with appropriate state and local transportation agencies to determine the final design and other details of project-related grade crossings and warning devices. (V)	Review contract specifications	Before construction	Crossings are designed in accordance with ARRC and DOT&PF guidelines.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
65: Before the start of project-related operations, the Applicant shall contact appropriate local, state, and Federal emergency response organizations and shall provide them with information concerning the proposed operations, schedules, and any site hazards or restrictions that could impact responders. (V)	Interview the community liaison	During construction	The Community Liaison has contacted the appropriate emergency response organizations.
66: The Applicant shall obtain a section 9 Bridge Permit from the U.S. Coast Guard for construction of project-related bridges over navigable rivers. (V)	Section 9 permit issued	Before construction	The (lack of) response by USCG to ARRC's letter dated 4/25/12 implies concurrence that the determination that the Little Susitna River crossing is within scope of 33 CFR Section 115.70, Advanced Approval of Bridges for a Section 9 Bridge Permit. USCG has the permit application upon which they can act, but it is not required for the commencement of construction. There have been no changes to this permit position during last quarter.
67: In coordination with the U.S. Coast Guard, the Applicant shall provide adequate clearances for navigation of recreational boats on navigable rivers. (V)	Section 9 permit issued	Before construction	Clearance provided by the new bridge proposed on the Little Susitna River exceeds the existing clearance of the bridge immediately down-stream.
68: In conjunction with final engineering design, the Applicant shall consult with the ADNR and the ADF&G and develop and implement a plan to ensure that project-related bridges and culverts placed on navigable or public waters are designed and installed to accommodate: (1) navigation by recreational boat users in a manner that shall not impede existing uses, to the extent practicable, and (2) public access and use of the statutory easements as established by the reasonable requirements of Alaska Statute (Alaska Stat. § 38.05.127, Access to Navigable or Public Water). The Applicant shall submit the plan to OEA, ADNR, and ADF&G.	Review plan	Before construction	A Maintenance of Navigable and Public Waterway Rights Plan was submitted to STB and DNR. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.
69: The Applicant shall develop a spill prevention, control, and countermeasure plan for petroleum products and/or response plan for hazardous materials, as required by applicable Federal and state regulations, prior to initiating any project-related construction activities. These plans shall address methods for preventing discharges and spill control, and containment and cleanup should a release occur. Plans shall include a requirement to conduct weekly inspections of equipment for any fuel, lube oil, hydraulic, or antifreeze leaks. The plan shall provide that, if leaks are found, the Applicant shall require the contractor(s) to immediately remove the equipment from service and repair or replace it. (V)	SWPPP approval by ADEC	Before construction	Each contractor awarded work is responsible for preparing a SPCC plan as required by and in accordance with state and federal regulations. The SPCC plan is available for public review at the ARRC building (327 W, Ship Creek Ave., Anchorage, AK).

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
70: As part of the APDES Stormwater Construction Permit and Stormwater Pollution Prevention Plan, the Applicant shall: - Restore land used for temporary staging areas during project-related construction to natural conditions if occurring on undeveloped ADNR land or to its former uses if occurring on private land. - Restore public land areas that were directly disturbed by project-related construction equipment and not owned by the Applicant (such as temporary access roads, haul roads, and crane pads) to their original condition, as reasonable and practicable, upon completion of construction. - In business and industrial areas, store project-related equipment and materials in established storage areas or on the Applicant's property. The Applicant shall prohibit parking of equipment or vehicles, or storage of materials along driveways or in parking lots, unless agreed to by the property owner. - Prohibit project-related construction vehicles, equipment, and workers from accessing work areas by crossing business or agricultural areas, including parking areas or driveways, without advance notice to or permission from the owner. (V)	SWPPP approval by ADEC	Before construction	Each contractor awarded work is responsible for preparing a SWPPP and submitting it to ADEC. To date, Bristol Environmental Remediation (Segment 1 and 4), Quality Asphalt Paving (Segment 3 and 5), and Granite Construction (Segment 6) have submitted a SWPPP's to ADEC, along with a notice of intent for coverage under the ACGP. Segment 1, 3, 4, 5, and 6 construction is complete and the SWPPP for Segments 1, 3, 4, 5 & 6 has been terminated with ADEC. The clearing work on Segment 2 did not require an SWPPP.
71: For each of the public grade crossings on the rail line, the Applicant shall provide permanent signs prominently displaying both a toll-free telephone number and a unique grade crossing identification number in compliance with Federal Highway Administration regulations (23 Code of Federal Regulations part 655). The Applicant's personnel shall answer the toll-free number 24 hours a day. (V)	Interview the community liaison	During construction	Signage at each crossing is provided. A Project Office (327 W, Ship Creek Ave., Anchorage, AK), website (www.portmacrail.com), and hotline (907-892-6000) are available for the public to access further information.
72: The Applicant shall continue its ongoing community outreach efforts by maintaining a Web site about the project throughout the construction period of the rail line. (V)	Interview the community liaison	During construction	The Project website (www.portmacrail.com) and ARRC website (www.alaskarailroad.com) are active and will be updated during the duration of construction.
73: In the event of any damage caused by project-related construction activities, the Applicant shall work with affected landowners to appropriately redress any damage to each landowner's property. (V)	Interview the community liaison	During construction	If warranted, this measure will be employed.
74: The Applicant shall work with affected businesses or farms to appropriately address project-related construction activity issues affecting any business or farm. (V)	Interview the community liaison	During construction	If warranted, this measure will be employed.
75: To the extent practicable, the Applicant shall ensure that entrances and exits for businesses are not obstructed by project-related construction activities, except as required to move equipment. (V)	Interview the community liaison	During construction	If warranted, this measure will be employed.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
76: During construction of the crossings over navigable rivers, some short-term temporary restrictions of watercraft traffic could occur for safety purposes. In that event, the Applicant shall install warning devices to notify boaters of project-related bridge construction activities. The Applicant also shall display signs providing the name, address, and telephone number of a contact person onsite to help waterway users obtain immediate responses to questions and concerns about project activities. (V)	Interview the community liaison	During construction	Signage at each crossing is provided. A Project Office (327 W, Ship Creek Ave., Anchorage, AK), website (www.portmacrail.com), and hotline (907-892-6000) are available for the public to access further information.
77: The Applicant shall make reasonable efforts to minimize disruptions to utilities by scheduling project-related construction work and outages to low-use periods. The Applicant shall notify residents and other utility customers in advance of project-related construction activities requiring temporary service interruptions. (V)	Interview the community liaison	During construction	If warranted, this measure will be employed.
78: The Applicant shall make reasonable efforts to identify all utilities that are reasonably expected to be materially affected by the project-related construction within the right-of-way or that cross the right-of-way. The Applicant shall consult with utility owners during design and construction so that utilities are protected during project-related construction activities. The Applicant shall notify the owner of each such utility identified prior to project-related construction activities and shall coordinate with the owner to minimize damage to utilities. (V)	Interview the community liaison, review contract specifications	During construction	If warranted, this measure will be employed.
79: The Applicant shall bury all project-related utilities along the 200-foot right-of-way and within the terminal reserve. (V)	Review design criteria	During construction	Project-related utilities will be installed underground.
80: In accordance with the Applicant's Oil Spill Contingency Plan and Emergency Response Plan, the Applicant shall make the required notifications to the appropriate Federal and state environmental agencies in the event of a reportable hazardous materials release. The Applicant shall work with the appropriate agencies, such as the ADEC, the USEPA, and the USFWS, to respond to, and remediate releases. (V)	SWPPP approval by ADEC	Before construction	Each contractor awarded work is responsible for preparing a SWPPP and submitting it to ADEC. To date, Bristol Environmental Remediation (Segment 1 and 4), Quality Asphalt Paving (Segment 3 and 5), and Granite Construction (Segment 6) have submitted a SWPPP's to ADEC, along with a notice of intent for coverage under the ACGP. Segment 1, 3, and 6 construction is complete and the SWPPP for Segments 1, 3, 4, 5 & 6 has been terminated with ADEC. The clearing work on Segment 2 did not require an SWPPP.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
81: At least one month before initiating construction activities in the area, the Applicant shall provide the information described below regarding project-related construction of the rail line, and other information, as appropriate, to fire departments within the project area, the Federal Emergency Management Agency, and the MSB Emergency Operations Department: • The schedule for construction throughout the project area, including the sequence of construction of public grade crossings and approximate schedule for these activities at each crossing; • A 24-hour emergency telephone number to reach the Applicant in the event of an emergency; • The name and number of the Applicant's project contact, who shall be available to answer questions or attend meetings for the purpose of informing emergency-service providers about the project-related construction and operations; and • Revisions to this information, including changes in construction schedule, as appropriate. (V)	Interview the community liaison	Before construction	The Community Liaison is currently performing this duty.
82: Prior to project-related construction, the Applicant shall consult with Alaska Department of Natural Resources (ADNR) and other appropriate agencies, including the Alaska Department of Fish and Game (ADF&G), and user groups to develop a plan to ensure construction activities occur during the most appropriate timeframe to limit, to the extent practicable, potential impacts on recreation activities. The plan shall be developed prior to completion of final engineering plans and following consultation with the ADNR, the ADF&G, other appropriate government agencies, and user groups to determine the location of all officially recognized trails that would be crossed by the rail line. The plan shall designate temporary access points if main access routes must be obstructed during project-related construction and include an agreed-upon number and location of access points as determined during consultation with applicable agencies. (V)	Review plan	Before and during construction	To ensure the safety of trail users, there may be periodic, temporary closures or detours to trails during the construction period. Notice would be provided to trail users at each crossing indicating the closures, construction schedule, and alternate access points. It is the intent of ARRC to maintain continued access at all trail crossings during construction; in most cases, having an on-site flag person present to assist trail users in crossing the construction area safely. ARRC and MSB will continue to work with area stakeholders, including the Big Lake Trails Committee, Alaska Department of Natural Resources (ADNR), and the Alaska Department of Fish & Game in an effort to schedule construction activities around seasonal usage of trails. During the construction of each segment, contractors are being required to develop a segment specific Traffic Control Plan. The Plan will identify temporary trail closure dates and provide ARRC with a plan to ensure a crossing opportunity remain available to trail users. Information related to appropriate signage and flag persons will also be submitted as necessary to facilitate safe passage during construction. To date, no significant issues of related to recreation activities or access have arisen.
83: The Applicant shall consult with the appropriate management agencies, including the ADNR and the ADF&G to ensure that project-related bridges and culverts are designed, constructed, and maintained to accommodate travel by winter modes of transportation (snow machine, dog sled, etc.) on streams and rivers used for recreational access and subject to the provisions of Alaska Statute (Alaska Stat. § 38.05.127, Access to Navigable or Public Water).	Review plans	Before and during construction	A Maintenance of Navigable and Public Waterway Rights Plan was submitted to STB and DNR. No comments were received on the plan and ARRC has assumed agency concurrence on the plan until notified otherwise.

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Mitigation Measure	Compliance Metric	Timeframe	Status Comments
84: The Applicant shall consult with resource management agencies, including the ADNR and the ADF&G, appropriate user groups, and property owners regarding the location and design of crossings for trail easements that intersect with the proposed rail line.	Review plan	Before and during construction	Extensive consultation has been completed at the direction of STB and SHPO. Trail crossing design plans are available on the project website. A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.

Mitigation Checklist – Third Quarter 2019

84A: At a minimum, the Applicant shall provide at grade-separated or grade-separated crossings of all officially recognized trails crossed by the proposed rail line. As of the date of the Final EIS, a total of 8 officially recognized trails had been identified that intersect the Mac East- Variant Connector 3 Variant- Houston-Houston South Alternative. This number could change due to various factors including updates to trail plans, route selection, and final engineering. For the purposes of this mitigation measure, the Applicant shall adhere to the definition of an officially recognized trail provided below. “An officially recognized trail is one that is specifically established within currently adopted plans by ADNR and/or MSB, or are established within these plans at the time of construction or right-of-way acquisition by the Applicant or the MSB (whichever occurs first). In addition, an officially recognized trail is used primarily for recreational purposes. The locations of officially recognized trails may or may not be provided for by recorded easements or right-of-way instruments. In some cases, officially recognized trails may be adopted by or mapped in a recognized trail plan, but a recorded easement or right-of-way instrument may not exist. The presence of a recorded easement or right-of-way easement is not sufficient alone to make the property an officially recognized trail.” Based on the Applicant's January 2008 inventory of officially recognized trails, the following recognized trails are crossed by the Mac East Variant- Connector 3 Variant - Houston-Houston South Alternative: • Crooked Lake Trail • Iditarod National Historic Trail • Houston Lake Loop Trail • Flat Lake Connector Trail Based on OEA's analysis, the following additional officially recognized trails are crossed by the Mac East Variant- Connector 3 Variant - Houston-Houston South Alternative: • Big Lake Trail #1 • Big Lake Trail #2 • Big Lake Trail #5 • Big Lake Trail #14	Review plan	Before construction	<u>Segment 1:</u> Figure 8 Lake Trail: Installed oversized culvert under the rail located on Matanuska-Susitna Borough land. No change to the trail alignment. <u>Segment 3:</u> Historic Iditarod Trail: Bridge built over the trail on DNR land. No trail realignment within the existing trail easement. DNR Authorization # ADL 231373. Iditarod Race Trail (Big Lake Trail #14): Bridge built over the trail on DNR land. No trail realignment within the existing trail easement. DNR Authorization # ADL 227588. Crooked Lake Trail: Trail was realigned to cross state land as directed by DNR's Final Administrative Decision. <u>Segment 4:</u> Flat Lake Connector Trail (Big Lake Trail #6) and Iron Dog Connector (Big Lake Trail #5): Bridge built over the creek and trail on TLO land. The new alignments accommodate safer approaches to the rail crossing. Klondike Inn and Call of the Wild Trail (Big Lake Trail #1) & Houston Lake Loop Trail: Bridge built over the trail on TLO land. <u>Segment 5:</u> Big Lake Trail #2 (Beaver Lakes North/ Little Susitna River Trail): At-Grade crossing built within the section line easements. <u>PRESERVING TRAIL ACCESS</u> A Master Trails Easement Agreement was executed on August 1, 2013, between the MSB and TLO in order to preserve the existing trails and construct the new trail realignments within Segment 4 and part of Segment 5. The Borough is working with agency land owners, TLO, DNR, and the Borough Land & Resource Management Division, to complete the surveying, mapping, and recording easement documents to satisfy the terms of the DNR Administrative Decision and TLO's trail agreements. <u>TRAIL REALIGNMENT MAPS</u> Maps were completed in 2015 and installed on kiosk at trailheads and intersections. <u>ABBREVIATIONS</u> TLO = Alaska Mental Health Trust, Trust Land Office DNR = State of Alaska, Department of Natural Resources
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Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
84B: The Applicant shall design each crossing to accommodate existing trail users as determined at the time of construction, or right-of-way acquisition by the Applicant or MSB (whichever comes first).	Review plan	Before construction	Extensive consultation has been completed at the direction of STB and SHPO. Trail crossing design plans are available on the project website. A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.
84C: The Applicant shall provide a sufficient number of at grade or grade-separated trail crossings to ensure that the average distance between trail crossings over the length of the rail line is not greater than 3.0 miles (i.e., length of the new rail line divided by total number of Applicant-supplied, trail crossings). Trail crossings provided by the Applicant to meet this minimum crossing frequency may be collocated with project-related stream and road crossings if the collocated trail reasonably and safely accommodates existing trail users as determined at the time of construction, or right-of-way acquisition by the Applicant or MSB (whichever comes first). Any trails that the Applicant proposes to combine at one grade-separated trail crossing under mitigation measure 91 shall count as one trail in calculating the average crossing distance of 3.0 miles. Each grade-separated trail crossing provided by the Applicant under mitigation measure 92 (i.e., the trails that contribute to the integrity of the Iditarod Sled Dog Historic District) can be included in the calculation of the average crossing distance of 3.0 miles, regardless of officially recognized status.	Review plan	Before construction	Extensive consultation has been completed at the direction of STB and SHPO. Trail crossing design plans are available on the project website. A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.
84D: If the applicant proposes to construct an at-grade crossing of any officially recognized trails, the applicant shall submit a report to OEA for review and concurrence prior to the start of project-related construction of the rail segment containing the proposed at-grade crossing. The subject report shall address the following items for each officially recognized trail at which an at-grade crossing is proposed: • Identify each officially recognized trail. • Explain why a grade separated crossing is not feasible or appropriate. Specify engineering constraints or potential environmental impacts of a grade-separated crossing, as applicable. • Specify the safety controls and devices that would be installed or implemented for the proposed at-grade crossing. • Identify the current principal users or user groups of the proposed at-grade crossing, consult with these parties, and summarize their degree of acceptance of the proposed at-grade crossing and its proposed safety measures. • Explain any substantive objections of the parties to an at-grade crossing or its safety measures.	Review and approve plan	Before construction	Extensive consultation has been completed at the direction of STB and SHPO. Trail crossing design plans are available on the project website. A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
85: When project-related construction takes place on state and private land, the Applicant shall consult with the ADNDR Division of Forestry to salvage or dispose of commercial and personal use timber within the right-of-way in accordance with the reasonable requirements of the Alaska Forest Resources and Practices Act (Alaska Stat. § 41.17) and the Susitna Forestry Guidelines.	Review form	Before construction	In a letter dated March 20, 2013, ARRC received notification from the State of Alaska Division of Forestry Office that the project is in compliance with Alaska Division of Forestry – Forest Resources and Practices Act regulations. A Detailed Plan of Operations filing was determined to be unnecessary for the project.
86: The Applicant shall ensure that field-work contractors engaged in project-related construction are provided with training for the identification of hazardous materials, including unexploded ordnance (UXO) that could be encountered during project-related construction. If unanticipated sources of hazardous or regulated materials, including UXO, or potentially contaminated areas are encountered during project-related construction activities, the Applicant shall immediately notify the ADEC and stop all work in the area until a response plan has been approved by ADEC. Handling, treatment, and disposal of any hazardous materials shall occur in full compliance with all Federal, state, and local requirements.	Review contract specifications	During construction	This measure is included in the construction contract specifications.
87: The Applicant shall conduct project-related right-of-way acquisition in conformance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 United States Code § 4601), regulations promulgated pursuant to that statute (49 Code of Federal Regulations part 24), and all reasonable terms and conditions of Alaska Statute (Alaska Stat. § 34.60.010 through 34.60.150, Relocation Assistance and Real Property Acquisition Practices).	Interview ARRC and MSB right-of-way staff, confirm compliance	Before construction	Condition conforms to project right-of-way acquisition process.
88: The Applicant shall consult with local airports in the vicinity of new project-related communication towers and the ADOT&PF and the Federal Aviation Administration to ensure that the towers are appropriately sited and that notice has been given to pilots of the construction and location of the new towers.	Review design criteria	Before and during construction	Construction of the Houston Tower was completed in accordance with FAA, state, and local regulations. The Port MacKenzie tower, when constructed, will also be in accordance with this measure.
89: If the USACE completes a full-scale remedial investigation and feasibility study of the nature and extent of contamination or explosive hazards for the former Susitna Gunnery Range, and the USACE's study area encompasses portions of the project-related right-of-way, the Applicant shall observe the findings and recommendations of the study as approved by ADEC.	Review contract specifications	Before and during construction	If warranted, this measure will be employed.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
90: Prior to initiation of project-related construction activities, and for a period of 1 year following start-up of operations on the rail line, the Applicant shall establish a Community Liaison to consult with affected communities, businesses, and appropriate agencies; develop cooperative solutions to local concerns; be available for public meetings; and conduct periodic public outreach. The Applicant shall provide the name and phone number of the Community Liaison to mayors and other appropriate local officials in each community through which the proposed rail line passes.	Interview community liaison	Before and during construction	The Project Office has been temporarily moved to 327 W, Ship Creek Ave., Anchorage, AK. Mr. David Kabella (ARRC) has been assigned as the Community Liaison and project manager. The Project website (www.portmacrail.com) and ARRC website (www.alaskarailroad.com) will be updated with Project news and contact numbers.
91: Project-related construction vehicles, equipment, and workers shall not access work areas by crossing residential properties without the permission of the property owners.	Review contract specifications	Before and during construction	If private property access is necessary, this measure will be employed.
92: Prior to completing final project design, the Applicant shall prepare a draft report on any officially recognized trails that it proposes to relocate rather than provide grade-separated or at-grade crossings of the trails. The draft report shall address the rationale for the proposed trail relocations; describe potential impacts to existing trail users if the trails are relocated rather than being equipped with grade-separated crossings; and summarize the Applicant's discussions with user groups and other interested parties affected by the proposed relocations. The draft report shall identify all parties consulted with by the Applicant regarding proposed trail relocations. All consulted parties shall be provided a copy of the draft report for review and comment for a period not to exceed 30 calendar days. The Applicant shall prepare a final report and submit the final report to OEA and the parties. In addition to the contents required in the draft report, the final report shall summarize all substantive comments from the parties and the Applicant's comment responses.	Review and approve plan	Before construction	Extensive consultation has been completed at the direction of STB and SHPO. Trail crossing design plans are available on the Project website. A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
93: Prior to completing final project design, the Applicant shall prepare a draft report that identifies the location and use of all trails contributing to the Iditarod Dog Sledding Historic District. The draft report shall identify the contributing trails, state of current use for dog sledding (if any), and information on sources and parties consulted pertaining to trail use. OEA and all consulted parties shall be provided a copy of the draft report for review and comment for a period not to exceed 30 calendar days. The Applicant shall prepare a final report and submit the final report to OEA and the parties. In addition to the contents required in the draft report, the final report shall summarize all substantive comments from the parties and the Applicant's comment responses. Based on the final report, all trails that are determined to be contributing to the integrity of the historic district, are in use for dog sledding, and are necessary to maintain the connectivity of the district, shall be provided with grade-separated crossings to allow for continued use.	Review and approve plan	Before construction	A revised IDSHD Summary and Implementation Plan was submitted to STB, SHPO, and other consulting parties on November 21, 2012. The plan is available on the project website.
94: To reduce glare from lighting used during nighttime project-related construction activities, and during operation of the terminal reserve, the Applicant shall require construction contractors to direct lighting onto the immediate area under construction only and to avoid shining lights toward residences, businesses, recreational areas, and down roadway or trail corridors.	Review contract specifications	During construction	This measure is included in the construction contract specifications.
95: To minimize the visual impact of the cleared right-of-way including the terminal reserve for this project, the Applicant shall minimize clearing at road and trail crossings, which could be accomplished by leaving a few larger trees and some smaller trees and shrubs untouched, to reduce visual contrast and mimic natural clearings in the landscape, where practical and consistent with safety and maintenance requirements.	Review design criteria and contract specifications	During construction	Clearing has been limited to only the areas needed to facilitate construction. The entire right-of-way will not be cleared; in general, only the footprint and a small area (~20') outside of the footprint will require clearing.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
96: Where practicable to reduce visual impact in areas of high visibility (such as residential areas, road and trail crossings, and crossings of the Little Susitna River, and the areas surrounding the terminal reserve) without increasing the project footprint and when appropriate given maintenance, access, safety considerations, and natural vegetation patterns, the Applicant shall: - Plant native vegetation along the right-of-way and perimeter of the terminal reserve to reduce the contrast with line, color, and texture. Plant species that are preferred by moose as browse shall be avoided to the extent practicable. - Plant native trees and bushes around the base of bridge supports located on land to reduce the visual prominence of such features and break up the uniform lines, colors, and smooth textures of the bridge supports. A variety of plant types native and indigenous to the project area shall be used to provide multiple layers, seasonality, and reduced susceptibility to disease. Plant species that are preferred by moose as browse shall be avoided to the extent practicable. - In areas with hill cuts, shape slopes to reflect the natural landscape, where practicable, and plant with native materials to provide an amorphous and irregular form and rough texture. - Dispose of excess material in a suitable fill location and not cast on downhill slopes.	Review Reclamation Plan and Invasive Species Control and Management Plan	During and after construction	This measure is being implemented Project wide; as described in the Reclamation Plan and Invasive Species Control and Management Plan submitted to STB in 2012.
97: If there is a material change in the facts or circumstances upon which the Board relied in imposing specific environmental mitigation conditions, and upon petition by any party who demonstrates such material change, the Board may review the continuing applicability of its final mitigation, if warranted.	Review project design, permits, and contract specifications	Before, during, and after construction	If warranted, this measure will be employed.
98: The Applicant shall submit quarterly reports to the OEA on the progress of, implementation of, and compliance with all Board-imposed mitigation measures. The reporting period for these quarterly reports shall begin on the date of a Board Final Decision authorizing the project until 1 year after the Applicant has completed project-related construction activities. The Applicant shall submit copies of the quarterly reports within 30 days following the end of each quarterly reporting period and distribute the reports to appropriate Federal and state agencies, as specified by OEA.	Review and approve reports	During and after construction	As included in this quarterly submittal.
99: Within 60 days following a Board decision authorizing the project, the Applicant shall prepare and submit an annotated outline of the required quarterly report to the OEA for review and approval.	Review and approve outline	Before construction	A Quarterly Report Annotated Outline has been submitted and approved by STB.

Mitigation Checklist – Third Quarter 2019

Mitigation Measure	Compliance Metric	Timeframe	Status Comments
100: The Applicant shall retain a third-party contractor to assist the OEA in the monitoring and enforcement of mitigation measures until 1 year after the Applicant has completed project-related construction.	Confirm with ARRC	Before construction	ARRC has coordinated with STB to retain ICF for this position.

Permit Status – Port MacKenzie Rail Extension Project

Active Permit Reviews

None at this time

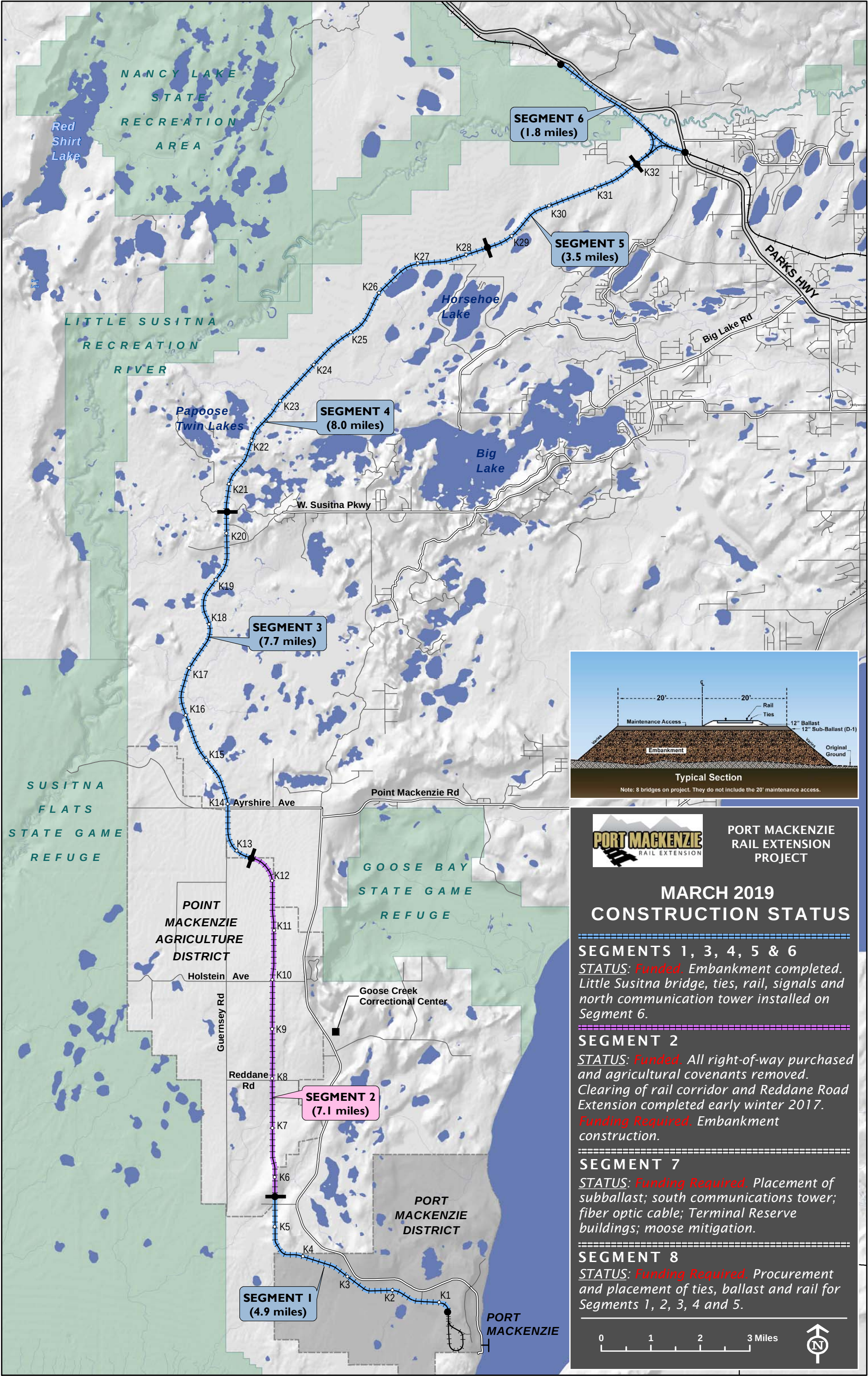
Segment						Acquired Permits			
1	2	3	4	5	6	Permit Type	Agency Responsible	Date Acquired	Status
X	X	X	X	X	X	Section 404 Permit	USACE	September 2012; February 2013 (M1), July 2013 (M2), February 2014 (M3), April 2015 (M4), December 2015 (M5)	Permit Issued (POA-2007-1586); Five modifications to the permit have been authorized to date (POA-2007-1586-M1, M2, M3, M4, and M5).
X	X	X	X	X	X	Section 401 Water Quality Certification	ADEC	March 20, 2012	Permit issued (Reference No. POA-2007-1586)
X						Title 16 Fish Habitat Permit: Baker Farm Road, MC 4.5 (aka MP K5.5)	ADF&G	July 2011, April 2013 (Amend 1)	Permit Issued (Permit #FH 11-IV-0286); Amendment 1 Issued
		X				Title 16 Fish Habitat Permit: Houston 0.8, Outlet of Diamond Lake (aka MP K16.8)	ADF&G	July 2011, September 2013 (Amend 1)	Permit Issued (Permit #FH 11-IV-0287); Amendment 1 Issued
			X			Title 16 Fish Habitat Permit: Houston 4.3, Outlet of Crooked Lake (aka MP K20.7)	ADF&G	July 2011, April 2014 (Amend 1)	Permit Issued (Permit #FH 11-IV-0288)); Amendment 1 Issued
			X			Title 16 Fish Habitat Permit: Houston 6.3, Trib. of Little Susitna River (aka MP K22.8)	ADF&G	July 2011, April 2014 (Amend 1)	Permit Issued (Permit #FH 11-IV-0289)); Amendment 1 Issued
				X		Title 16 Fish Habitat Permit: Houston South 1.0, Outflow of Little Horseshoe Lake (aka MP K27.8)	ADF&G	July 2011, April 2014 (Amend 1)	Permit Issued (Permit #FH 11-IV-0291)); Amendment 1 Issued
					X	Title 16 Fish Habitat Permit: MP 174.3, Little Susitna River Crossing	ADF&G	July 2011, September 2013 (Amend 1)	Permit Issued (Permit #FH 11-IV-0292); Amendment 1 Issued
X	X	X	X	X	X	Title 16 Fish Habitat Permit: Temporary Water Use Sites	ADF&G	July 2011	Permit Issued (Permit #s FH 11-IV-0294 through 0302)
			X			Title 16 Fish Habitat Permit: Temporary Water Use of Muleshoe Lake	ADF&G	April 2012	Permit Issued (Permit #FH 12-IV-0161)

Acquired Permits									
Segment									
1	2	3	4	5	6	Permit Type	Agency Responsible	Date Acquired	Status
					X	Title 16 Fish Habitat Permit: MP 175.0, Trib. Little Susitna River	ADF&G	May 2012, June 2013 (Amend 1), October 2013 (Amend 2)	Permit Issued (Permit #FH 11-IV-0293); Amendment 1 and 2 Issued
			X			Title 16 Fish Habitat Permit: MP K22.2 Papoose Twins Lake Stream	ADF&G	March 2012, March 2014 (Amend 1)	Permit Issued (Permit #FH 12-IV-0080); Amendment 1 Issued
				X		Title 16 Fish Habitat Permit: MP K 26.2 Unnamed lake.	ADF&G	July 6, 2011 December 4, 2015 (Amend 1)	Permit Issued (Permit #FH 11-IV-0296) Amendment 1 Issued
		X				Title 16 Fish Habitat Permit: MP K 14.0 Unnamed Pond near Ayrshire Rd.	ADF&G	July 6, 2011 December 4, 2015 (Amend 1)	Permit Issued (Permit #FH 11-IV-0300) Amendment 1 Issued
X						Title 16 Fish Habitat Permit: Unnamed stream near Baker Farm Road	ADF&G	July 6, 2011 December 4, 2015 (Amend 1)	Permit Issued (Permit # FH 11-IV-0302) Amendment Issued
		X	X	X	X	Temporary Water Use Permit: Northern Sources (5)	ADNR-DMLW	May 2012, May 2014 (Amend.)	Permit Issued (TWUP A2011-53); Water withdrawal rates amended
			X	X		APDES Construction General Permit	DEC	March 2016 (Seg. 4) April 2016 (Seg. 5)	Segment 4 CGPNOIREI-0342 Segment 5 CGPNOIREI-0047
X	X	X				Temporary Water Use Permit: Southern Sources (5)	ADNR-DMLW	May 2012	Permit Issued (TWUP A2011-54)
					X	Floodplain Development	MSB	June 2011; March 2015	Permit Issued (FHDP 172920110019); Certificate of Completion issued March 25, 2015
X						Port Development Permit	MSB	January 2012	Permit Issued (Permit #172320120001)
					X	Section 9 Bridge Permit, Little Susitna River	USCG	March 2011	No longer necessary to start construction as the Little Susitna River crossing is within scope of 33 CFR Section 115.70, Advanced Approval of Bridges for a Section 9 Bridge. USCG may act on permit application at their discretion
X	X	X	X	X		DNR Land Use (ADL 227588); DNR Easements, DNR Authorizations, DNR Permits	ADNR, DMLW	April 2013	Permit issued on April 1, 2013.
Permits Acquired by ARRC Contractors									
			X			Title 16 Fish Habitat Permit: MP K22.2, Temporary Crossing of Inlet Stream of	ADF&G	March 2014	Permit Issued (#FH 14-IV-0238) to Bristol Environmental Remediation Services

Acquired Permits									
Segment									
1	2	3	4	5	6	Permit Type	Agency Responsible	Date Acquired	Status
						East Papoose Twins Lake			
			X			Title 16 Fish Habitat Permit: MP K27.9, Temporary Crossing of Unnamed Tributary of Little Susitna River	ADF&G	November 2013; March 2014 (Amend 1)	Permit Issued (#FH 13-IV-0856) to Bristol Environmental Remediation Services; Amendment 1 Issued
			X			Title 16 Fish Habitat Permit: MP K22.8, Temporary Crossing of Unnamed Tributary of Little Susitna River	ADF&G	November 2013;	Permit Issued (#FH 13-IV-0855) to Bristol Environmental Remediation Services
			X			Title 16 Fish Habitat Permit: MP 20.7, Temporary Crossing of Unnamed Tributary of Little Susitna River	ADF&G	November 2013; March 2014 (Amend 1)	Permit Issued (#FH 13-IV-0854) to Bristol Environmental Remediation Services; Amendment 1 Issued
		X				Title 16 Fish Habitat Permit: MP 16.8, Temporary Winter Stream Crossing of Diamond Lake Outlet Stream	ADF&G	January 2014	Permit Issued (#FH 13-IV-0899) to Bristol Environmental Remediation Services
		X				Title 16 Fish Habitat Permit: MP 16.8, Temporary Bridge Installation of Diamond Lake Outlet Stream	ADF&G	May 2013; September 2013 (Amend 1)	Permit Issued (#FH 13-IV-0531) to QAP dba Colaska; Amendment 1 Issued
					X	Title 16 Fish Habitat Permit: Water Withdrawal of Little Susitna River – Water Body 247-41-10100	ADF&G	April 2013	Permit Issued (#FH 13-IV-0272) to Granite Construction
			X			Title 16 Fish Habitat Permit: Water Withdrawal Sites (four locations)	ADF&G	May 2014	Permits Issued (#FH 14-IV-0432+ and 14-IV-0434+) to Bristol Environmental Remediation Services
			X			Temporary Water Use Permit: Segment 4 Sources (4)	ADNR-DMLW	May 2014	Permit Issued (TWUP A2013-22)
X						APDES Construction General Permit	DEC	March 2012	Permit Issued (AKR10DY32) to Bristol Construction Services LLC; Notice of Termination 10/20/15
X						APDES Construction General Permit	DEC	March 2012	Permit Issued (AKR10DZ24) to ARRC; Notice of Termination 10/22/15
		X				APDES Construction General Permit	DEC	April 2013	Permit Issued (AKR10EI67) to QAP; Notice of Termination 12/4/15
		X				APDES Construction General Permit	DEC	April 2013	Permit Issued (AKR10EJ13) to ARRC, Construction; Notice of Termination 9/29/15.
			X			APDES Construction General Permit	DEC	September 2013	Permit Issued (AKR10EN90) to Bristol Construction Services LLC; Notice of Termination 9/2/16
			X			APDES Construction General Permit	DEC	October 2013	Permit Issued (AKR10EO70) to ARRC; Notice of

Acquired Permits									
Segment									
1	2	3	4	5	6	Permit Type	Agency Responsible	Date Acquired	Status
									Termination 9/9/16
				X		APDES Construction General Permit	DEC	May 2015	Permit Issued (AKR10FB44) to QAP; Notice of Termination 7/27/16
				X		APDES Construction General Permit	DEC	April 2015	Permit Issued (AKR10FB50) to ARRC; Notice of Termination 7/27/16
					X	APDES Construction General Permit	DEC	March 2013; November 2014	Permit Issued (AKR10EI53) to Granite Construction; Notice of Termination 11/25/14
					X	APDES Construction General Permit	DEC	April 2013	Permit Issued (AKR10EJ14) to ARRC; Notice of Termination 11/25/14
		X	X	X	X	APDES Construction General Permit	DEC	January 2014	Permit Issued (AKR10EP64) to ARRC for trail clearing work; Notice of Termination 11/16/15

Attachment 1.
PMRE Construction Status Map



Port MacKenzie Rail Extension Project

ARRC Project No. 113405

Diagnostic Team Report

August 2019



Prepared For:
Alaska Railroad Corporation

Prepared By:
Kinney Engineering, LLC
3909 Arctic Blvd, Ste 400
Anchorage, AK 99503
907-346-2373
AECL1102

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Abbreviations

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
APV	Accident Prediction Value
ARRC	Alaska Railroad Corporation
ATM	Alaska Traffic Manual
CEA	Chugach Electric Association Inc.
CIRI	Cook Inlet Region, Inc.
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation and Public Facilities
DT	Diagnostic Team
FHWA	Federal Highway Administration
FL	Flashing Lights Traffic Control Device
FRA	Federal Railroad Administration Office of Safety Analysis
FQ	Four-Quadrant Flashing Lights with Automatic Gates Traffic Control Device
Green Book / GB	A Policy on Geometric Design of Highways and Streets
GT	Flashing Lights with Automatic Gates Traffic Control Device
KE	Kinney Engineering, LLC
MHTLO	Alaska Mental Health Trust Land Office
mph	Miles per Hour
MSB	Matanuska- Susitna Borough
MUTCD	Manual on Uniform Traffic Control Devices
NO	Number or No Traffic Control Devices
PMRE	Port MacKenzie Rail Extension
ROW	Right of Way
SS	Stop Sign Traffic Control Device
TBD	To Be Determined
vpd	Vehicles per Day
XB	Railroad Cross Buck Signs Traffic Control Device

Definition of Terms

Accident Prediction Value (APV): A calculated value intended to predict the likelihood of a collision occurring over a given period of time given conditions at the crossing.

Active Traffic Control: Traffic control devices at a railroad-road or railroad-trail crossing that is activated by detection of an approaching train. These include flashing lights and/or automatic gates.

Average Annual Daily Traffic (AADT): A measurement of the number of vehicles traveling on a segment of highway each day, averaged over the year.

Diagnostic Team (DT): A group of experienced individuals from several sources with the purpose of performing an engineering study to evaluate railroad-highway crossings as to its deficiencies and presenting recommended improvements.

Passive Traffic Control: Traffic control at a railroad-highway crossing involving signs and striping only.

Sight Triangle: An area free of obstructions, which allows a vehicle approaching a railroad-highway crossing to safely observe an approaching train.

Case I: Sight triangle for a vehicle moving at the posted speed limit and a train traveling at the maximum timetable approaching the crossing.

Case II: Sight triangle for a stopped vehicle departing from the crossing and a train traveling at the maximum timetable approaching the crossing.

Vehicle Storage: The distance before and after a railroad-road crossing that is required to safely contain vehicles stopped at the crossing.

Executive Summary

The Port MacKenzie Rail Extension Project, located in the Matanuska-Susitna Borough of Alaska, will provide a rail connection between Port MacKenzie and the Alaska Railroad mainline just south of Houston, Alaska. This will make efficient transportation available between Interior Alaska and the barges that arrive at the Port. Currently, only the railroad embankment and rails between Millers Reach Road and the mainline are in place. The remaining rail installation is anticipated in the future. The new rail will extend approximately 32 miles and create a total of fifteen new railroad-road/trail crossings. Seven of the future crossings will be at-grade crossings, as listed below:

- Chugach Electrical Association
(CEA) Power Lines Access Road
- Ayrshire Avenue
- Susitna Parkway
- Papoose Twins Road
- Natural Gas Access Road
- Big Lake Trail #2
- Millers Reach Road

At the time of publication, the MSB is the sole owner and responsible party for the Port MacKenzie Rail Extension facilities. Future ownership and maintenance responsibilities will be negotiated by the MSB.

This Diagnostic Team study was undertaken to evaluate these seven future at-grade crossings and determine the appropriate levels of protection, as well as evaluate sight distance triangles and crossing geometry, make recommendations, and consider alternative solutions. The Diagnostic Team recommended the following preferred actions be implemented before the future crossings are open to concurrent vehicular/pedestrian and train traffic:

- Improve sight distance by clearing view obstructions within the required sight distance triangles to allow vehicles approaching the at-grade crossing to safely observe a train approaching.
- Improve the roadway/trail surface at all crossings except Ayrshire Road, which is currently paved.
- Install minimum passive traffic control devices (signs) at future crossings except Ayrshire Avenue and Millers Reach Road, which should receive active crossing protection.
- Install additional crossing warning signs for enhanced alertness where needed for site-specific conditions (Ayrshire Avenue, Susitna Parkway, Papoose Twins Road, and Big Lake Trail #2).
- Improve the approach alignment of the road at Millers Reach Road and the grade of the roadway at CEA Power Lines Access Road.

- Consolidate Susitna Parkway and Papoose Twins Road crossings as a long term recommendation.
- Construct an alternative access for the subdivision west of the crossing location and/or construct a grade separated crossing north of the crossing location as long term recommendations for Millers Reach Road.

1 Introduction

1.1 Purpose and Need

Kinney Engineering, LLC (KE) has been retained to lead a Diagnostic Team (DT) Study and prepare this report for the Port MacKenzie Rail Extension (PMRE) Project. The purpose of the project is to examine safety and traffic operations for seven future at-grade railroad crossings of the PMRE¹. The specific scope of this DT Report is to document the findings and recommendations from the study, which assessed existing conditions and proposed development at the future at-grade crossings.

The evaluation was conducted in accordance with the *Alaska Policy on Railroad/Highway Crossings*, adopted by ARRC and the Alaska Department of Transportation and Public Facilities (DOT&PF) in 1988. Section 4.3.1 of the Policy states:

“A professional diagnostic team should perform an on-site evaluation before any major improvement is planned for an existing crossing or a new crossing is approved.”

The following future at-grade crossings were evaluated:

Table 1: Project Railroad-Road and Railroad-Trail Crossings

Study Area ID	PMRE Project Crossing Station	MP	Crossing Name	Road Classification	Public or Private	Maintenance Responsibility
1	232+15	K2.6	CEA Power Lines Access Rd	Access Road	Private	TBD
2	2827+83	K13.9	Ayrshire Avenue	Minor Collector	Public	TBD
3	3434+40	K19.7	Susitna Parkway	Minor Collector	Public	TBD
4	4271+10	K20.4	Papoose Twins Rd	Local	Public	TBD
5	5287+26	K27.8	Natural Gas Access Rd	Access Road	Private	TBD
6	5379+65	K30.2	Big Lake Trail #2	Trail	Public	TBD
7	5471+06	K31.9	Millers Reach Rd	Minor Collector	Public	TBD

The project extends from Port MacKenzie to the ARRC mainline just south of Houston, Alaska as shown in Figure 1. Figure 1 also highlights the railroad-road and railroad-trail at-grade crossings included in the DT study.

¹ Throughout the report, when referring to the PMRE at-grade crossings, it should be understood that these are future new crossings, whether they are referred to as crossings or future crossings. At the time of this study, none of the at-grade crossings have been fully built. The road/trail is present but rails are not installed.

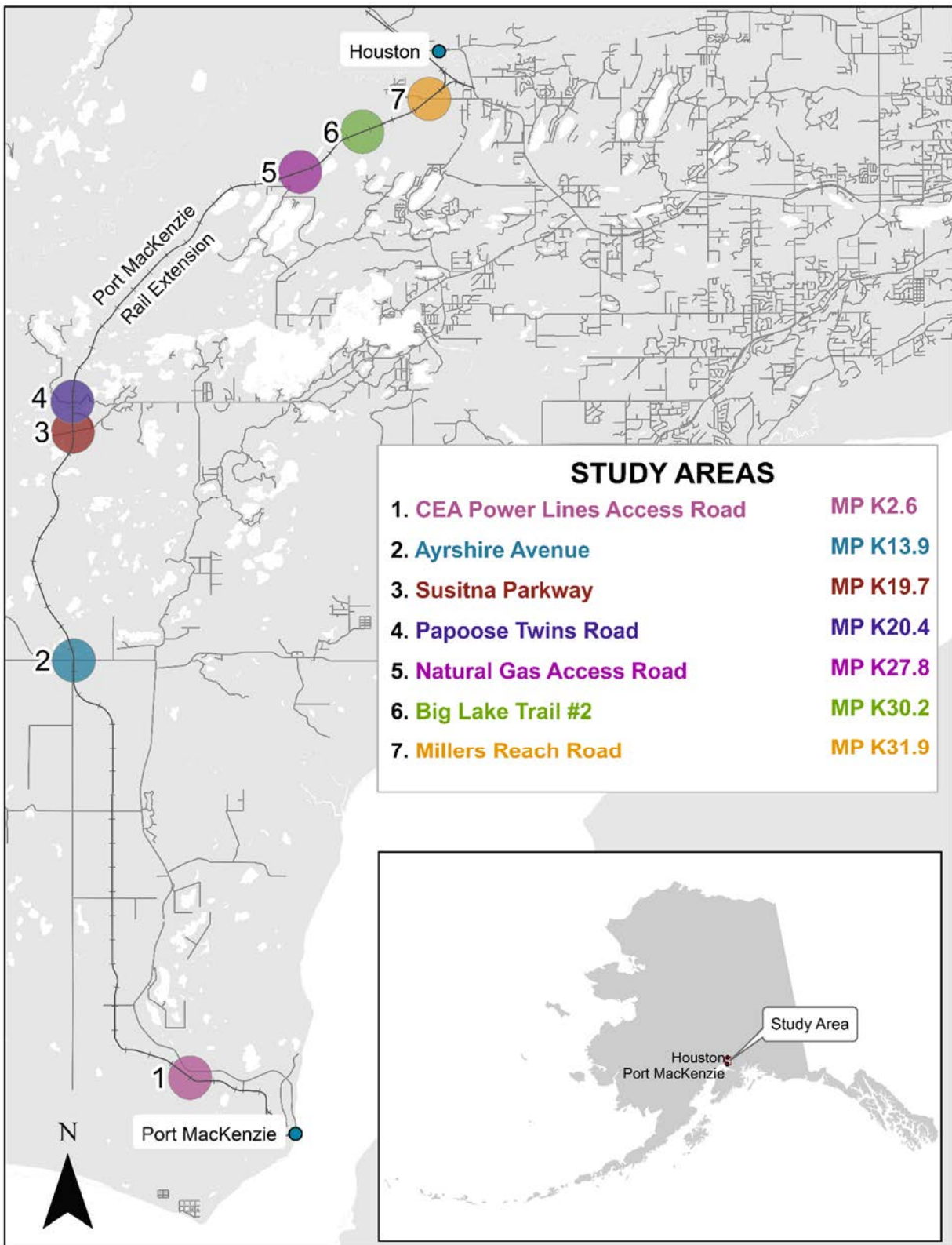


Figure 1: Project Vicinity Map and At-Grade Crossing Locations

2 Background

In June 2007, Matanuska-Susitna Borough (MSB) and ARRC began environmental work, as well as engineering and alternative analysis for the PMRE. After extensive review, the Surface Transportation Board issued a Record of Decision for the route in 2011. In the spring of 2013, construction of the rail line embankment started. As of this study, construction of the rail embankment is substantially complete for most of the 32-mile rail extension. Segment 2, between MP K5.48 and K12.7, has been cleared but embankment construction has not begun. Rail installation has not started but is anticipated in the future.

2.1 Existing Conditions

The PMRE will construct fifteen railroad-road/trail crossings. Eight of the future crossings will be grade separated and seven will be at-grade crossings. The DT study evaluated the seven at-grade crossings, which includes four public roads, two private access roads, and one recreational trail. The rail and road/trail approach embankment of the at-grade crossings are complete. Currently, the crossings are used by vehicles and recreational equipment; however, trains are not present.

Private Crossings

The Chugach Electric Association Inc. (CEA) Power Lines Access Road is an existing gravel one-lane private road. This road is mainly used to access the CEA transmission lines by maintenance vehicles and, as such, has very little traffic. At times, CEA vehicles may be towing 100-foot long utility poles. Posted speed limits are not present on this road, but the geometry of the road suggests a design speed of 20 miles per hour (mph), per the *Policy on the Geometric Design of Highways and Streets* (PGDHS). See Section 3.3.3 for more information on design speed. The land on either side of the access road is owned by MSB; however, the road is maintained by CEA. There are currently two private gates located on either side of the newly constructed rail embankment.

The Natural Gas Access Road is also an existing gravel one-lane private road. This road has very little traffic and is mainly used to access a buried gas well, which is located near the future crossing. This road does not have posted speed limits, but the geometry of the road suggests a design speed of 15 mph, per the PGDHS. See Section 3.3.3 for more information on design speed. The road and the land surrounding the crossing is owned by the State of Alaska Mental Health Trust Land Office (MHTLO). There is currently a private gate near the beginning of the access road north of Horseshoe Lake. The other end of the road dead ends at the buried gas well pad.

Public Road Crossings

In the vicinity of the future crossings, the MSB OSHP classifies Ayrshire Avenue, Susitna Parkway, and Millers Reach Road as Minor Collectors; Papoose Twins Road, is classified as a Local Road. The roads are mainly used for residential and recreational access to homes, cabins, and government-owned recreational land.

Ayrshire Avenue is two lanes and paved from Point MacKenzie Road to just past Guernsey Road, west of the future crossing. The posted speed limit is 45 mph. For the purpose of this study, a 2019 Average Annual Daily Traffic (AADT) of 400 vehicles per day (vpd) was used for Ayrshire Avenue. The AADT is based on historical MSB traffic data (See subsection 2.1.1). MSB owns Ayrshire Avenue and the land northwest of the future crossing. The land northeast of the crossing is privately-owned and the land southeast of the crossing is owned by Cook Inlet Region, Inc. (CIRI). The Point MacKenzie Correctional Farm is located southwest of the crossing.

Near the future crossing, Susitna Parkway is a narrow, windy, gravel, local road. The last posted speed limit on the road before the crossing is 35 mph; though, geometry of the road near the crossing encourages much lower speeds. MSB have recorded AADT for a section of Susitna Parkway, classified by MSB as a Major Collector roadway, which is east of the future crossing location. However, there are many side roads between the traffic count location and the crossing location where traffic can disperse. In addition, the future crossing location is within a section of the parkway classified by MSB as a Minor Collector, and as such has very different roadway characteristics than where the traffic counts were taken. The roadway near the future crossing is very similar to the future crossing at Papoose Twins Road, which has recorded traffic counts (see below). Because these two crossings are very similar with respect to roadway and traffic characteristics, the 2019 AADT for Susitna Parkway was assumed to be the same as Papoose Twins Road at 70 vpd. Susitna Parkway and the land southwest of the future crossing are owned by MSB. The land in the northern quadrants and the southeast quadrant are privately owned. Currently the road is maintained by residents in the area.

Papoose Twins Road is a narrow, windy, gravel, local road. The last posted speed limit on the road before the crossing is 35 mph; though, geometry of the road near the crossing encourages much lower speeds. The MSB recorded AADT for this location was 69 vpd in 2017. No other recorded AADT data is available for this location; therefore, for the purpose of this study, the 2019 AADT was assumed to be 70 vpd. MSB owns and maintains the road and land surrounding the future crossing apart from the southeast quadrant, which is privately-owned.

Millers Reach Road is a two-lane, gravel, local road. The posted speed limit is 25 mph. For the purpose of this study, an assumed 2019 AADT of 500 vpd was used (see subsection 2.1.1). The

road is owned by the City of Houston. The land north of the crossing is owned by MSB and the land south of the crossing is owned by Knikatu Inc.

Trail Crossing

In the immediate vicinity of the future crossing, Big Lake Trail #2 is a wide recreational trail. It is primarily used in the winter for snow-machining and dog-mushing. According to the *Alaska Snowmobile Safety Laws, Rules, and Regulations 2002-2003* produced by DOT&PF, Alaska Department of Natural Resources, and the Division of Parks and Outdoor Recreation, “no person may drive a vehicle at a speed greater than is reasonable and prudent considering traffic, roadway, and weather conditions”. It also states that the maximum speed limit for any other roadway (besides an alley, business district, and residential district) is 55 mph. For the purpose of this study, this crossing was evaluated at a trail speed of 55 mph. The land on both sides of the trail is owned by Knikatu Inc.

The characteristics of the roads and trail that intercept the future crossings are summarized in Table 2.

Table 2: Roadway Characteristics

Study Area ID	Name	Speed (mph)	AADT 2019	Land Ownership	Road Ownership	Classification	Cross Section	Travel Surface Type
1	CEA Power Lines Access Road	20	1	MSB	Maintained by CEA	Private	1 lane	Gravel
2	Ayrshire Avenue	45	400	MSB/Private	MSB	Minor Collector	2 lanes; 1 each direction	Paved
3	Susitna Parkway	35	70	MSB/Private	MSB	Minor Collector	2 narrow lanes; 1 each direction	Gravel
4	Papoose Twins Road	35	70	MSB/Private	MSB	Local	2 narrow lanes; 1 each direction	Gravel
5	Natural Gas Access Road	15	1	MHTLO	MHTLO	Private	1 lane	Gravel
6	Big Lake Trail #2	55	10	Knikatu Inc.	TBD	Trail	1 lane	Gravel/Snow
7	Millers Reach Road	25	500	MSB/Knikatu Inc.	Houston	Minor Collector	2 lanes; 1 each direction	Gravel

2.1.1 Public Road 2019 AADT

The MSB Average Daily Traffic Volume History has recorded AADT data for these locations; however, the data is irregular and only a few AADTs are recorded in the last ten years for each public road. In order to be conservative, the maximum recorded AADT between 2008 and 2017 was used to represent the existing (2019) AADT for the public road crossings.

2.2 Future Operations and Development

2.2.1 2040 AADT

The area of the PMRE, including the at-grade crossings, is most frequently used by local residents, snowmachiners, hunters, and anglers, and as such, the use of the road and trail crossings will increase proportional to the population growth in the surrounding areas. Population forecasts for the MSB are produced by the Alaska Department of Labor and Workforce Development (DOLWD). In August of 2018 DOLWD published population projections for the MSB forecasting through 2045. The forecasts indicate a steady regional growth rate of two percent. 2040 AADTs were calculated for Ayrshire Avenue, Susitna Parkway, Papoose Twins Road, Big Lake Trail #2, and Millers Reach Road using this regional growth rate, as shown in Table 3. Because of their restricted use, the CEA Power Lines and Natural Gas Access Roads are assumed to have the same AADT in 2040 as 2019. Future development or change of land use in these areas would require the crossing to be re-evaluated.

Table 3: Crossing 2040 AADT

Crossing	AADT 2019	Source/ Reasoning	AADT 2040	Growth Factor
CEA Power Lines Access Road	1	Limited Use	1	N/A; Future use is assumed to match 2019
Ayrshire Avenue	400	Maximum MSB Traffic Count between 2008 and 2017	600	2% Regional MSB Growth
Susitna Parkway	70	Roadway and Traffic Characteristics very similar to Papoose Twins Road; use same AADT	100	2% Regional MSB Growth
Papoose Twins Road	70	Only MSB Traffic Count was in 2017: 69 vpd	100	2% Regional MSB Growth
Natural Gas Access Road	1	Limited Use	1	N/A; Future use is assumed to match 2019
Big Lake Trail #2	10	Assumed Use	15	2% Regional MSB Growth
Millers Reach Road	500	Maximum MSB Traffic Count between 2008 and 2017	750	2% Regional MSB Growth

2.2.2 Future PMRE Operations

After construction of the one mainline track is complete, a train will run approximately two times a day (day or night) at a maximum 60-mph train speed through the future at-grade crossings. It is expected the trains will carry industrial, construction, and natural resource commodities.

At the time of publication, the MSB is the sole owner and responsible party for the PMRE facilities. Future ownership and maintenance responsibilities will be negotiated by the MSB.

3 Diagnostic Team Field Review and Recommendations

3.1 Meetings and Site Visits

Initial Meeting

A DT meeting was held on April 2, 2019 in Wasilla, Alaska to discuss the seven future at-grade crossings and to make recommendations regarding crossing protection and evaluated design alternatives as they relate to the crossings. Prior to the meeting, field measurements of the existing sight distances at each crossing were taken.

The DT met at the Curtis D. Menard Sports Complex for an initial briefing and discussion, and then the interested parties traveled to the crossings to make observations and verify the data. The meeting presented aerial graphics depicting existing sight distance conditions and possible crossing protection alternatives. Site visits were completed at the Millers Reach Road, Natural Gas Access Road, Big Lake Trail #2, and Ayrshire Avenue crossings. Papoose Twins Road and Susitna Parkway could not be visited due to road conditions. CEA Power Lines Access Road was elected to not be visited because it is a private crossing with private gates.

Attendees were as follows:

- Jessica Miranda, Jeanne Bowie, and Heather Edic with KE
- Rachel Maddy and Gabriel Thomas with ARRC
- Jon Knowles and Sarah Riopelle (meeting and site visits: Millers Reach Road, Big Lake Trail #2) with DOT&PF
- Brad Sworts and Mike Weller with MSB
- Heidi Hansen with CIRI
- James Keel (meeting and site visits: Millers Reach Road, Big Lake Trails #2, Natural Gas Access Road) and John Fairchild (meeting only) with Western Lakes Fire District
- Ray Russell (meeting and site visits: Millers Reach Road and Big Lake Trail #2) with Houston Public Works
- Jené Hodges and Jessie Laub-Elkins (meeting only) with First Student
- Bob Charles (meeting only) with Knik Tribe
- Christian Vierhuff (meeting only) with CEA

In addition to the meeting, Jeff Green with MHTLO was consulted via phone regarding the Natural Gas Access Road.

Follow-up Meeting

A follow-up DT meeting was held on May 30, 2019 in the MSB Capital Projects Office in Palmer, Alaska. This meeting included an abbreviated DT, with members familiar with safety and operations of at-grade crossings. The purpose of this meeting was to discuss possible crossing alternatives as they compare with existing crossings with similar characteristics. Presented at the meeting were summaries of all existing crossings with similar roadway densities, train densities, roadway speed, train speed, and geometry as the future at-grade PMRE crossings. Alaska has a very low fatal crash rate at train crossings. Analyzing the existing traffic control devices of similar crossings will help to preserve Alaska's very low crash rate trend.

Following the meeting, site visits were conducted at Millers Reach Road, Susitna Parkway, and Papoose Twins Road to verify existing conditions.

Attendees at the follow-up meeting were as follows:

- Jessica Miranda, Jeanne Bowie, and Heather Edic with KE
- Rachel Maddy with ARRC (meeting only)
- Scott Thomas with DOT&PF
- Brad Sworts, Mike Weller, and Jamie Taylor with MSB (meeting only)

The following sections explain requirements and guidelines to be met at a railroad-highway or railroad-trail crossing. The findings and recommendations resulting from the DT meetings are also presented.

A summary of the comments from both DT meetings are in Attachment A.

3.2 References

In performing an evaluation of a railroad-road/trail crossing safety and traffic operations, multiple references and resources are available as listed below:

- *A Policy on the Geometric Design of Highways and Streets* (PGDHS), American Association of State Highway and Transportation Officials (AASHTO), 2011
- ADOT&PF Railroad Crossing Certification Checklist, ADOT&PF, July 2015
- *Alaska Policy on Railroad/Highway Crossings* (the Policy), ADOT&PF and ARRC, September 1988
- *Alaska Traffic Manual* (ATM), DOT&PF, 2016
- Federal Railroad Administration Office of Safety Analysis (FRA) website, <https://safetydata.fra.dot.gov/OfficeofSafety>
- *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT≤400)*, American Association of State Highway and Transportation Officials (AASHTO), 2001
- *Manual for Railway Engineering*, American Railway Engineering and Maintenance Association (AREMA), 2013 Edition.
- *Manual on Uniform Traffic Control Devices* (MUTCD), FHWA, 2009
- *Railroad-Highway Grade Crossing Handbook* (the Handbook), U.S. Department of Transportation Federal Highway Administration (FHWA), August 2007
- *Standard Plans*, Alaska Railroad Corporation
- *Technical Standards for Roadway, Trail, and Utility Facilities in the ARRC Right-of-Way*, Alaska Railroad, January 2014
- *Alaska Snowmobile Safety Laws, Rules, and Regulations*, ADOT&PF, Alaska Department of Natural Resources, and the Division of Parks and Outdoor Recreation, 2002-2003

3.3 Assumptions

3.3.1 Train Traffic

Analysis was completed using two day-trains per day projection, but trains will run whenever vessels arrive at the Port. Even if scheduled arrival time for vessels is during the day, weather or other conditions may cause a delay; therefore, there is a possibility for trains to operate during the night. Assuming train traffic only operates during the day results in a conservative evaluation.

3.3.2 Average Annual Daily Traffic

Assumptions about vehicular and pedestrian traffic at the crossings are discussed in Sections 2.1 and 2.2.

3.3.3 Road and Trail Speed Limits

Near the future crossings, Susitna Parkway and Papoose Twins Road do not have posted speed limits. The last posted speed limit sign was 35 mph; therefore, 35 mph was used to assess these crossings.

The Natural Gas access road and the CEA access road do not have posted speed limits. These travel ways are narrow, which encourage vehicles to drive slowly. The horizontal alignment of the access roads was roughly evaluated for appropriate driving speeds. The tightest curve near the future crossing along the CEA Access Road has a radius of approximately 150 feet, the tightest radius near the future crossing along the Natural Gas Access Road is 80 feet. Figure 5-5 in the *PGDHS*, which is also provided as Figure 2 of this report, display design speeds associated with various horizontal curve radii along gravel surfaces. According to this figure, the Natural Gas Access road is likely to have a design speed limit of 15 mph, and CEA Access Road is likely to have a design speed limit of 20 mph. For the purposes of this study, these were the speed limits used to evaluate the future crossings at the access roads.

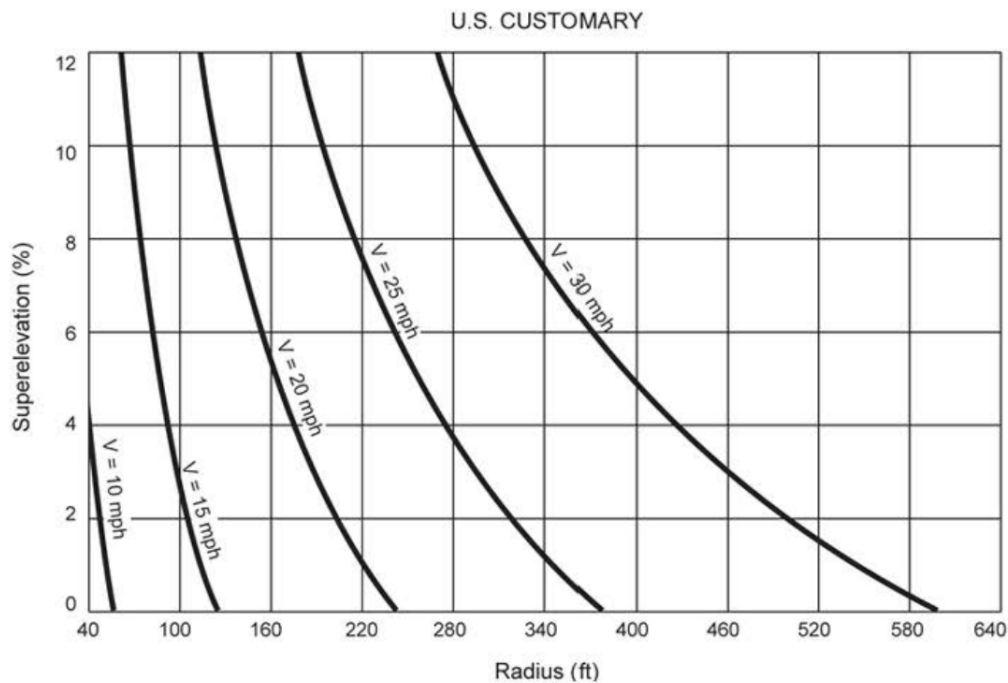


Figure 5-5 Minimum-Radius Horizontal Curve for Gravel Surface

Figure 2: Minimum Radius for Horizontal Curves on Gravel Surface

Source: 2011 *PGDHS*

As stated in Section 2.1, the maximum speed limit for snowmachines for roadways besides an alley, business district, and residential district is 55 mph. For this evaluation, 55 mph was used as the operating speed for the Big Lake Trail #2 crossing.

3.3.4 Design Vehicle

Because Ayrshire Avenue and Millers Reach Road are school bus routes, the design vehicle used for these roads is a school bus.

The design vehicle for the CEA Power Lines Access Road crossing is a 120-foot truck-trailer, due to the potential for work vehicles towing 100-foot utility poles.

The design vehicle for Big Lake Trail #2 is a snowmachine, as that is the primary user of the trail.

A passenger vehicle design vehicle was chosen for the remaining routes.

3.4 Sight Triangle Distance

Sight distance triangles are unobstructed views from motorists/pedestrians on a road/trail to an approaching train on the railroad. Sight distance at and approaching an at-grade railroad-road/trail crossing is an important factor for vehicles/pedestrians to safely navigate through the crossing. The required sight distances are based on the maximum potential train speed and posted roadway speed limit, or justifiable assumed road speed as explained in Section 3.3.3. Two scenarios for sight distances must be verified for safe operations at a crossing. Both scenarios involve a train traveling toward the crossing at the maximum train speed for that location.

In the Case I scenario, also called “moving vehicle” case, a vehicle traveling toward the crossing at the posted speed limit must be able to see the moving train far enough in advance of the crossing to have time to decide whether to stop or proceed through the crossing, and then be able to successfully complete the chosen action. Case I sight triangles (approach sight triangles) do not necessarily have to be met where the road is stop controlled or has active traffic control devices but is desirable at all crossings.

In the Case II scenario, also called “stopped vehicle” case, a vehicle stopped at the crossing must be able to see far enough down the tracks to have time to accelerate and clear the crossing before an approaching train reaches the crossing. At all at-grade crossings, Case II sight distance triangles (clearing sight triangles) must be met, as a minimum.

Figure 3 demonstrates the approach and clearing sight triangles that are formed from the required distance along the railroad from the crossing (d_r) and the required distance along the highway from the crossing (d_H). Table 32 of the *Railroad-Highway Grade Crossing Handbook* lists those required sight distances for varying train and roadway speeds and is replicated in Table 4. The maximum potential train speed for the Port MacKenzie Rail Extension train is 60 mph. These distances are based on relatively flat roadway grades and a 65-foot design vehicle and should be adjusted accordingly for differing site conditions and/or design vehicles.

Table 4: Sight Distances for Combinations of Highway Vehicle and Train Speeds

	Case II: Departure from Stop	Case I: Moving Vehicle							
	Vehicle Speed (mph)								
Train Speed (mph)	0	10	20	30	40	50	60	70	80
	Distance along railroad from crossing d_T (feet)								
10	240	146	106	99	100	105	111	118	126
20	480	293	212	198	200	209	222	236	252
30	721	439	318	297	300	314	333	355	378
40	961	585	424	396	401	419	444	473	504
50	1201	732	530	494	501	524	555	591	630
60	1441	878	636	593	601	628	666	709	756
70	1681	1024	742	692	701	733	777	828	882
80	1921	1171	848	791	801	833	888	946	1008
90	2162	1371	954	890	901	943	999	1064	1134
	Distance along highway from crossing d_H (feet)								
	15	69	135	220	324	447	589	751	931

Source: Railroad-Highway Grade Crossing Handbook

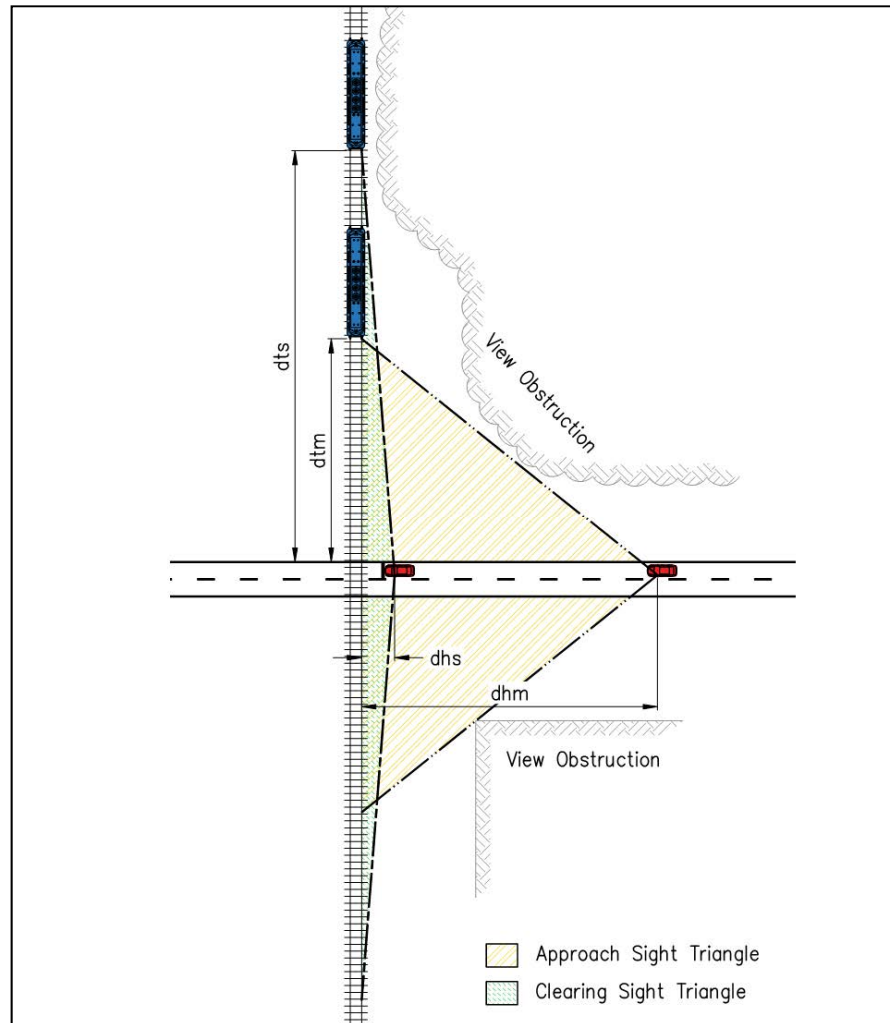


Figure 3: Sight Distance Triangle Diagram

Figure 4 on page 15 illustrates the sight distance requirements for both cases for the CEA Power Lines Access Road crossing. Representatives from CEA noted that they could potentially drive a heavy truck with long utility poles (120-foot total length) through this crossing. This vehicle combination may require additional time to accelerate and clear the crossing, and as such, need to spot a moving train farther down the tracks. Therefore, sight distance lengths at this crossing were adjusted to account for a 120-foot length design vehicle; see Attachment B for additional information. For Case I, there is inadequate sight distance in the east quadrants for westbound traffic looking north or south along the tracks. For Case II, the westbound and eastbound traffic has inadequate sight distance looking south towards a northbound train. Both cases of restricted sight distance are because of the vegetation and the horizontal alignment of the southern portion of the track. Case I and Case II sight distance could be remedied by removing and maintaining the vegetation.

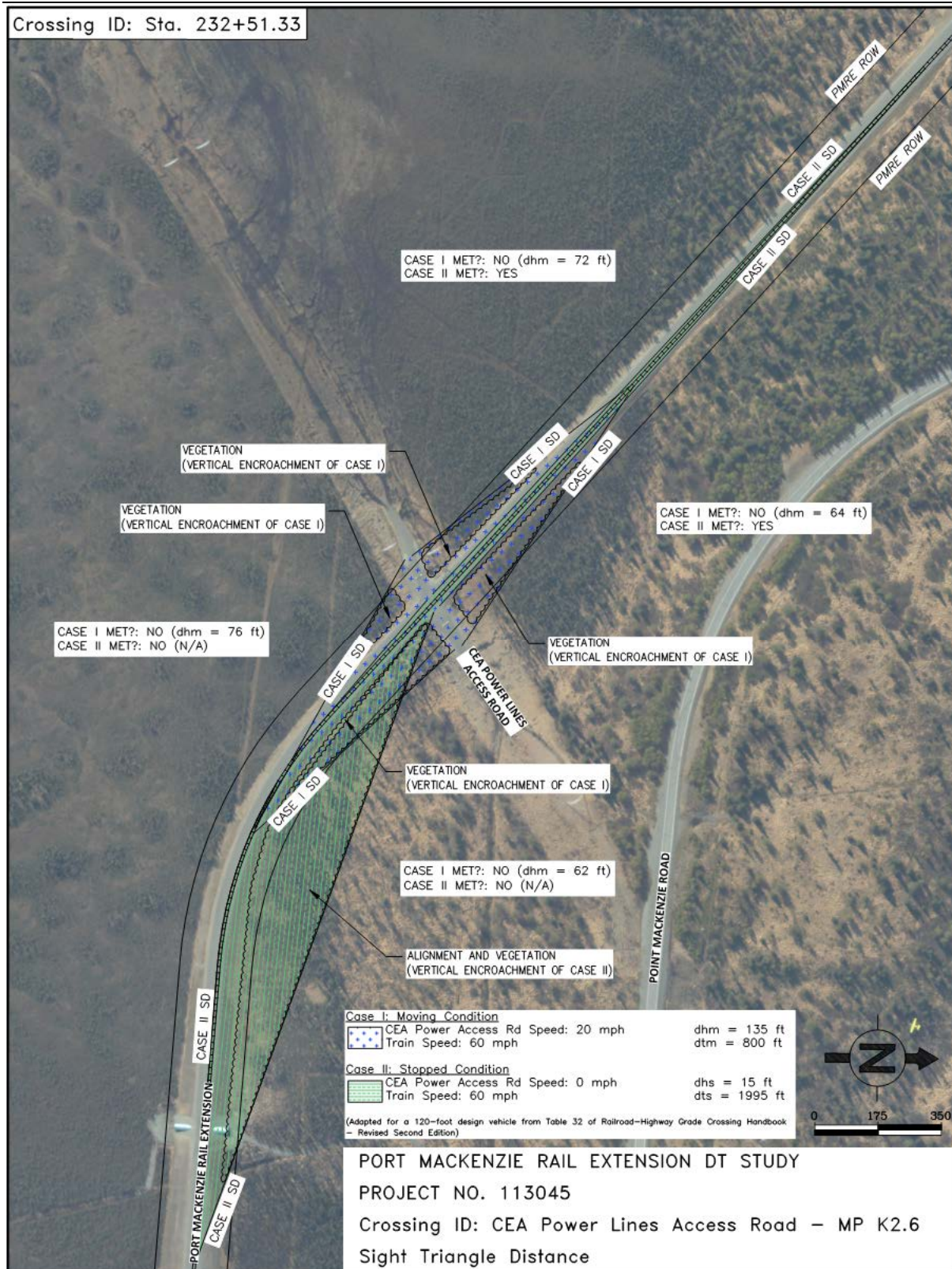


Figure 4: CEA Power Lines Access Road Crossing Sight Distance Triangles

Figure 6 on page 17 illustrates the sight distance requirements for both cases for the Ayrshire Road crossing. Case I is not met in any of the quadrants due to vegetation encroachment in all quadrants and the existing terrain in both of the southern quadrants. Case II sight triangles are met for all approaches at this crossing. Removing the encroaching vegetation and the southeast terrain obstruction would resolve Case I sight distance issues for all quadrants except for the southwest quadrant. Guernsey Road parallels the future railroad tracks to the west. The vertical alignment of this road makes obtaining the Case I sight distance in this quadrant unfeasible.

Figure 7 on page 18 illustrates the sight distance requirements for both cases for the Susitna Parkway crossing. Case I is not met in any of the quadrants due to vegetation encroachment in all quadrants and the existing terrain in the northeast quadrant. Figure 5 below shows the Susitna Parkway crossing looking towards the north, the embankment in the northeast quadrant can be seen in the right side of the photo. Case II sight triangles are met for all approaches at this crossing. Removing the vegetation and northeast embankment within the sight triangles would allow Case I sight distance to be met for all quadrants.



Figure 5: Susitna Parkway Crossing (Looking North)

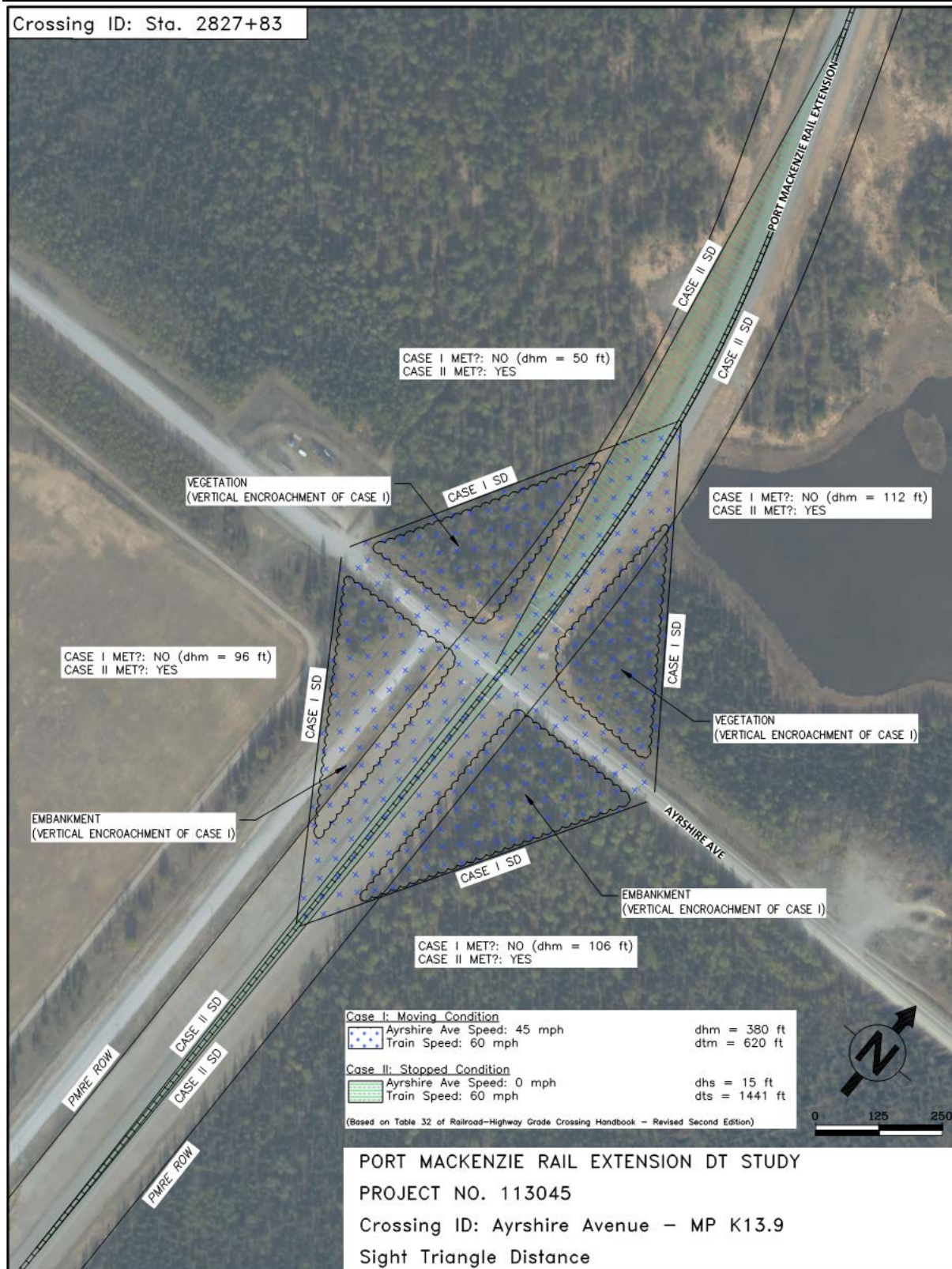


Figure 6: Ayrshire Avenue Crossing Sight Distance Triangles

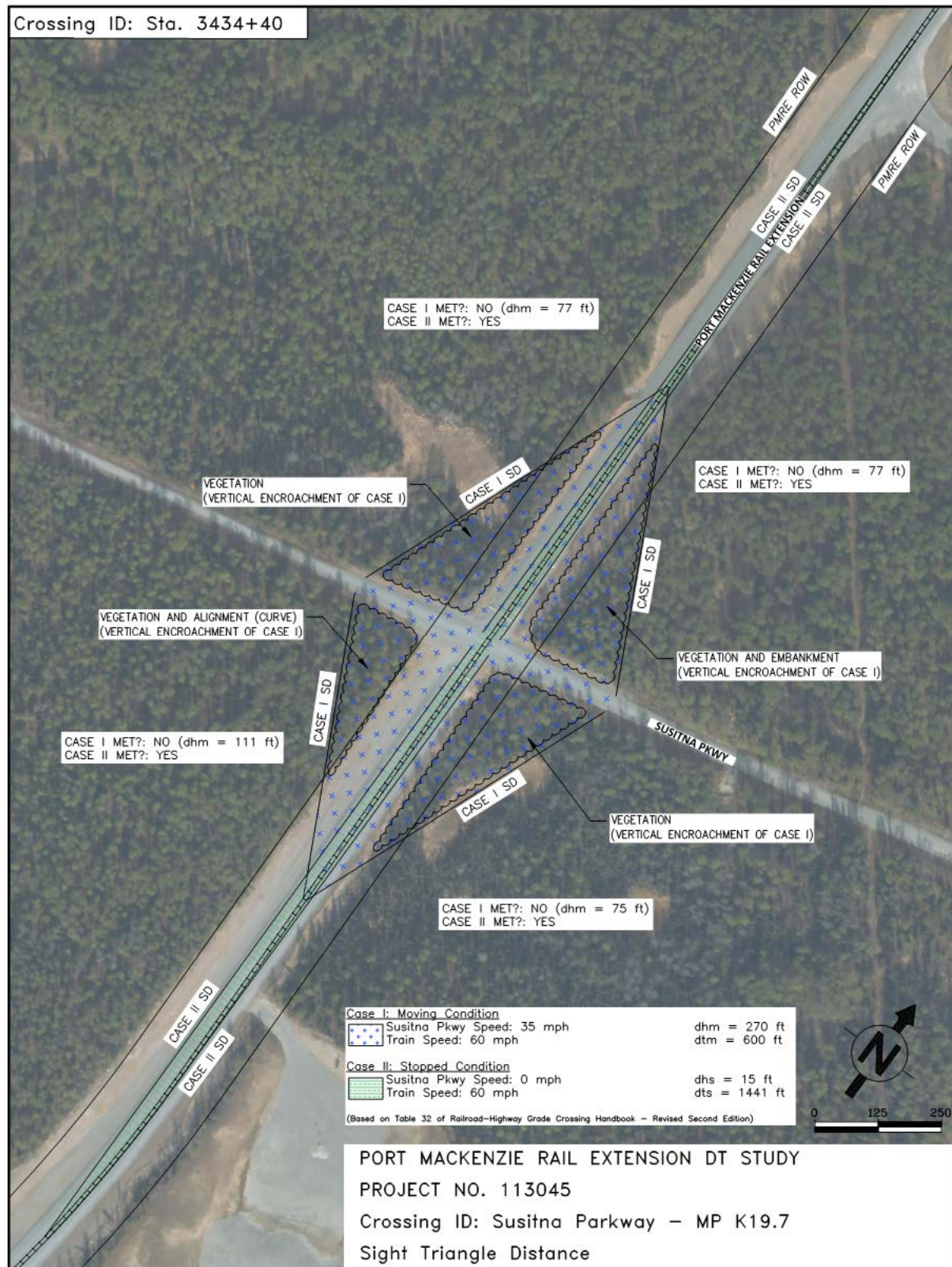


Figure 7: Susitna Parkway Crossing Sight Distance Triangles

Figure 8 below shows Papoose Twins Road looking north from the railroad crossing. As seen in the figure, sight distance is restricted due to the steep embankments. Figure 9 on page 20 illustrates the sight distance requirements for both cases for the Papoose Twins Road crossing. Case I is not met in both southern quadrants and in the northeast quadrant due to the steep cut-slope terrain. Case I sight distance is also restricted in the northwest quadrant due to vegetation. Case II sight triangles are met for all approaches at this crossing. Removing and maintaining the vegetation in the northwest quadrant would resolve the Case I sight distance issue in that quadrant; however, establishing Case I sight distances in the other quadrants at this crossing is not viable due to the height of the cut-sloped terrain.



Figure 8: Papoose Twins Road Crossing (Looking South)

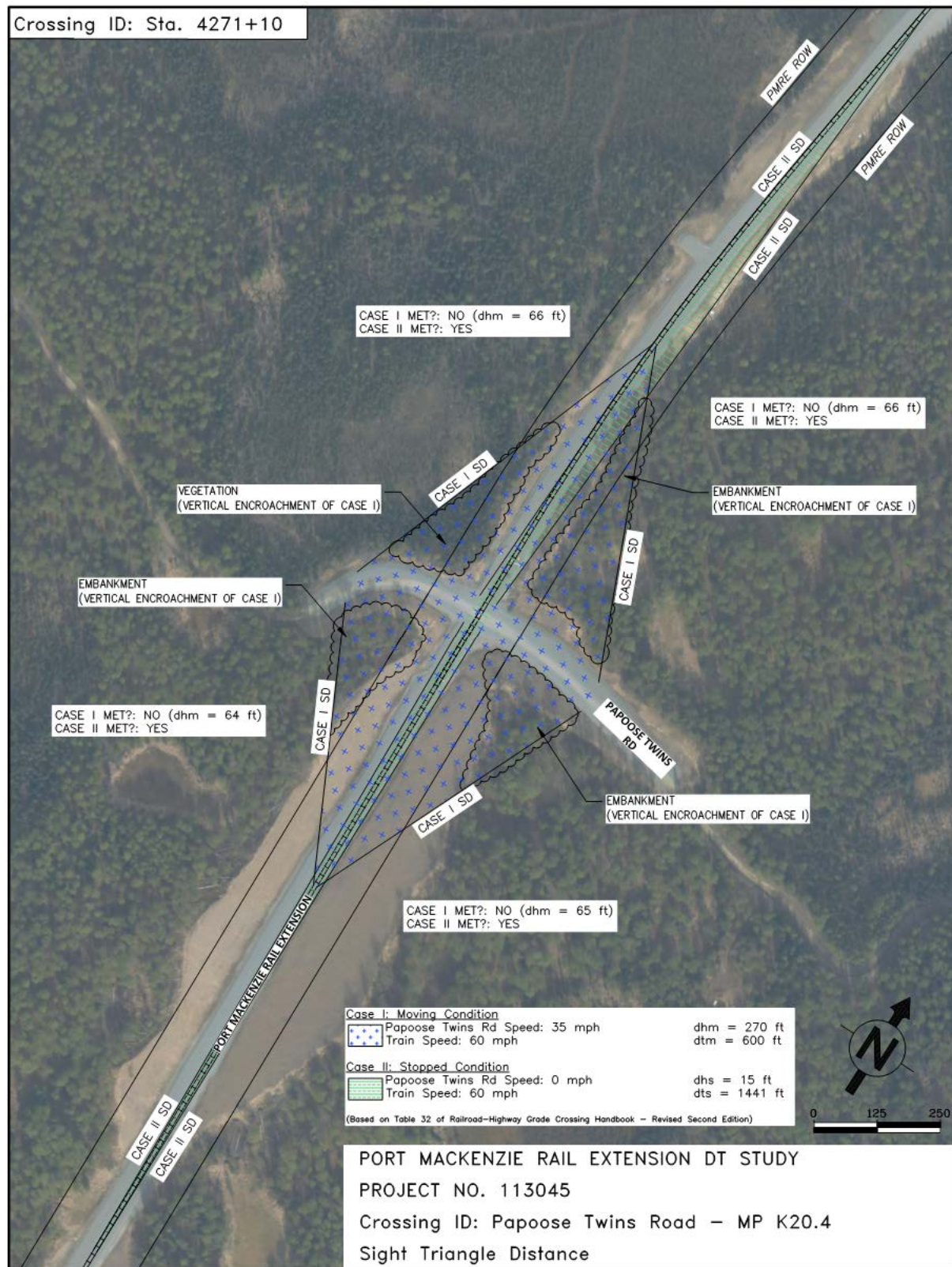


Figure 9: Papoose Twins Road Crossing Sight Distance Triangles

Figure 11 on page 22 illustrates the sight distance requirements for both cases for the Natural Gas Access Road crossing. For Case I, there is inadequate sight distance in the southwest quadrant for eastbound traffic looking south along the tracks. This could be remedied by removing and maintaining the vegetation. The other three quadrants have adequate sight distance for Case I. Case II sight triangles are met for all approaches at this crossing.

Figure 12 on page 23 illustrates the sight distance requirements for both cases for the Big Lake Trail #2 crossing. A recent fire in the area has thinned out much of the vegetation, allowing Case I sight distance to be met. However, once vegetation has been re-established, Case I sight distance would be restricted. A proactive measure should be taken by removing and maintaining the residual vegetation within the sight distance triangles to prevent regrowth. Case II sight triangles are met for all approaches at this crossing.

Figure 13 on page 24 illustrates the sight distance requirements for both cases for the Millers Reach Road crossing. Case I is not met for any of the quadrants due to vegetation encroachment; the embankment in the northeast, as shown in Figure 10; and the skew angle of Millers Reach Road. This could be remedied by removing and maintaining the vegetation, removing the encroaching embankment, and/or realigning Millers Reach Road crossing. Case II sight triangles are met for all approaches at this crossing.



Figure 10: Millers Reach Road Crossing (Looking North)

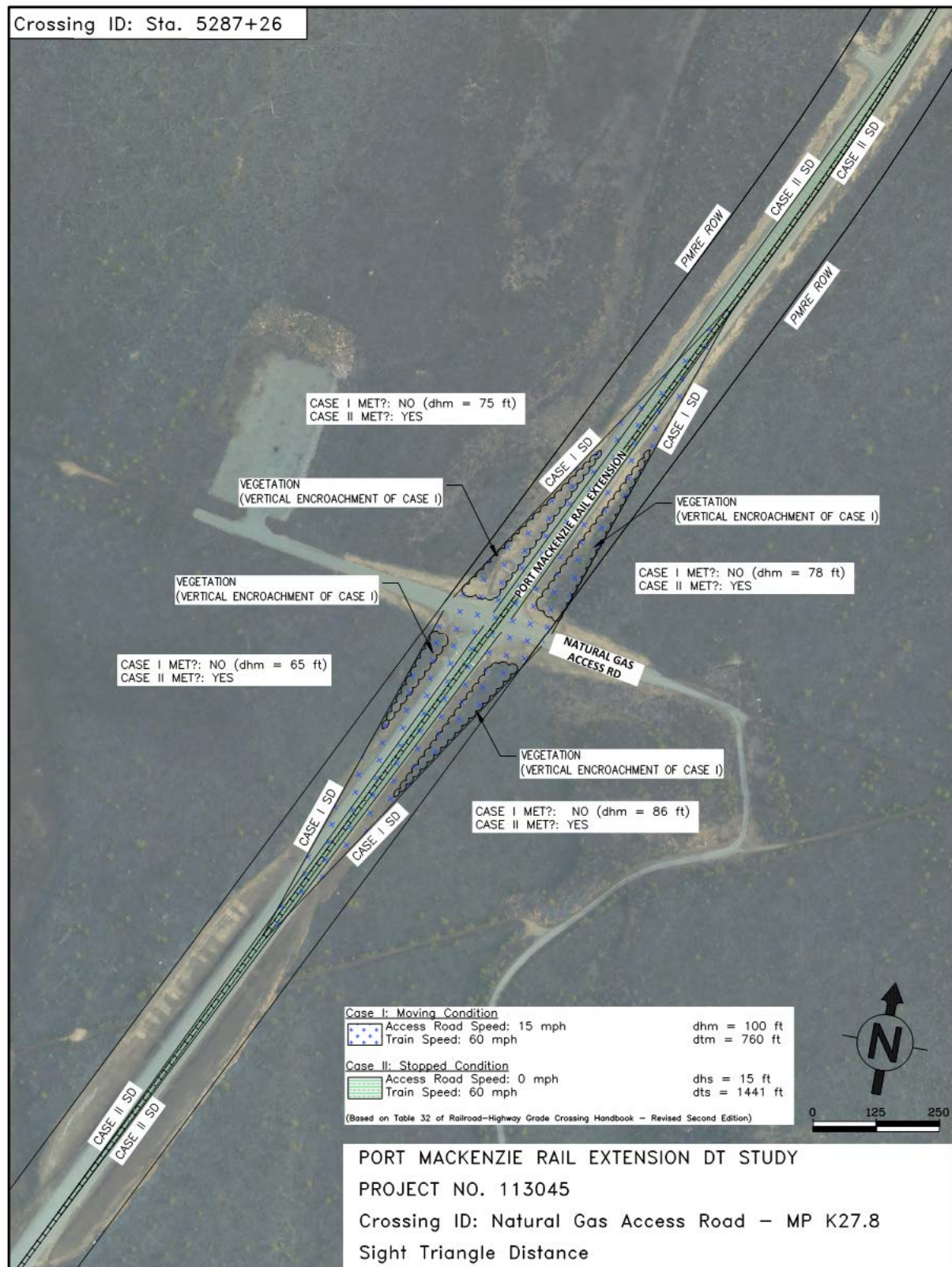


Figure 11: Natural Gas Access Road Crossing Sight Distance Triangles

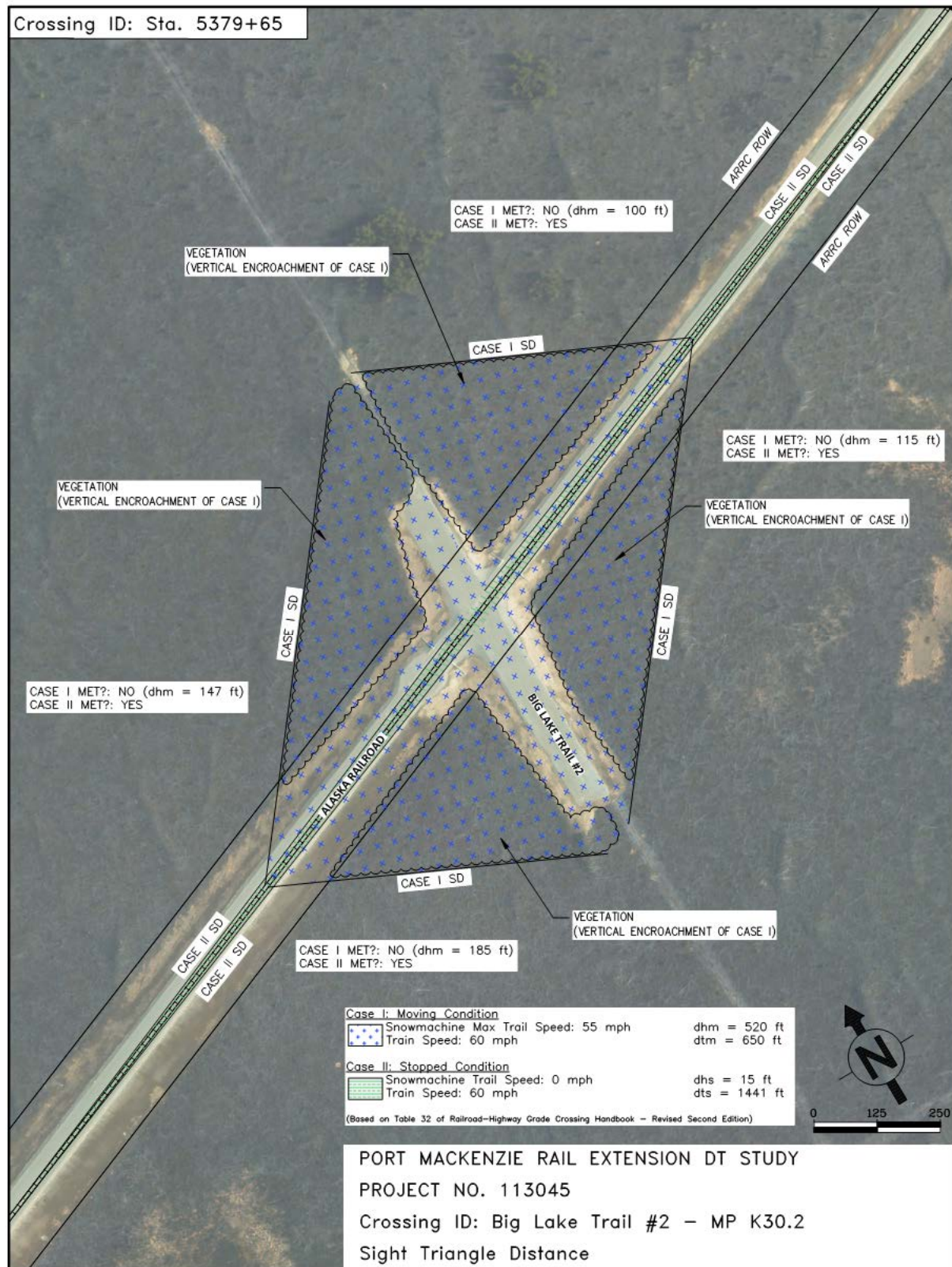


Figure 12: Big Lake Trail #2 Crossing Sight Distance Triangles

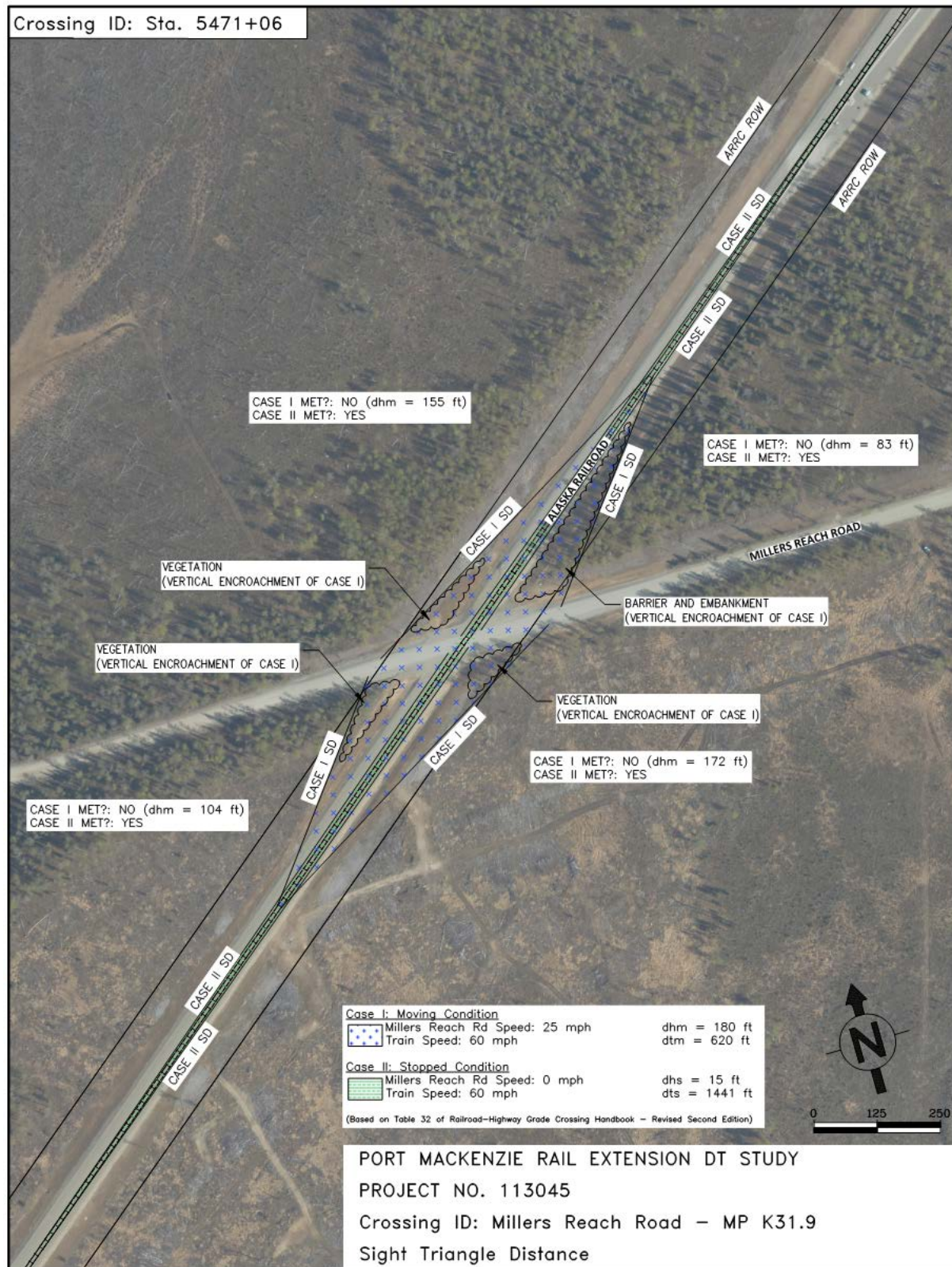


Figure 13: Millers Reach Road Crossing Sight Distance Triangles

3.5 Accident Prediction Value (APV)

Accident Prediction Value (APV) was developed by U.S. DOT to predict the likelihood of a crash happening at a crossing over a period of time. The computed "U.S. DOT Accident Prediction Value" of a crossing is the product of a series of factors representing the various characteristics of the crossing including AADT, number of trains per day, train speeds, existing crossing protection (if present), number of main tracks, number of highway lanes, highway type (functional classification), road surface at crossing, and crossing-related crash history. These factors are used to produce a collision prediction value. Section III-B-2 of *Railroad-Highway Grade Crossing Handbook* (hereafter referred to as the Handbook) provides the method for computing APVs. The calculated APV of a crossing is then compared to threshold values provided in the *Alaska Policy on Railroad/Highway Crossings* (hereafter referred to as the Policy) and *Alaska Traffic Manual* (ATM). The threshold values correspond to minimum levels of traffic control required at a crossing. Table 5 presents APV threshold values as presented in Appendix B of the Policy.

Table 5: Threshold APV

ALASKA POLICY ON RAILROAD/HIGHWAY CROSSINGS		
APPENDIX B		
Changes in Level of Protection Revised September 1, 1988		
Existing traffic control device	Calculated Accident Prediction Value (APV)	Recommended Action for Improvement
Passive	0.08 to 0.12	*See note below.
	0.12 to 0.15	Flashing lights.
	0.15 to 0.23	Flashing lights or gates and flashing lights.
	0.23 to 12.4	Gates and flashing lights.
	12.4 to 18.5	Gates and flashing lights or grade separation.
	Greater than 18.5	Grade separation.
Flashing lights	0.12 to 0.18	*See note below.
	0.18 to 3.7	Gate and flashing lights.
	3.7 to 5.6	Gates and flashing lights or grade separation.
	Greater than 5.6	Grade separation.
Gates	1.32 to 1.98	*See note below.
	Greater than 1.98	Grade separation.

• NOTE - When the calculated hazard index falls within this range the decision may be to do nothing, improve the existing traffic control system, install a different type of traffic control system, or make some other improvement at the crossing.

Table 6 through Table 12, list factors that affect the collision prediction model, as well as the calculated APVs for each crossing for existing (2019) and design year (2040) AADT.

The number of years used for this analysis is five based on the recommendation from the Handbook.

Crash history is a factor in the APV calculation. The crossings for this study are all future crossings; and therefore, do not have a crash history. The Policy (4.5.5) requires that new crossings be compared to existing crossings of similar geometric characteristics and rail and highway traffic densities for anticipated crashes. Existing crossings within Alaska with an AADT of less than 1,000 vpd and a train frequency of one to three trains per twenty-four hours were reviewed for crash history; in total 39 crossings were reviewed. All but one² of the similar crossings had no collisions in the past ten years; therefore, it is expected that the study crossings will have a very low likelihood of experiencing a collision.

Note the normalizing factors used are for the year 2010. At this time, these are the most recent normalizing factors available. Normalizing factors allow the U.S. DOT collision prediction model to be calibrated with current collision trends.

Table 6: CEA Power Lines Access Road Crossing Existing & Future APV

Crossing ID: 1 – CEA Power Lines Access Road		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	1	1
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Private	Private
Number of Highway Lanes	1	1
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.00162	0.00162

² Crossing ID 868456M; 2/14/2014; train struck by highway user

Table 7: Ayrshire Avenue Crossing Existing & Future APV

Crossing ID: 2 – Ayrshire Avenue		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	400	600
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	Yes	Yes
Max Timetable Speed, mph	60	60
Highway Type	Minor Collector	Minor Collector
Number of Highway Lanes	2	2
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.01906	0.02119

Table 8: Susitna Parkway Crossing Existing & Future APV

Crossing ID: 3 – Susitna Parkway		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	70	100
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Minor Collector	Minor Collector
Number of Highway Lanes	2	2
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.00613	0.00685

Table 9: Papoose Twins Road Crossing Existing & Future APV

Crossing ID: 4 – Papoose Twins Road		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	70	100
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Local	Local
Number of Highway Lanes	2	2
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.00613	0.00685

Table 10: Natural Gas Access Road Crossing Existing & Future APV

Crossing ID: 5 – Natural Gas Access Road		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	1	1
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Private	Private
Number of Highway Lanes	1	1
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.00162	0.00162

Table 11: Big Lake Trail #2 Crossing Existing & Future APV

Crossing ID: 6 – Big Lake Trail #2		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	10	15
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Trail	Trail
Number of Highway Lanes	1	1
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.00332	0.00378

Table 12: Millers Reach Road Crossing Existing & Future APV

Crossing ID: 7 – Millers Reach Road		
Analysis Year	2019	2040
Traffic Control	Passive	Passive
AADT, vpd	500	750
Train Movements per Day	2	2
Number of Main Tracks	1	1
Average Number of Trains During Daylight	2	2
Highway Paved?	No	No
Max Timetable Speed, mph	60	60
Highway Type	Minor Collector	Minor Collector
Number of Highway Lanes	2	2
Number of Crossing Related Crashes	0	0
Number of Analysis Years	5	5
Normalizing Constant (2010)	0.46130	0.46130
US DOT Calculated APV	0.01112	0.01251

The Policy's threshold for active crossing protection is 0.12. Comparing the calculated APVs with the Policy's threshold values, passive crossing protection is the minimum required for safety at the future crossings. However, geometry, sight distance, and engineering judgement may influence the recommended or required traffic control.

3.5.1 APV Sensitivity Analysis

Further analysis was completed to determine the number of collisions and/or AADT that would result in an APV warranting a minimum of active protection at each crossing. Table 13 summarizes the number of collisions required at the crossings in order for that crossing to warrant a minimum of active crossing protection. Table 14 displays the minimum AADT at zero through six collisions that would result in an APV of 0.12 for each crossing. The red cells indicate where the AADT meets the 2019 volumes for each crossing. These results indicate that if any of the crossings experienced three to six crossing-related crashes, the crossing would warrant, at a minimum, active traffic control devices. Given Alaska's low crossing-related crash history at similar existing at-grade crossings³, this analysis suggests a minimum of active crossing protection is unlikely to be warranted within the design life to 2040, based on APV alone.

Table 13: Collisions Warranting A Minimum of Active Protection, APV (0.12)

Crossing	2019			2040		
	AADT	Collision Sensitivity Analysis	APV based on AADT and Collision	AADT	Collision Sensitivity Analysis	APV based on AADT and Collision
CEA Power Lines Access Road	1	6	0.120	1	6	0.120
Ayrshire Avenue	400	3	0.120	600	3	0.127
Susitna Parkway	70	5	0.123	100	5	0.127
Papoose Twins Road	70	5	0.123	100	5	0.127
Natural Gas Access Road	1	6	0.120	1	6	0.120
Big Lake Trail #2	10	6	0.130	10	6	0.130
Millers Reach Road	500	4	0.121	750	4	0.126

³ Existing traffic control devices at crossings most likely influence the low crash rate. See Section 3.6 for a review of existing traffic control devices.

Table 14: AADT Warranting A Minimum of Active Protection, APV (0.12)

Crossing	CEA Power Line Access Road	Ayrshire Avenue	Susitna Parkway	Papoose Twins Road	Natural Gas Access Road	Big Lake Trail #2	Millers Reach Road
2019 AADT -->	1	400	70	70	1	10	500
Collisions							
0	> 1,000,000	> 1,000,000	> 1,000,000	> 1,000,000	> 1,000,000	> 1,000,000	> 1,000,000
1	755,650	89,000	755,650	755,650	755,650	755,650	755,650
2	28,870	3,350	28,870	28,870	28,870	28,870	28,870
3	3,390	395	3,390	3,390	3,390	3,390	3,390
4	480	56	480	480	480	480	480
5	51	6	51	51	51	51	51
6	1	1	1	1	1	1	1

3.6 Existing Crossing Comparison

Section 4.5.5 of the Policy states that “The DOT Accident Prediction Values will be used as a factor in determining protection at new crossings. The new crossing will also be compared to existing crossings of similar geometric characteristics and rail and highway traffic densities.” Alaska has an impeccable safety record at existing railroad-road crossings. Comparing characteristics of the future crossings with similar existing ones across Alaska helps ensure the recommendations/alternatives are aligned with upholding the current safety trend.

The expected train speed, train density, roadway speed, roadway density of the future PMRE crossings were compared with similar existing crossings across Alaska with respect to the existing traffic control devices. Other factors, such as number of tracks and genre of users were also taken into consideration during the comparison, as needed. Table 15 through

^o If sight distances can be achieved, YIELD signs are acceptable traffic control devices in place of STOP signs at these locations.

Table 19 show the future crossings and appropriate crossing protection as they compare with similar existing crossings.

Table 15: Access Roads Comparable Existing Crossings

Inventory of Existing Crossings with Comparable CEA Power Lines Access Road & Natural Gas Access Road								
Existing ID	Road/Site	City	Traffic Control Devices	Trains per day	Train Speed (mph)	AADT (vpd)	Road Speed (mph)	Notes
TBD	CEA Power Lines Access Rd	Point MacKenzie	SS ⁺	2	60	1	15	Future PMRE Crossing
TBD	Natural Gas Access Rd	Wasilla	SS ⁺	2	60	1	15	Future PMRE Crossing
868327X	Lynx Lake	Houston	SS	18	65	20	25	
868328E	Nancy Lake Landing	Houston	SS	18	65	200	25	House/Lodge
868358W	Ferry Rd	Healy	SS	12	49	5	10	
910231V	10th Ave	Nenana	SS	12	49	50	15	
868319F	Snider Crossing	Wasilla	SS	18	49	200	25	

Table 16: Ayrshire Avenue Comparable Existing Crossings

Inventory of Existing Crossings with Comparable Ayrshire Avenue								
Existing ID	Road/Site	City	Traffic Control Devices	Trains per day	Train Speed (mph)	AADT (vpd)	Road Speed (mph)	Notes
TBD	Ayrshire Avenue	Point MacKenzie	GT ⁺	2	60	400	45	Future PMRE Crossing
868332U	Fishhook-Willow Rd	Willow	GT	18	65	510	55	
910235X	2 Mile Lake	Nenana	SS	12	49	20	45	
910228M	Usibelli Tipple Mine	Healy	FQ	12	49	100	45	
868242V	Portage Glacier Rd	Portage	GT	10	49	1030	55	
868341T	Talkeetna Spur Rd	Talkeetna	GT	18	49	1806	45	
868322N	Pittman Rd	Wasilla	GT	20	49	4280	45	
868347J	Cantwell Rd	Cantwell	SS	12	50	320	45	Local Traffic

+ Based on comparison of existing crossings

Traffic Control Devices:

- FL: Flashing Lights
- SP: Special Protection (flagger)
- FQ: Four Quad Gates
- SS: Stop Signs
- GT: All Other Gates
- XB: Crossbucks/Yield Signs
- HS: Other Activated
- NO: No Signs or Signals
- OS: Other Signs or Signals

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Table 17: Susitna Parkway & Papoose Twins Road Comparable Existing Crossings

Inventory of Existing Crossings with Comparable Susitna Parkway & Papoose Twins Road								
Existing ID	Road/Site	City	Traffic Control Devices	Trains per day	Train Speed (mph)	AADT (vpd)	Road Speed (mph)	Notes
TBD	Susitna Parkway	Point MacKenzie	SS ^{0,+}	2	60	70	35	Future PMRE Crossing
TBD	Papoose Twins Road	Point MacKenzie	SS ⁺	2	60	70	35	Future PMRE Crossing
868327X	Lynx Lake	Houston	SS	18	65	20	25	
868347J	Cantwell Road	Cantwell	SS	12	50	320	45	
910231V	10 th Avenue	Nenana	SS	12	49	50	15	
910235X	2 Mile Lake	Nenana	SS	12	49	20	45	
868319F	Snider Crossing	Wasilla	SS	18	49	200	25	
868362L	Nenana Cemetery	Nenana	SS	12	49	250	25	

⁰ If sight distances can be achieved, YIELD signs are acceptable traffic control devices in place of STOP signs at these locations.

+ Based on comparison of existing crossings

Traffic Control Devices:

- FL: Flashing Lights
- SP: Special Protection (flagger)
- FQ: Four Quad Gates
- SS: Stop Signs
- GT: All Other Gates
- XB: Crossbucks/Yield Signs
- HS: Other Activated
- NO: No Signs or Signals
- OS: Other Signs or Signals

Table 18: Big Lake Trail #2 Comparable Existing Crossings

Inventory of Existing Crossings with Comparable Big Lake Trail #2								
Existing ID	Road/Site	City	Traffic Control Devices	Trains per day	Train Speed (mph)	AADT (vpd)	Road Speed (mph)	Notes
TBD	Big Lake Trail #2	Houston	SS ^{0,+}	2	60	10	55	Future PMRE Crossing
910343U	Kashwitna Trail	Willow	SS	18	49	20	20	
910361S	Kelly Lake Ped Path	Willow	SS	6	40		N/A	
910344B	Snow Machine Trail	Portage	SS	14	30	10	5	Adjacent to parking lot, slower speeds at crossing
910398G	Triple Lakes Trail	Denali	SS	6	30		N/A	
910381D	Denali Park Hiking Path	Denali Park	XB	14	25		N/A	
910385F	Denali Park Bike Path	Denali Park	SS	14	25		N/A	
910384Y	Grayling Lake Trail	Seward	SS	6	25		N/A	

⁰ If sight distances can be achieved, YIELD signs are acceptable traffic control devices in place of STOP signs at these locations.

+ Based on comparison of existing crossings

Traffic Control Devices:

- FL: Flashing Lights
- SP: Special Protection (flagger)
- FQ: Four Quad Gates
- SS: Stop Signs
- GT: All Other Gates
- XB: Crossbucks/Yield Signs
- HS: Other Activated
- NO: No Signs or Signals
- OS: Other Signs or Signals

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Table 19: Millers Reach Road Comparable Existing Crossings

Inventory of Existing Crossings with Comparable Millers Reach Road								
Existing ID	Road/Site	City	Traffic Control Devices	Trains per day	Train Speed (mph)	AADT (vpd)	Road Speed (mph)	Notes
TBD	Millers Reach Rd	Houston	GT ⁺	2	60	500	25	Future PMRE Crossing
868331M	Willow Station	Willow	GT	14	59	350	25	
910360K	East Fireweed Ave	Wasilla	GT	18	55	550	35	
868342A	Talkeetna Airport	Talkeetna	GT	14	40	510	25	
868345V	Parks Hwy	Cantwell	GT	12	60	1850	65	Skewed Crossing
868341T	Talkeetna Spur Rd	Talkeetna	GT	18	49	1806	45	Skewed Crossing
868557Y	Pease Rd	Anchorage	GT	26	35	3800	35	Skewed Crossing

+ Based on comparison of existing crossings

Traffic Control Devices:

- FL: Flashing Lights
- SP: Special Protection (flagger)
- FQ: Four Quad Gates
- SS: Stop Signs
- GT: All Other Gates
- XB: Crossbucks/Yield Signs
- HS: Other Activated
- NO: No Signs or Signals
- OS: Other Signs or Signals

3.7 Evaluated Geometrics

Approach Grade

Section 4.5.4.4 of the Policy states “The grade of approaches to all crossings should be level with top of rail (± 1 ”) for at least 100’ to prevent long low trailers from hitting the crossing.”

The grade of the existing approaches to all the PMRE future at-grade crossings appear to meet the policy except at the CEA Power Lines Access Road. The design vehicle for the CEA crossing is a truck-trailer approximately 120 feet and the vehicular approaches appear to be steep. For this crossing it is recommended that the approach grade be level for a minimum of 100 feet in both directions in order to clear the track.

Approach Skew

Section 4.5.4.5 of the Policy states “Roadway approaches to the crossing should be at or nearly 90 degrees. Short radius curves or skew angle approaches below 75 degrees will not be permitted.”

The skew angle of the existing approaches to all the PMRE future at-grade crossings appear to comply with the Policy except the Millers Reach Road crossing. The existing skew angle between Millers Reach Road and the proposed rail is less than 75 degrees. Realignment of Millers Reach Road approaches or installing active traffic control is recommended for this crossing.

Proximity of Crossings

Section 4.5.2 of the Policy states “New at-grade crossings should not be allowed if there is another crossing within two miles of the proposed new location, nor if there is a reasonable alternative to a crossing such as a feeder road.”

All future PMRE at-grade crossings are spaced farther apart than two miles except the crossings at Susitna Parkway and at Papoose Twins Road. A long-term alternative recommends consolidating these crossings and is described in Sections 3.9.3.

Vehicle Storage

Storage lengths for queuing vehicles at each future crossing were reviewed. It is important to have sufficient storage space before and after railroad crossings to avoid queuing vehicles stopping on the tracks or getting impacted by other vehicles on intersecting routes. All of the crossings appear to have adequate vehicle storage for their design vehicle as there are no conflicting intersections near the crossing locations.

3.8 Traffic Control Devices

The MUTCD, as amended by the ATM, provides guidance on appropriate traffic control at railroad-road/pedestrian crossings. Per Section 8B.04, the minimum traffic control at a crossing includes retroreflective crossbuck signs (R15-1), emergency contact informational plaque (I-13), a railroad crossing advance warning sign (W10-1), and a STOP or YIELD sign (R1-1 or R1-2). The MUTCD further states, “A YIELD sign shall be the default traffic control device for Crossbuck Assemblies on all highway approaches to passive grade crossings” and “The use of STOP signs should be limited to unusual conditions where requiring all highway vehicles to make a full stop is deemed essential by an engineering study.” Additional devices may be determined necessary by a DT Study.

Figure 14 shows placement of traffic control devices and pavement markings per the MUTCD. Traffic control devices and pavement markings should meet this layout, as appropriate. All future crossings except Ayrshire Avenue are currently gravel surfaced. It is ARRC practice to pave roadway approaches at least to the railroad right of way (ROW); and therefore, pavement markings are recommended at the PRME future at-grade crossings.

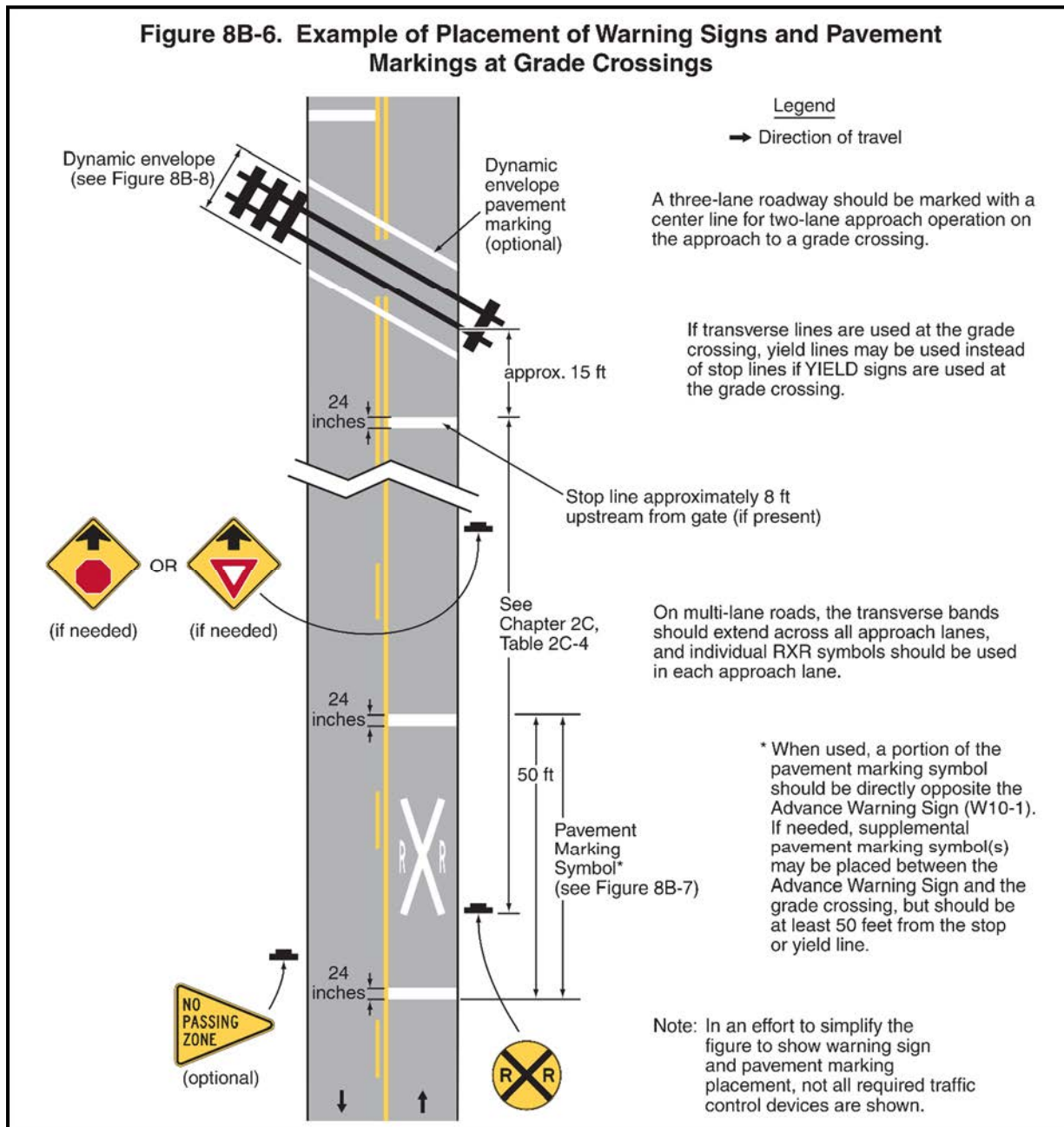


Figure 14: Railroad-Highway Crossing Signs and Pavement Markings Placement
Source: 2011 MUTCD

3.9 Recommended Improvements

Based on APVs, existing conditions, future train and vehicle/pedestrian operations, and comparison to similar existing crossings, alternatives that met at-grade crossing traffic and safety requirements were developed and assessed by the DT members. If crossing conditions/factors change from that which are described in this study, the crossing will be required to be re-evaluated for traffic and safety operations by a new DT study.

It is recommended that all alternatives include the following:

- Install minimum required traffic control devices per MUTCD: retroreflective crossbuck sign (R15-1) and emergency contact informational plaque (I-13) fifteen feet before the track and a railroad crossing advance warning sign (W10-1) per Table 2C-4 of the MUTCD.
- Per the Policy, level approach grades with the top of rails ($\pm$ one inch) for at least 100 feet to prevent long low trailers from hitting the crossing.
- Clear vegetation within the PMRE ROW. Work required to attain minimum sight distance triangles outside of PMRE ROW may need permits, easements, or other clearance from landowners.
- Pave crossing approaches to edge of PRME ROW, or the edge of new RR pavement markings, except for the Big Lake Trail #2 crossing. Pavement limits for Big Lake Trail #2 will be determined during the design phase to accommodate dog sled stopping maneuvers. Paving the approaches to a railroad at-grade crossing can help avoid gravel being carried into the tracks.
- Per the Handbook, install grade crossing pavement markings, as described in the MUTCD, on paved approaches.
- Incorporate concrete crossing panels at crossings for public roadways and construct per ARRC Standard Plans 2.78-06.
- Per the *Technical Standards for Roadway, Trail, and Utility Facilities in the ARRC Right-of-Way* 2014, extend the grade crossing surface width a minimum of two feet beyond the edge of pavement or improved shoulder, whichever results in the greater crossing width.
- Construct six- to eight-foot shoulders. ATV's are allowed to use shoulders at low speeds to safely cross the railroad at the public road crossings.

The following subsections outlines unique features of each future crossing that should be considered in addition to the list above.

3.9.1 CEA Power Lines Access Road Alternative

The recommended alternative for the CEA Power Lines Access Road, as shown in Figure 15, involves relocating the existing private gates to allow vehicle storage for a 120-foot long truck-trailer between the stop bar for the train and the private gates.

The DT recommends to clear and maintain clearance of the vegetation within the sight distance triangles, even if extending beyond Rail ROW (sight distance clearing triangles are shown in Figure 16).

Due to the geometry of the tracks near the crossing, STOP control should be installed fifteen feet from the closest track. DO NOT STOP ON TRACKS (R8-8) signs are also recommended on each approach to this crossing due to the long design vehicle.

Per Exhibit 1 of the *Guidelines for Geometric Design of Very Low-Volume Local Roads* ($ADT \leq 400$) the total roadway width for industrial/commercial access roads (20 mph) is 20 feet. The alternative reflects one 16-foot lane with two-foot shoulders on each side.

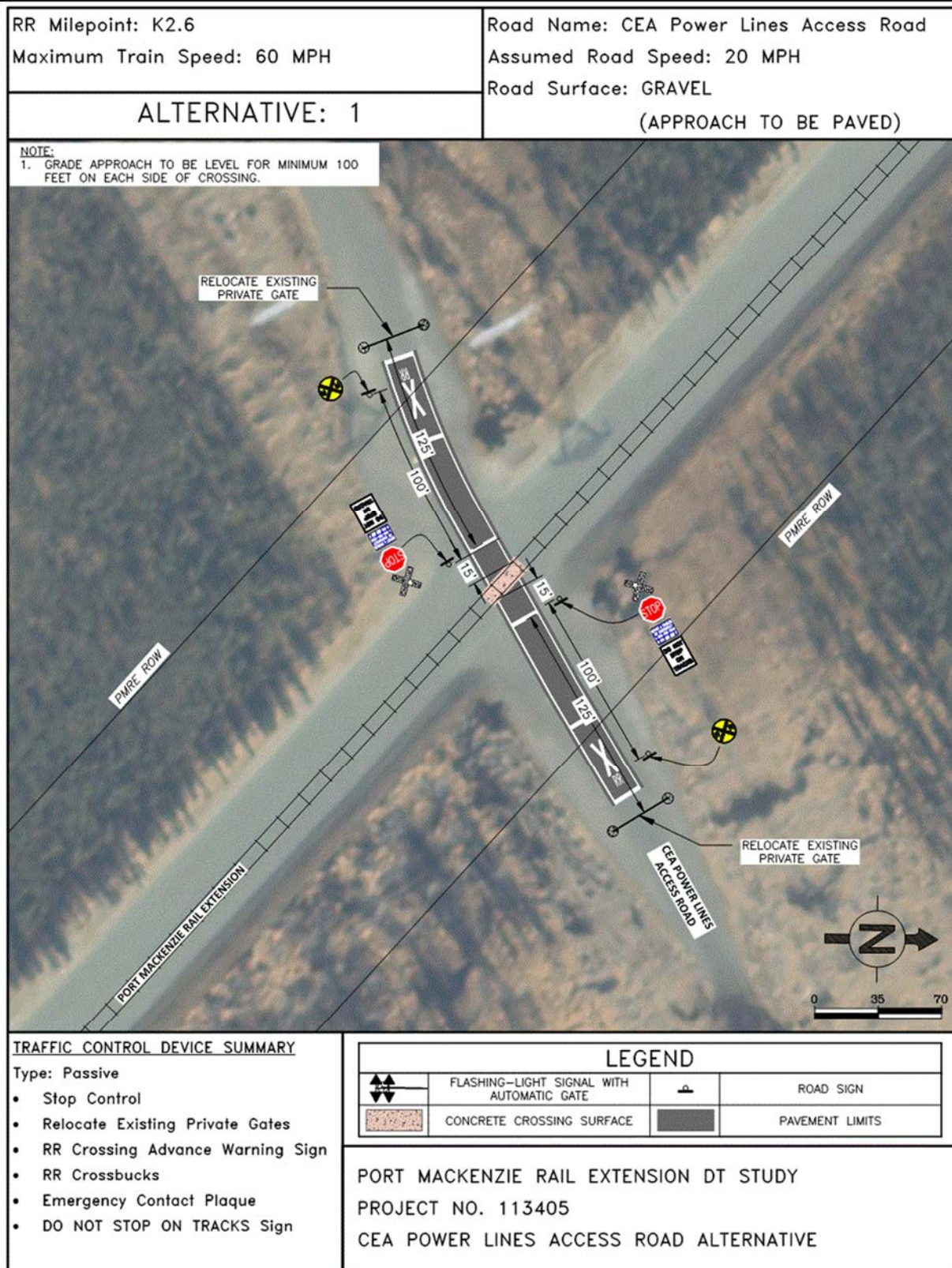


Figure 15: CEA Power Lines Access Road Preferred Alternative

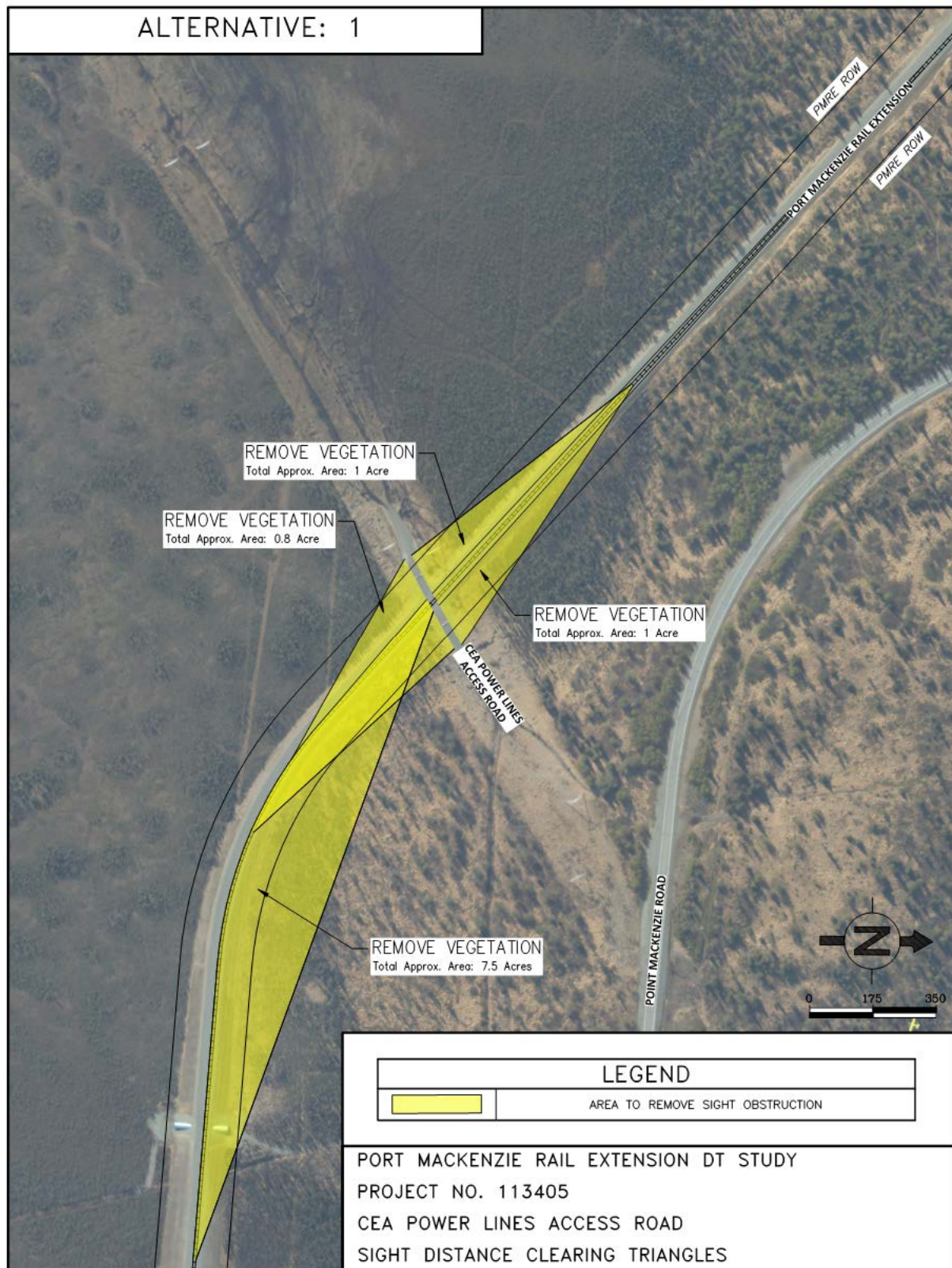


Figure 16: CEA Power Lines Access Road Clearing Triangles

3.9.2 Ayrshire Avenue Alternative

The recommended improvements for Ayrshire Avenue crossing are shown in Figure 17 on page 44. The DT recommends to clear and maintain clearance of the vegetation and terrain obstruction within the sight distance triangles, even if extending beyond Rail ROW and securing ROW rights is practical (sight distance clearing triangles are shown in Figure 18 on page 45).

This road is often traveled by non-local drivers, international drivers, and hazardous material (Haz-Mat) carrying vehicles. It has also been noted that the significant vertical curves within the vicinity of the crossing are often driven at high speeds. In addition, it is likely the area along Ayrshire Avenue will grow, increasing the traffic volume through the crossing. Flashing-Light Signals with Automatic Gates are recommended for this crossing. It is expected that drivers would not comply with only stop control. Crash cushions should be added to the gates on approach direction due to the speed of Ayrshire Avenue. Crash cushions also add a visual effect to slow down motorists. Installing active crossing protection would reduce the 2040 APV value from 0.021 to 0.008. In addition to gates, as Ayrshire Avenue traffic volume grows, pullout/stop lanes should be considered (similar to railroad crossing west of International Avenue and Spenard Road intersection in Anchorage, Alaska). This would provide an area, outside of the through travel lanes, where hazmat/commercial vehicles required to stop at railroad crossings can safely do so; mitigating risk of rear-end collisions.

The future crossing at Ayrshire Avenue lies in a sag vertical curve that is preceded by a crest vertical curve, limiting the sight distance along the road to the crossing. It is recommended the advance railroad crossing sign (W10-1) or additional advance warning signs be installed at a location before the crest peak that adequately warns motorists of the upcoming condition. In addition, Guernsey Road intersects Ayrshire Avenue fairly close to the future rail crossing. An additional highway-rail grade crossing advance warning sign (W10-4R) should be installed on Guernsey Road.

The alternative reflects two 12-foot lanes with six- to eight-foot shoulders. Shoulders are wide enough to allow ATVs to cross the railroad crossing on the shoulder at low speeds.

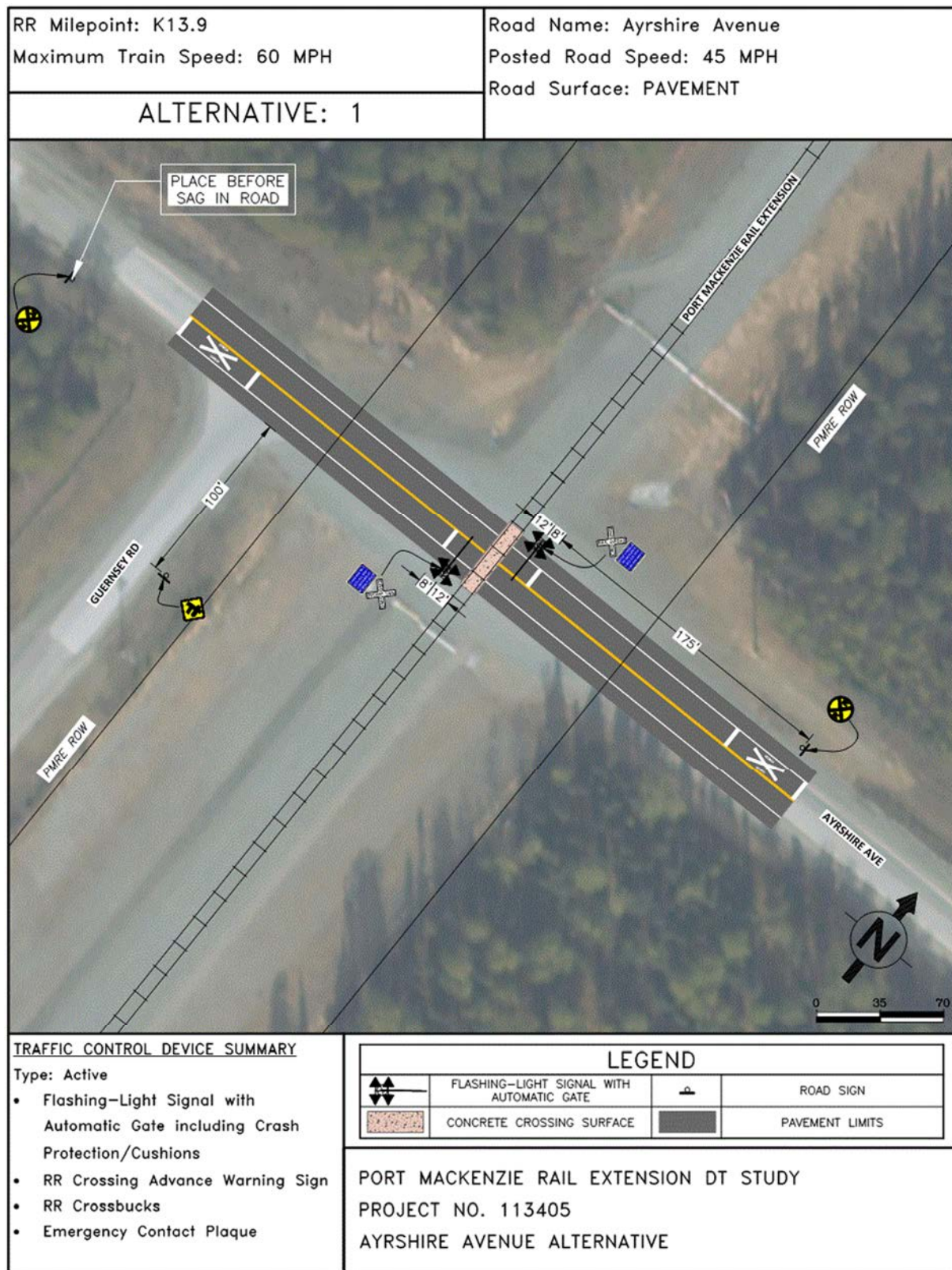


Figure 17: Ayrshire Avenue Preferred Alternative

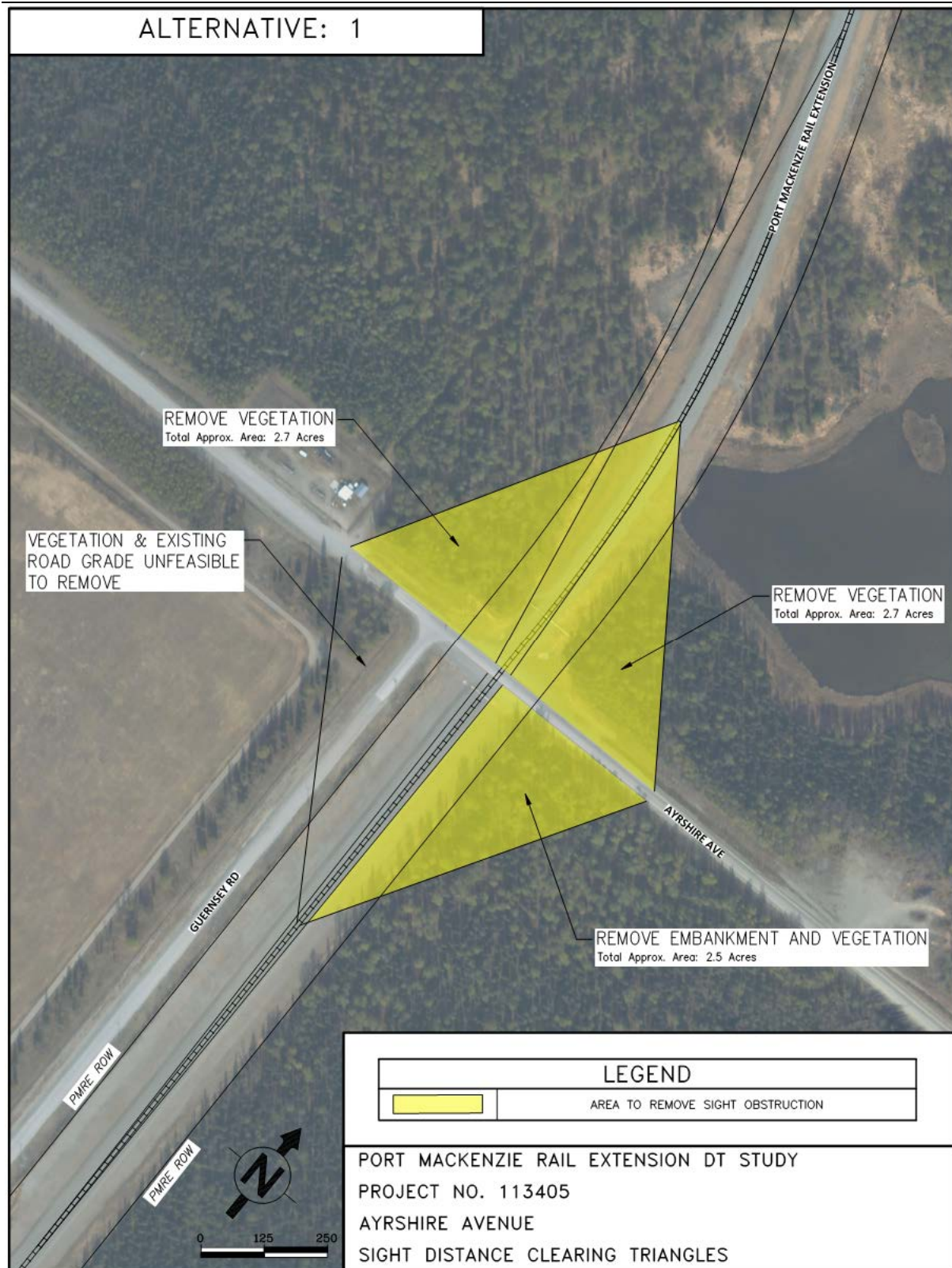


Figure 18: Ayrshire Avenue Clearing Triangles

3.9.3 Susitna Parkway Alternatives

Two short-term alternatives are presented for the Susitna Parkway crossing as shown in Figure 19 and Figure 20. The DT recommends to clear and maintain clearance of the vegetation and remove the northeast terrain view obstruction within the sight distance triangles, even if extending beyond Rail ROW (sight distance clearing triangles are shown in Figure 23). If sight distance triangles can be cleared, yield control should be installed fifteen feet from the closest track, as shown in the preferred Alternative 1. If sight distance cannot be met, stop control should be installed 15 feet from the closest track, as shown in Alternative 2.

In both alternatives, channelizing devices such as guardrail or concrete barrier should be installed for the approaching lane. The channelizing devices should be angled toward the lane to induce a narrowing effect, which will help encourage motorists to slow down. Object marker signs should be placed at the ends of the devices for enhanced conspicuity. The approach ends of the devices should be outside of the Clear Zone, as defined by the Alaska Highway Preconstruction Manual, or installed with a crash-worthy approved end terminal.

The alternatives reflect two 12-foot lanes with six- to eight-foot shoulders. Shoulders are wide enough to allow ATVs to cross the railroad crossing on the shoulder at low speeds.

The long-term alternative recommendation is to consolidate this crossing with the Papoose Twins Road crossing, as shown in Figure 21. One crossing would be eliminated and the other crossing would receive Flashing-Lights with Automatic Gates, see Figure 22. Construction of a road connecting the two routes west of the crossings would be required. It is expected that growth along Susitna Parkway will increase substantially more than Papoose Twins Road; therefore, anticipating to eliminate Papoose Twins Road crossing. However, at the time of design, the governing agency of the routes will determine which crossing to eliminate.

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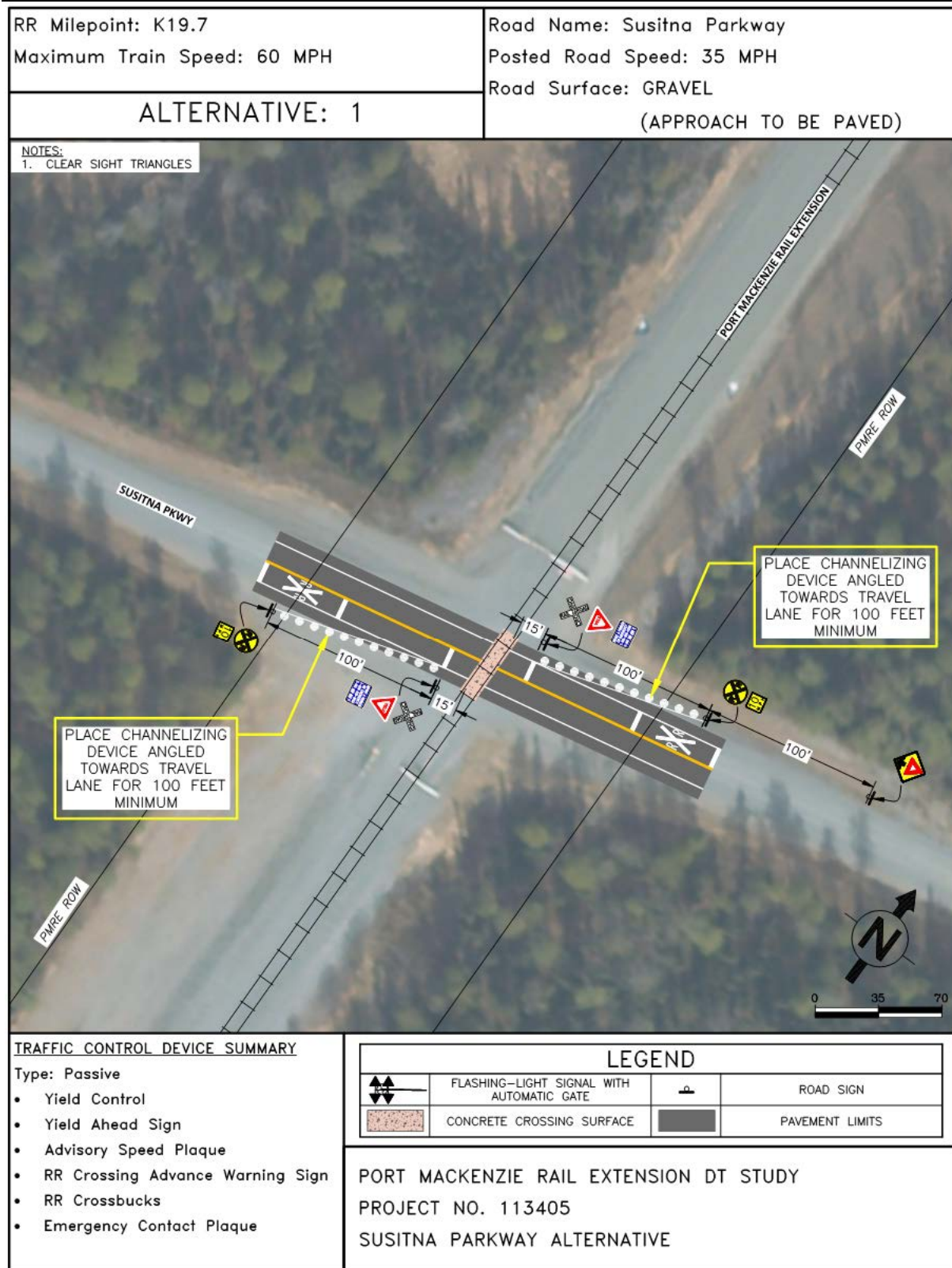


Figure 19: Susitna Parkway Preferred Alternative

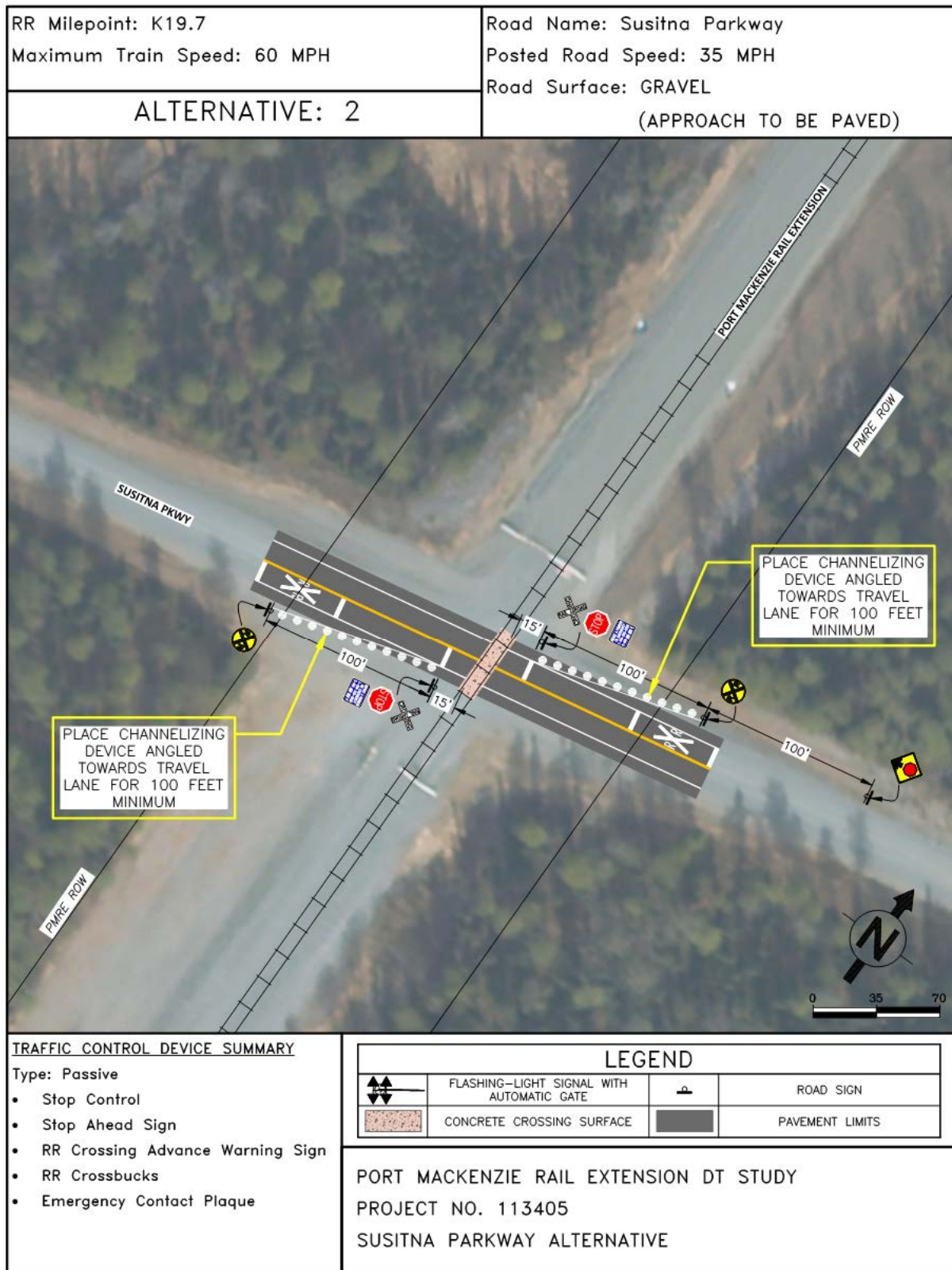


Figure 20: Susitna Parkway Alternative 2

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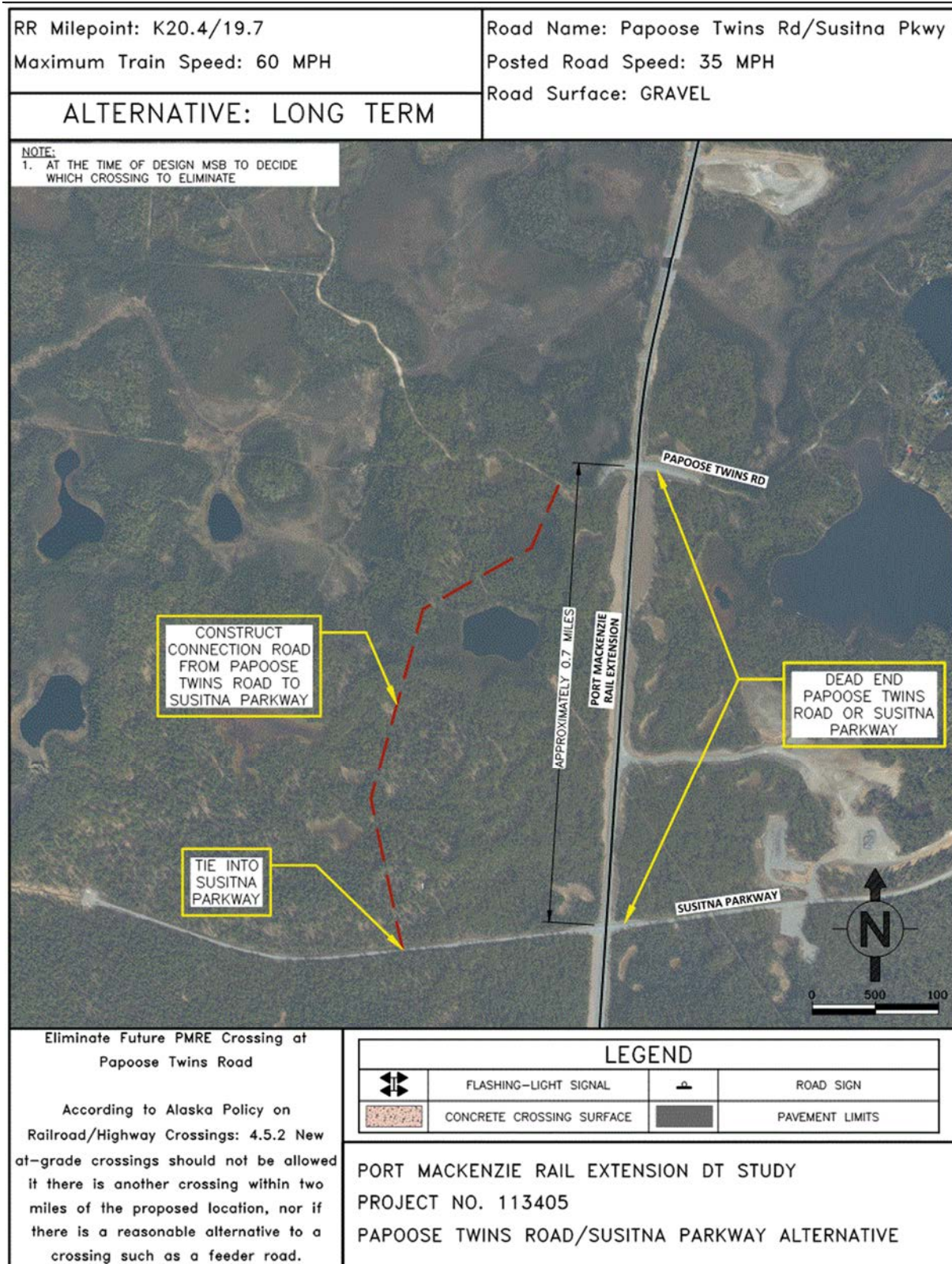


Figure 21: Susitna Parkway/Papoose Twins Road Long-Term Alternative

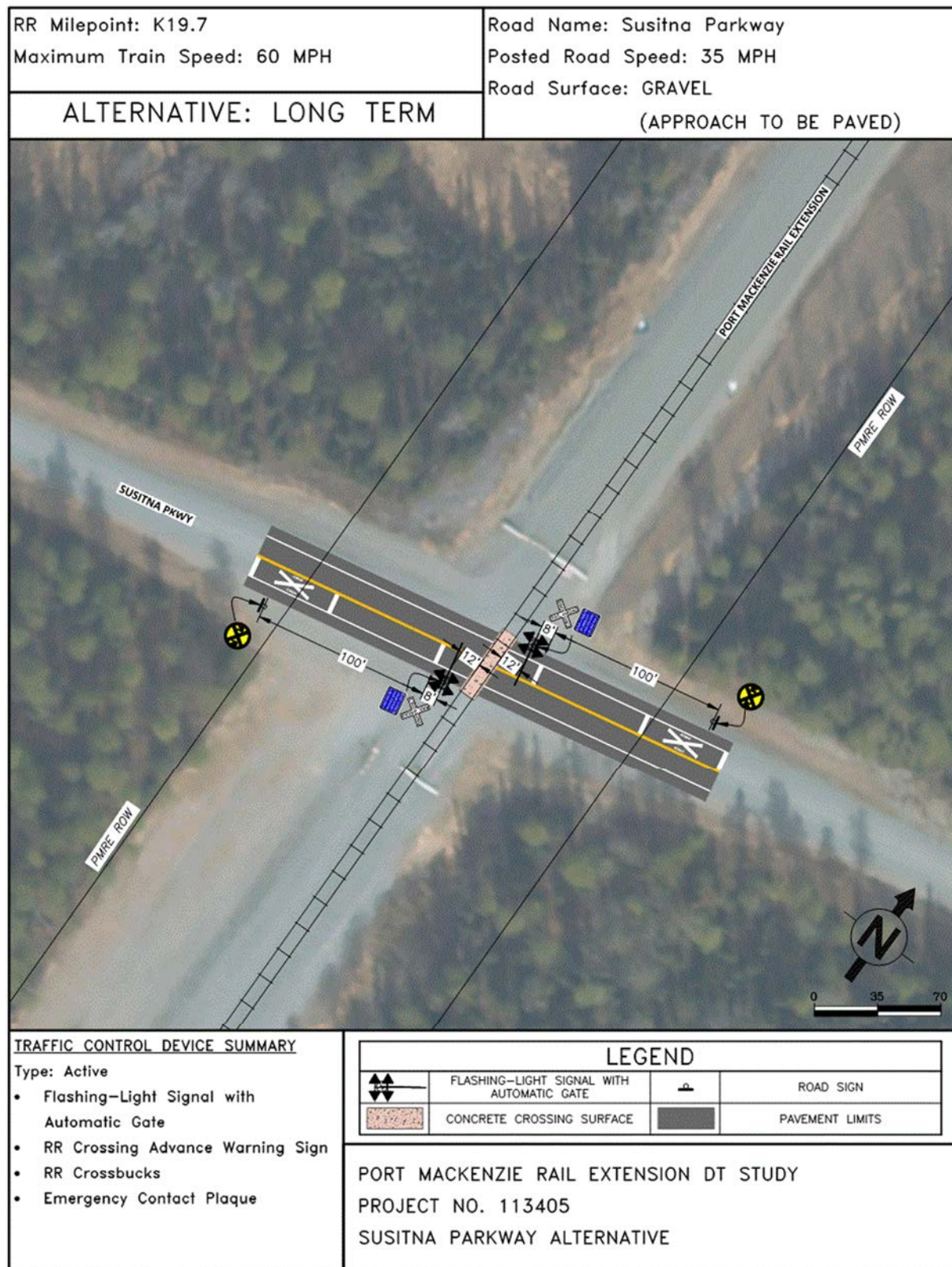


Figure 22: Susitna Parkway Long-Term Alternative Detail

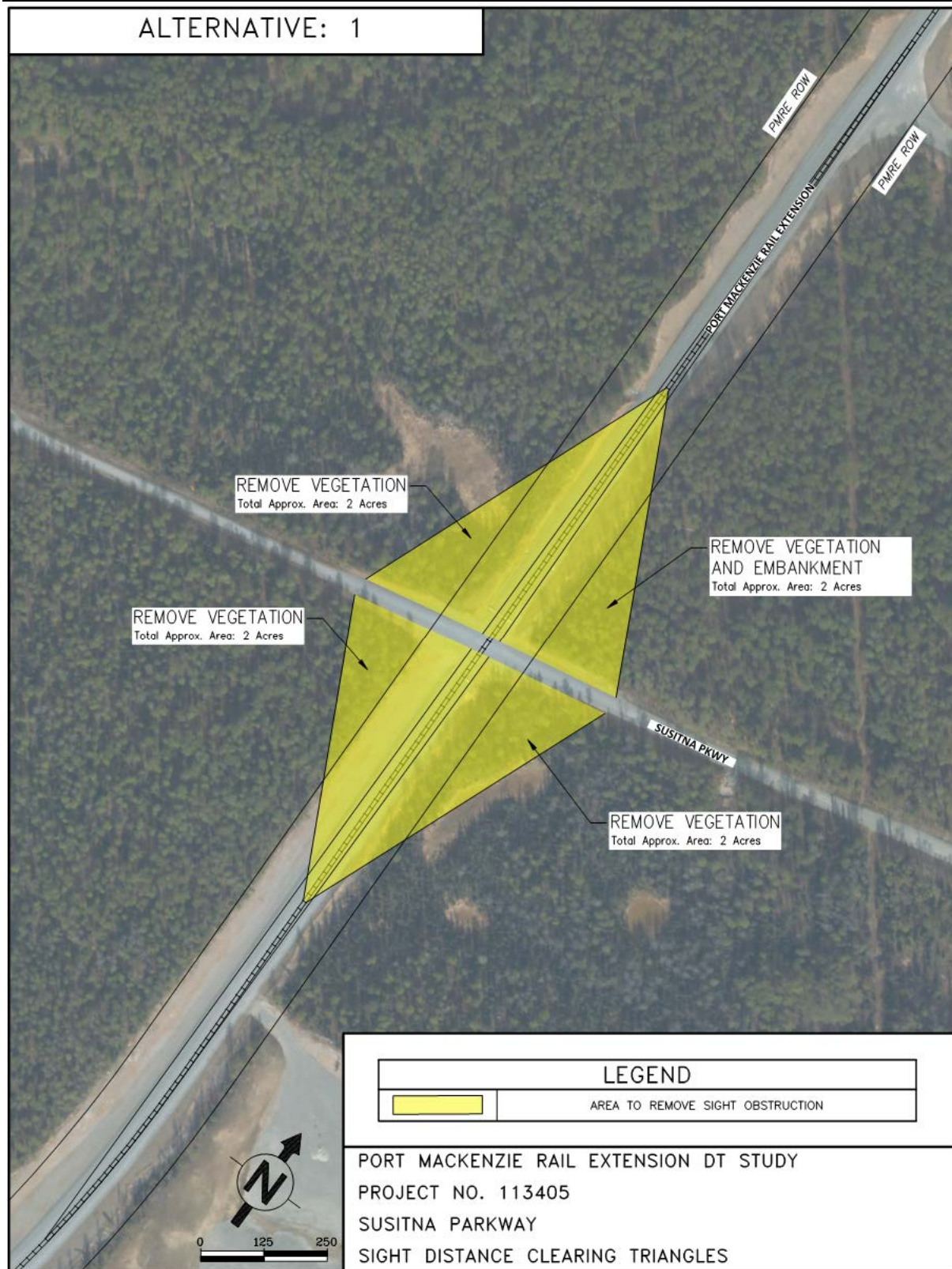


Figure 23: Susitna Parkway Clearing Triangles

3.9.4 Papoose Twins Road Alternative

The recommended improvements for the Papoose Twins Road crossing are shown in Figure 24. Removing the sight restrictions/steep cut-slope embankments within the sight distance triangles is not feasible for this location (see Figure 8 and Figure 26); therefore, the DT recommends installing stop control fifteen feet from the closest track.

There is an existing curve on the road west of the crossing. To enhance awareness of the upcoming stop control, a stop ahead sign (W3-1) should be placed before the curve for eastbound motorists.

Channelizing devices such as guardrail or concrete barrier should be installed for the approaching lane. The channelizing devices should be angled toward the lane to induce a narrowing effect, which will help encourage motorists to slow down. Object marker signs should be placed at the ends of the devices for enhanced conspicuity. The approach ends of the devices should be outside of the Clear Zone, as defined by the Alaska Highway Preconstruction Manual, or installed with a crash-worthy approved end terminal.

The alternative reflects two 12-foot lanes with six- to eight-foot shoulders. Shoulders are wide enough to allow ATVs to cross the railroad crossing on the shoulder at low speeds.

The long-term alternative recommendation is to consolidate this crossing with the Susitna Parkway crossing, as shown in Figure 21, with additional detail in Figure 25. See Section 3.9.3 for further information on this long-term alternative.

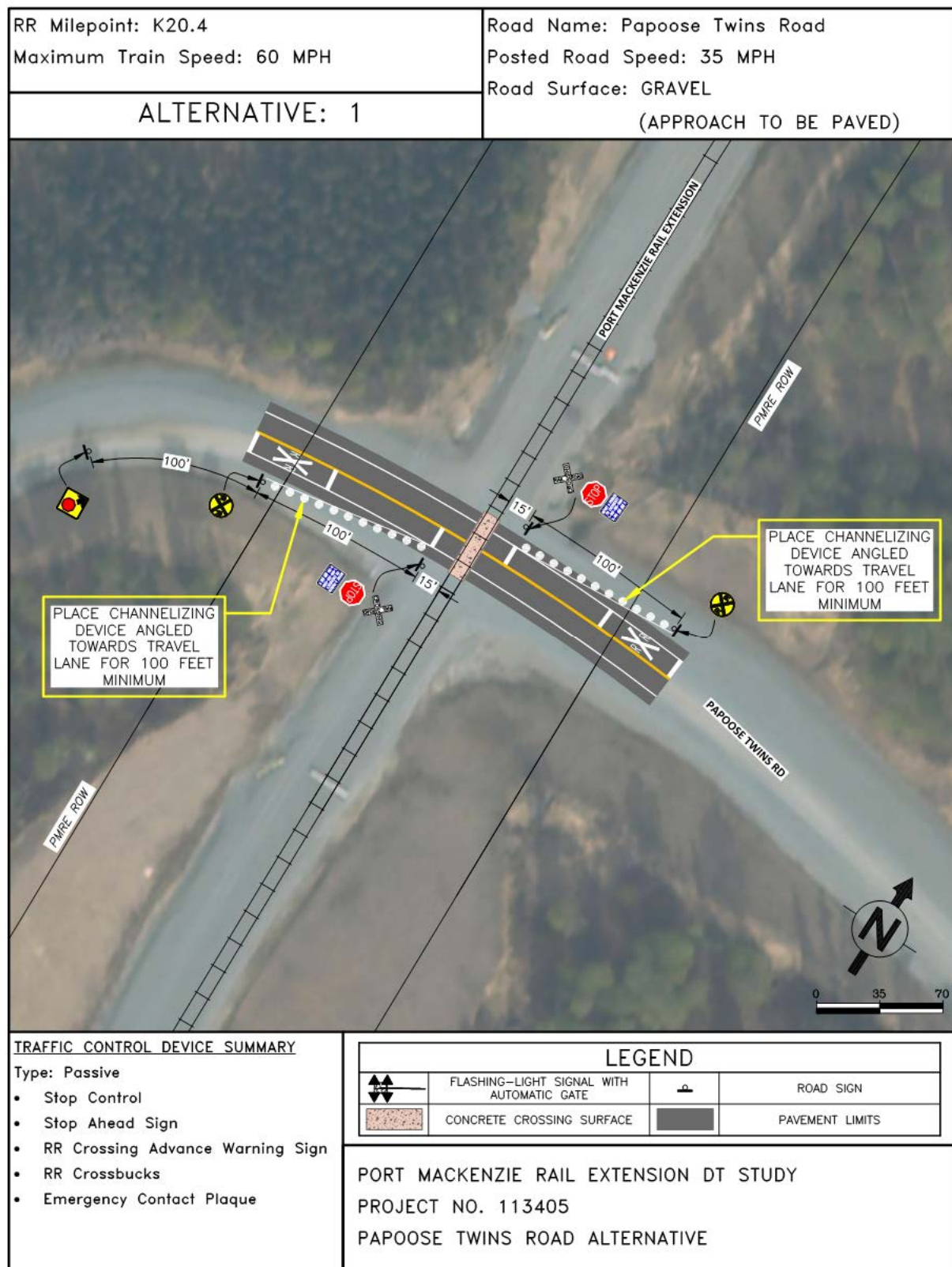


Figure 24: Papoose Twins Road Preferred Alternative

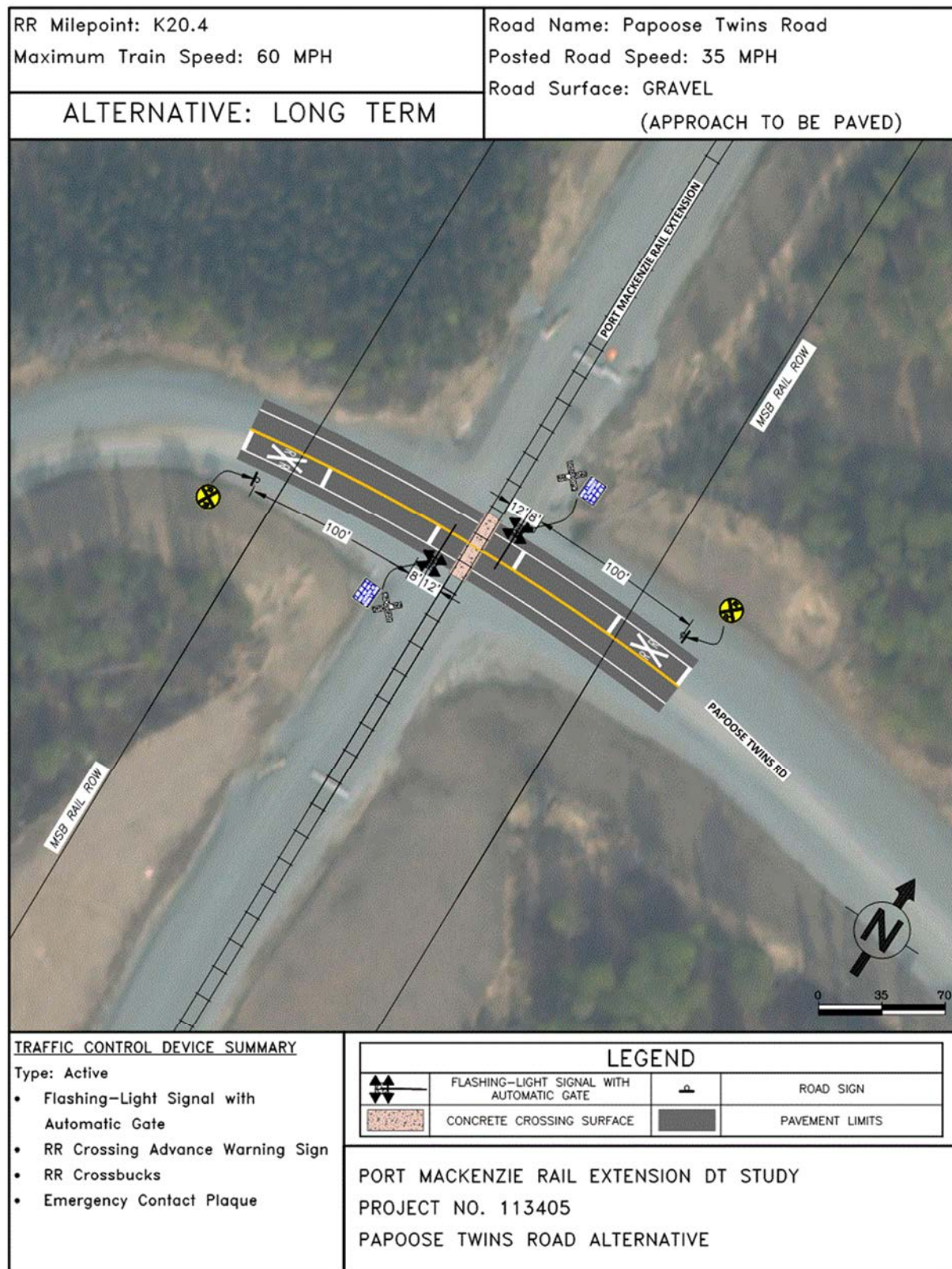


Figure 25: Papoose Twins Road Long-Term Alternative Detail

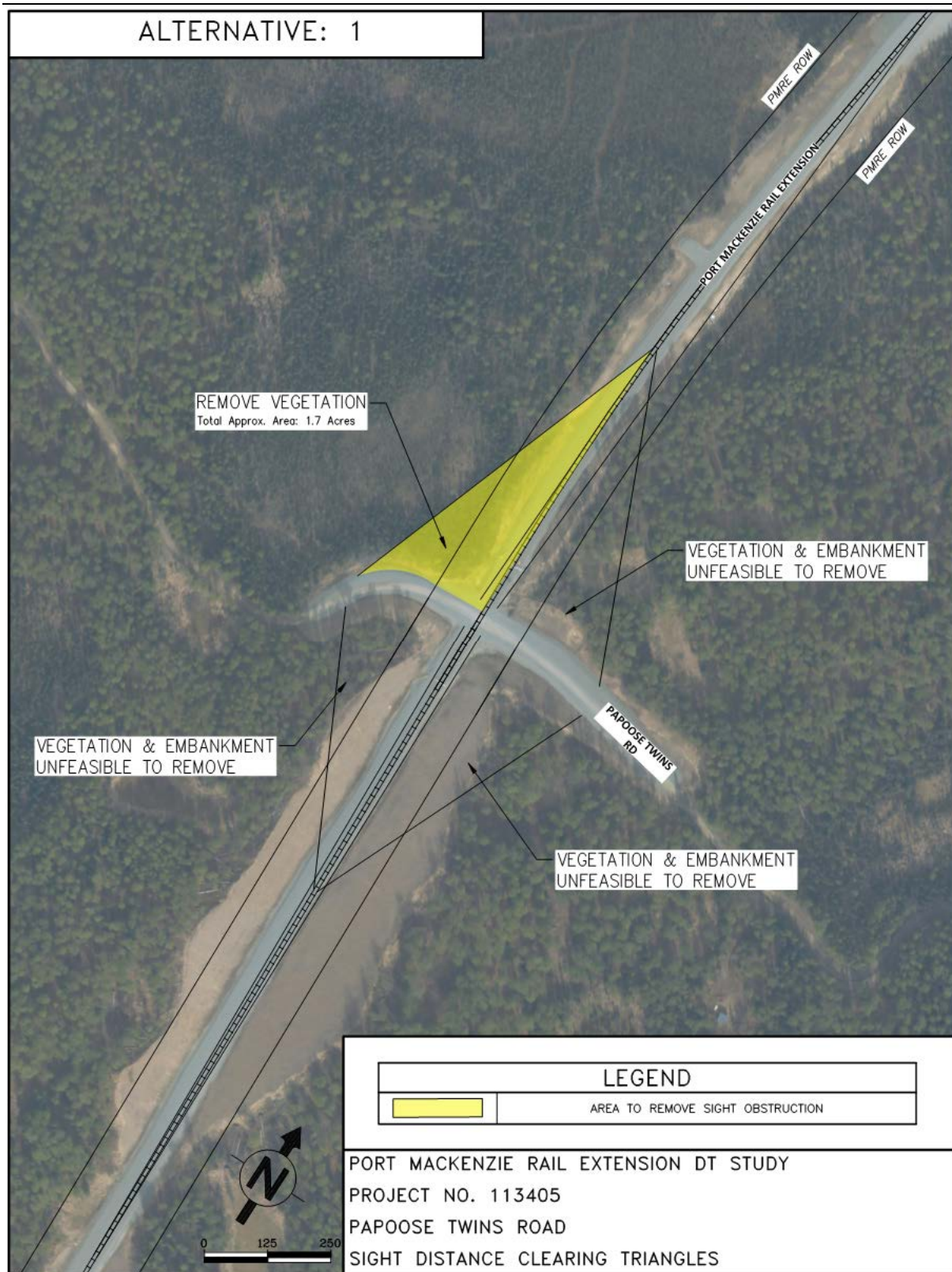


Figure 26: Papoose Twins Road Clearing Triangles

3.9.5 Natural Gas Access Road Alternative

The recommended improvements for the Natural Gas Access Road crossing are shown in Figure 27. The DT recommends to clear and maintain clearance of the vegetation within the sight distance triangles, which are within the Rail ROW (sight distance clearing triangles are shown in Figure 28).

It is recommended that STOP control should be installed fifteen feet from the closest track.

Private gates are also recommended to be installed to maintain restricted access across the crossing. The gates should be installed with enough storage distance between the stop bar and the gate to allow at least one design vehicle to stage. Access to open the private gates should be given to the leaseholder of the crossing and the owner/maintainer of the road.

Per *Exhibit 1 Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)* the total roadway width for industrial/commercial access roads (less than 15 mph) is 20 feet. The alternative reflects one 16-foot lane with two-foot shoulders.

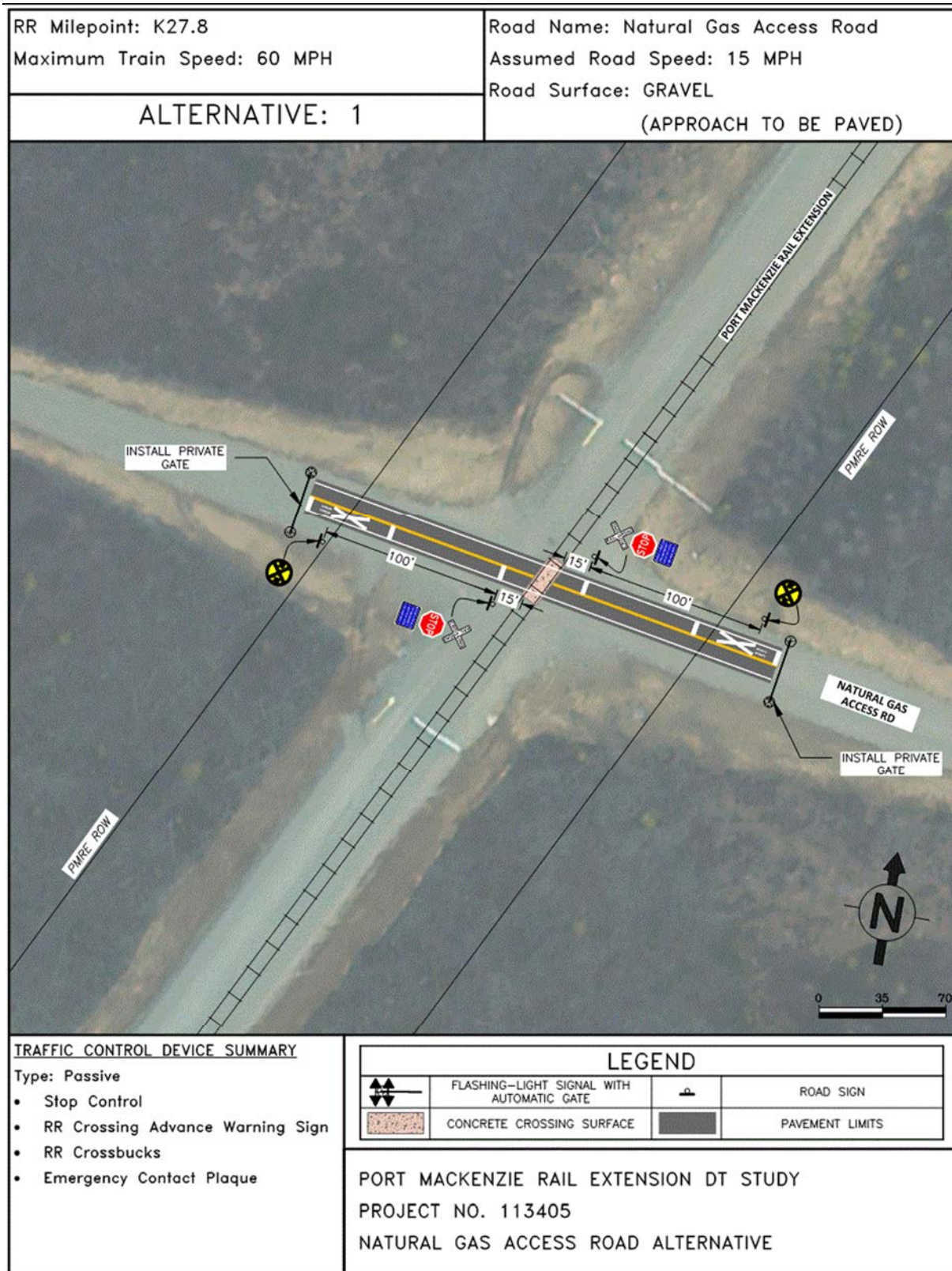


Figure 27: Natural Gas Access Road Preferred Alternative

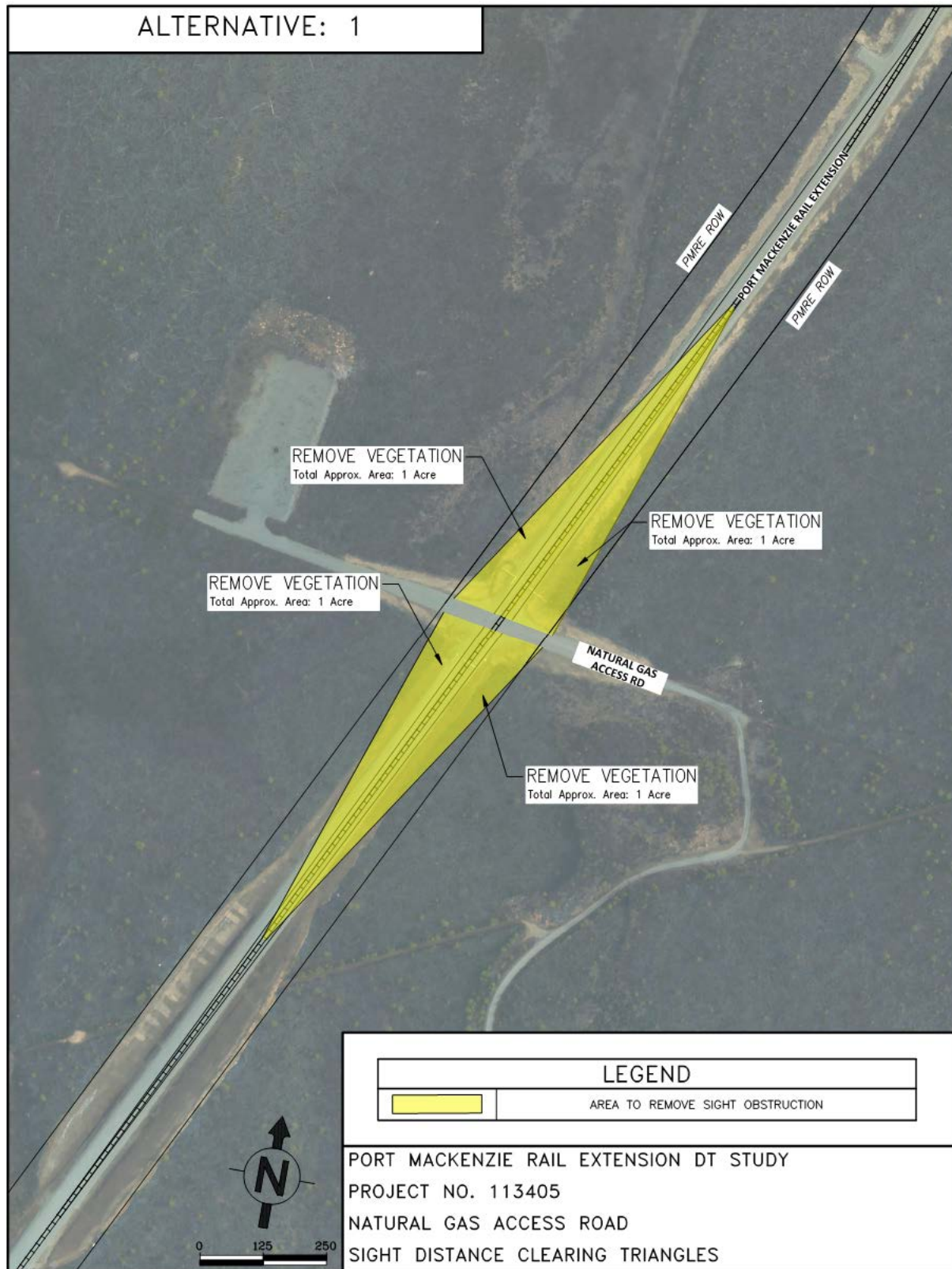


Figure 28: Natural Gas Access Road Clearing Triangles

3.9.6 Big Lake Trail #2 Alternative

The recommended improvements for the Big Lake Trail #2 crossing are shown in Figure 29. The DT recommends to clear and maintain clearance of the vegetation within the sight distance triangles, even if extending beyond Rail ROW (sight distance clearing triangles are shown in Figure 30).

The main users of this crossing would be snowmachine operators and dog sled mushers. It is assumed that snowmachine operators would most likely not adhere to stop signs; therefore, it is recommended that yield control be installed fifteen feet from the closest track. All traffic control devices are recommended to be placed on both the left side and right side of the approaches for enhanced conspicuity. The DT recommends additional highway-rail grade crossing advance warning signs, LOOK (R15-8) signs, and DO NOT STOP ON TRACKS (R8-8) signs on both approaches.

Pavement hinders dog sled braking mechanics. During the design phase of this crossing, it is recommended that the extend of paving be designed as to not encroach in the area needed for dog sleds to come to a complete stop, yet still effectively minimize gravel from being carried onto the tracks.

In addition, channelizing devices such as guardrail or concrete barrier should be installed on the approach side of the trail. Channelizing devices could be considered along the opposing lane. The opposing lane channelizing devices should be offset fifty feet away from the tracks, so as to not cause a pinch point and trap users on the tracks. staggered fifty feet from the start of the approach lane device. The channelizing devices should be angled toward the trail travel way to induce a narrowing effect, which will help slow down trail users. The throat of the narrowing devices should be wide enough to accommodate trail grooming equipment. Object marker signs should be placed at the ends of the devices for enhanced conspicuity.

The alternative reflects a 25-foot wide trail, per the plan of the Port MacKenzie Trail Relocation project.

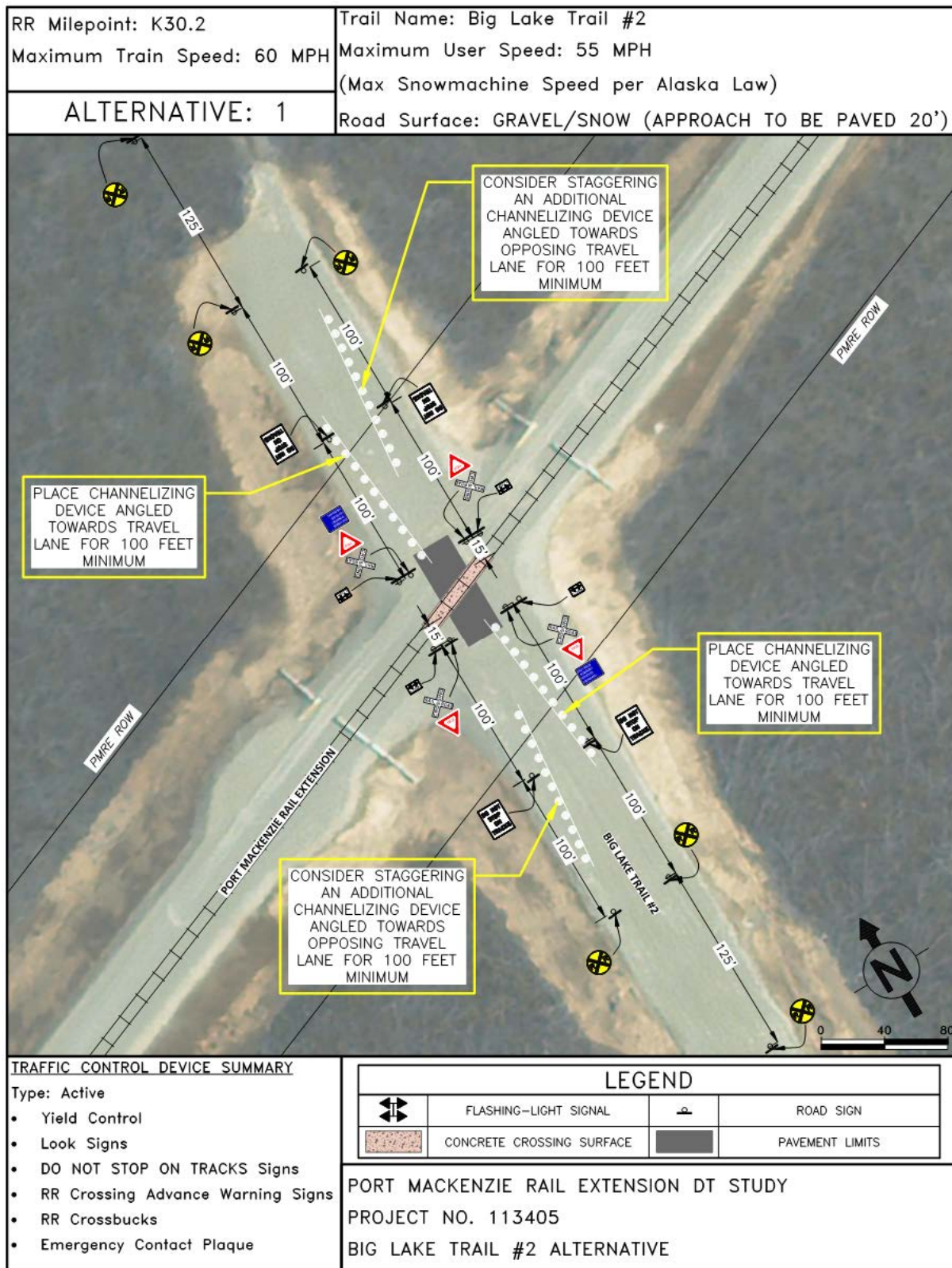


Figure 29: Big Lake Trail #2 Preferred Alternative

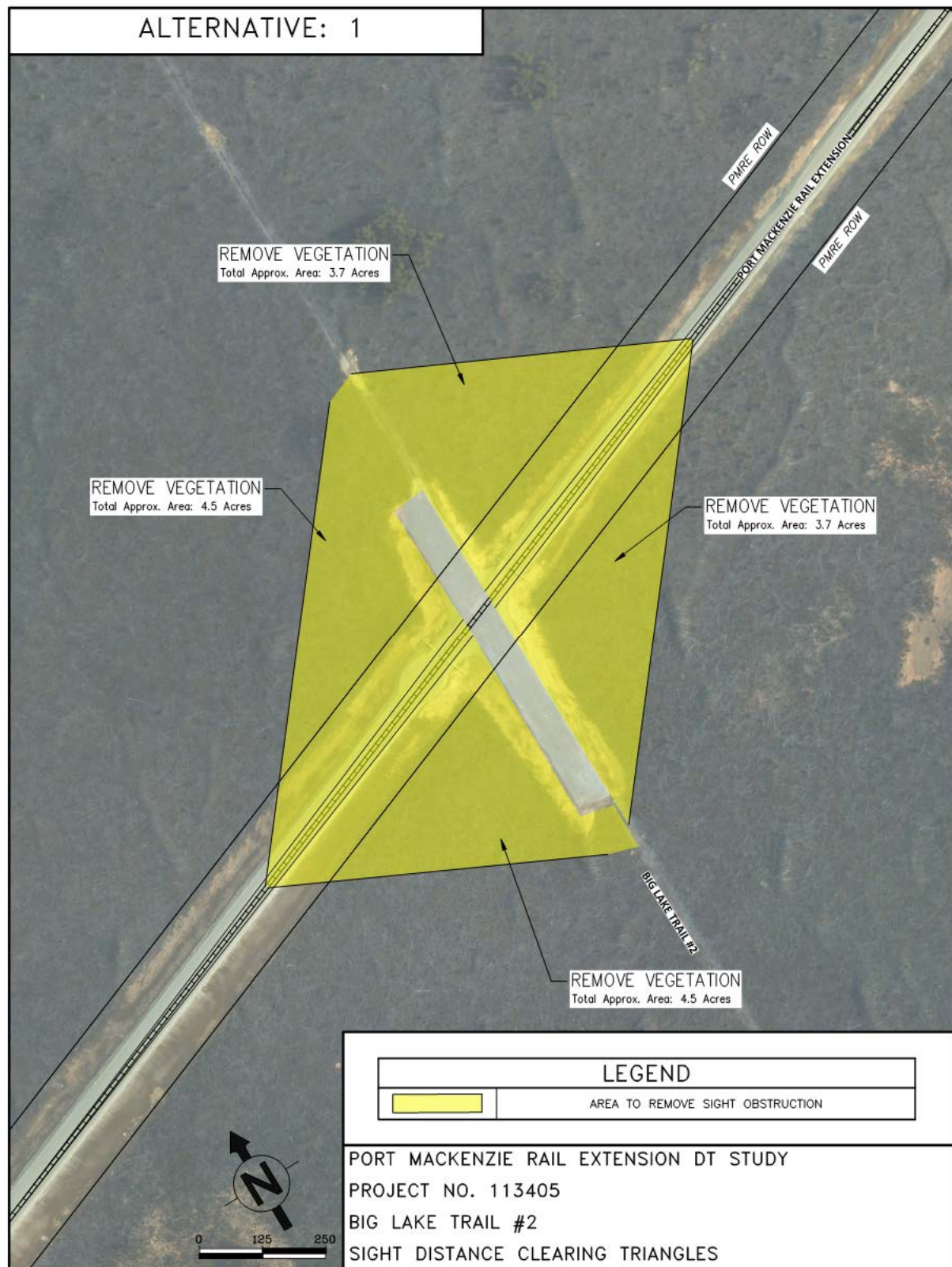


Figure 30: Big Lake Trail #2 Clearing Triangles

3.9.7 Millers Reach Road Alternatives

One short-term alternative is presented for the Millers Reach Road crossing as shown in Figure 31. The skew angle of Millers Reach Road and the tracks is less than the Policy minimum of 75 degrees. Millers Reach Road should be realigned to meet the skew angle minimum and be as close to 90 degrees as feasible. It is beneficial to shift the road to the north to correct the skew as it will only affect one landowner and assist to acquire ROW for the long-term grade-separated plans, as described below.

The vegetation should be cleared and maintained within the sight distance triangles of the alternative, as shown in Figure 32. Active traffic control, including flashing-light signals with automatic gates, should be installed perpendicular to the roadway. Installing active crossing protection would reduce the 2040 APV value from 0.013 to 0.009.

The alternative reflects two 12-foot lanes with six- to eight-foot shoulders. Shoulders are wide enough to allow ATVs to cross the railroad crossing on the shoulder at low speeds.

Long-term alternative for Millers Reach Road should include an alternate access for the subdivision west of the crossing. Currently, the road is the only access to and from the subdivision. If the future crossing should become impassible at any point, emergency and other access to and from the subdivision would be unavailable. Creating an alternate access through the Natural Gas Access Road crossing or the Big Lake Trail #2 crossing would mitigate the issue.

Long-term plans for the PMRE-Millers Reach Road crossing are to grade-separate this crossing. The intent is to shift the crossing to the north and re-construct the road to be an overpass of PMRE. This will eliminate the risk of conflict and the need for crossing protection.

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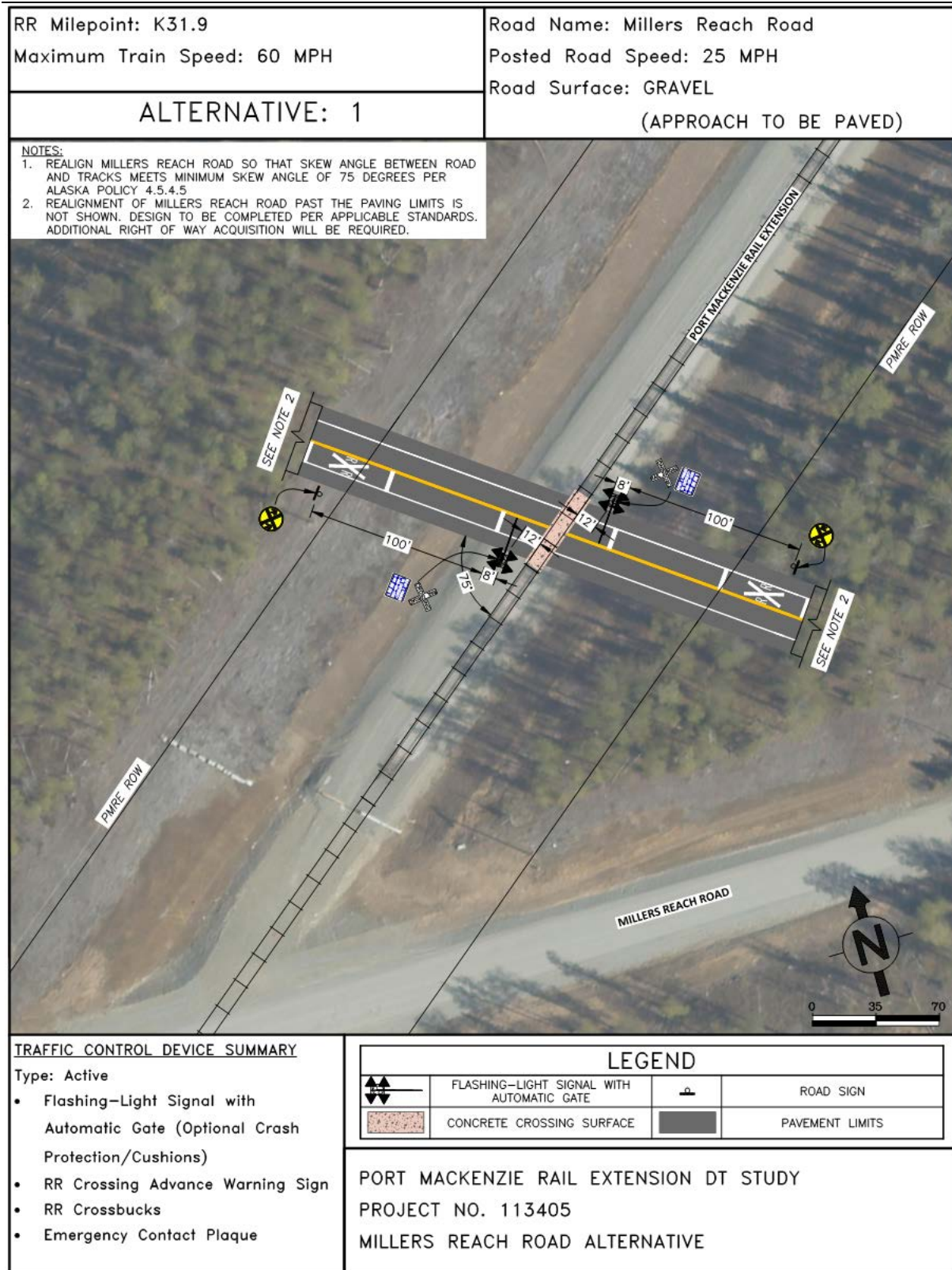


Figure 31: Millers Reach Road Preferred Alternative

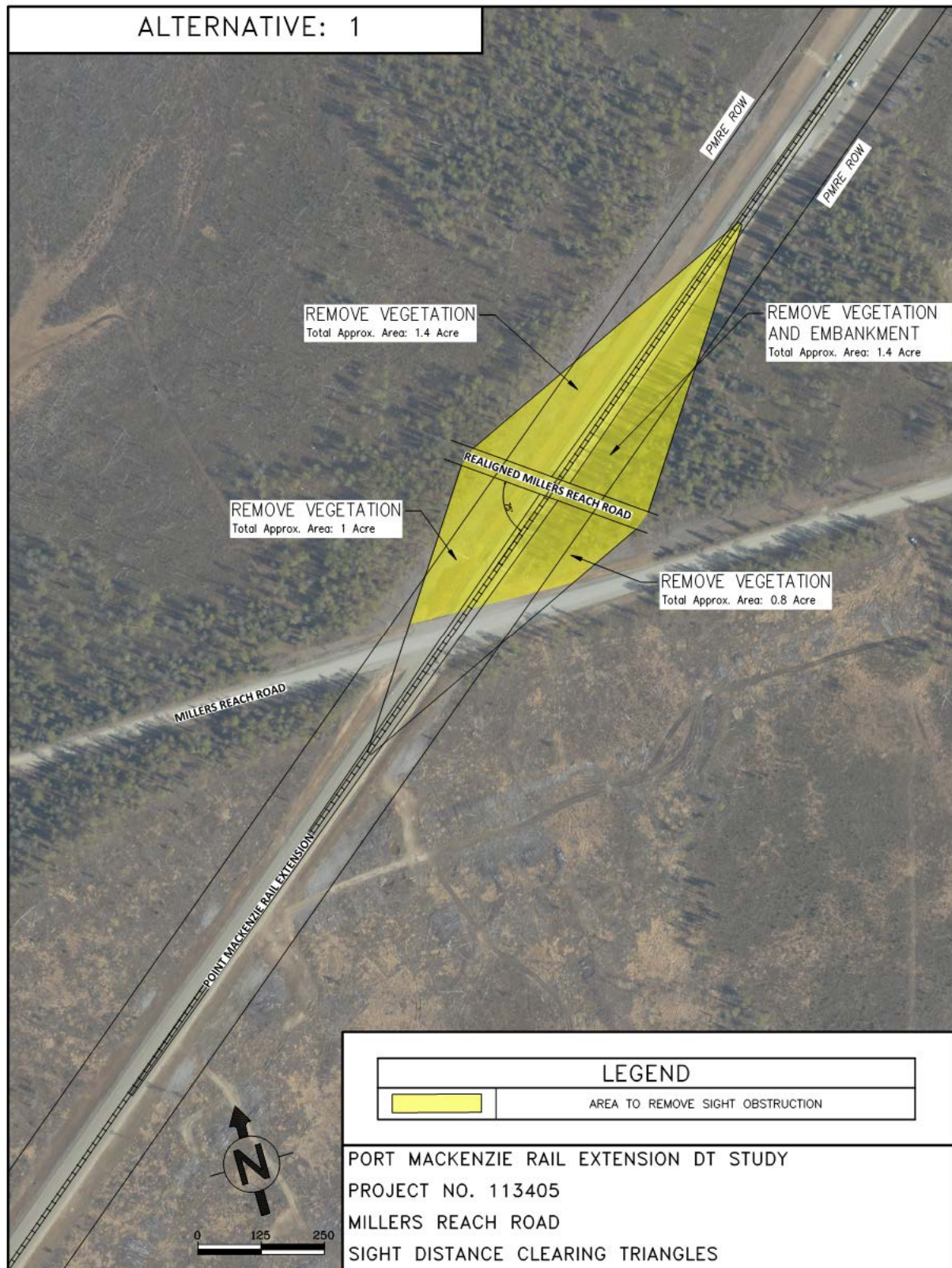


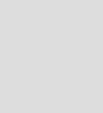
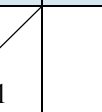
Figure 32: Millers Reach Road Clearing Triangles Preferred Alternative

4 Summary

The following is a summary of the DT recommendations for the PMRE future at-grade railroad-road and railroad-trail crossings:

- Install traffic control and clear vegetation as outlined in Table 20.
- Construct approach grades so they are level with the top of the rail for at least 100 feet.
- Pave crossing approaches as shown in the alternative figures. Ensure paving shoulders to accommodate ATVs.
- Install grade crossing pavement markings as described in Chapter 8 of the MUTCD.
- Install concrete crossing surface a minimum of two feet beyond the edge of the roadway shoulder.

Table 20: Comparison of Alternatives

Study Area ID	Future Crossing Alternatives	Road/Trail Ownership/ Maintenance ¹	2019		2040		Type	2040 APV with Alternative Crossing Protection	Traffic Control	Flashing-Light Signal and Automatic Gates	R15-1	I-13	W10-1	R1-1	R1-2	W3-2 / W3-1	R8-8	W10-4R	R15-8	W13-1	Additional DT Recommendations/ Remarks
			AADT	APV	AADT	APV															
1	CEA Power Lines Access Rd	CEA	1	0.002	1	0.002	Passive	0.002	Stop		2	2	2	2			2				- Relocate the existing private gates - Clear vegetation within SD triangles
2	Ayrshire Ave	MSB	400	0.019	600	0.021	Active	0.008	Flashing Lights with Automatic Gates	2	2	2	2					1			- Clear vegetation within SD triangles - Sight distance restricted by Guernsey Rd
3	Susitna Pkwy - Preferred	MSB	280	0.009	450	0.007	Passive	0.007	Yield (SD met)		2	2	2		2					2	- Clear vegetation within SD triangles - Remove northeast embankment - Add channelizing devices
	Susitna Pkwy - Alternative 2						Passive	0.007	Stop (SD not met)		2	2	2	2							Add channelizing devices
	Susitna Pkwy – Long Term						Active	0.005	Flashing Lights with Automatic Gates	2	2	2	2								- Eliminate Papoose Twins Rd Crossing - Construct road connecting Papoose Twins Rd and Susitna Pkwy west of crossings
4	Papoose Twins Rd	MSB	70	0.006	100	0.007	Passive	0.007	Stop		2	2	2	2							- Clear vegetation within northwest quadrant - Add channelizing devices
	Papoose Twins Rd – Long Term						Active	0.005	Flashing Lights with Automatic Gates	2	2	2	2								- Eliminate Susitna Pkwy Crossing - Construct road connecting Papoose Twins Rd and Susitna Pkwy west of crossings
5	Natural Gas Access Rd	MHTLO	1	0.002	1	0.002	Passive	0.002	Stop		2	2	2	2							- Clear vegetation within southwest quadrant - Add private gates
6	Big Lake Trail #2	MSB	10	0.003	15	0.004	Passive	0.004	Yield		4	2	6		4		4		4		- Clear vegetation within SD triangles - Add channelizing devices
7	Millers Reach Rd – Preferred	Houston	500	0.011	750	0.013	Active	0.009	Gates	2	2	2	2								- Realign Millers Reach Road for skew angle >75° - Clear vegetation within SD triangles
	Millers Reach Rd – Long Term						N/A	N/A	N/A												Construct alternative access to/from subdivision west of crossing. Tie into Big Lake Trail #2 crossing or Natural Gas Access Rd crossing.
	Millers Reach Rd – Long Term						N/A	N/A	Grade-Separate												Reconstruct Millers Reach Rd to be an overpass north of crossing location.

5 Diagnostic Team Report Approval

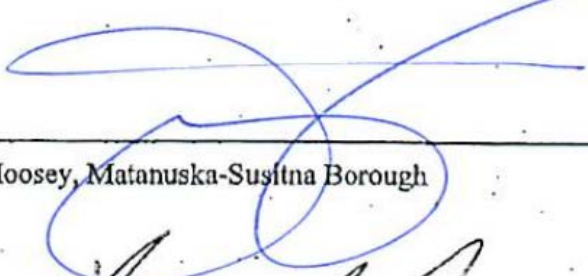
Signed:



Brian Lindamood, Alaska Railroad Corporation

9/5/19

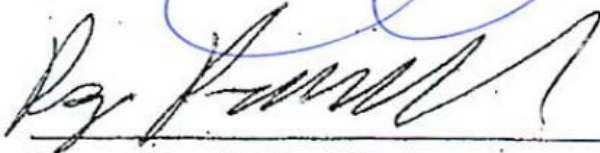
Date



John Moosey, Matanuska-Susitna Borough

9.11.19

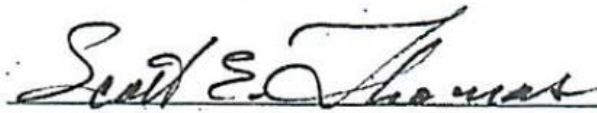
Date



Raymond Russell, City of Houston

9/5/19

Date



Scott Thomas, Alaska Department of Transportation & Public Facilities

9/4/19

Date

¹ Final crossing owner and/or maintenance responsibility to be determined during lease negotiations.

Attachment A
DT Meeting Summary

Project: Port MacKenzie Rail Extension
Project No. 113405

Meeting: Diagnostic Team Study Meeting

Date/Time: April 2nd, 2019; 9:30 a.m.

Location: Meeting: Curtis D. Menard Sports Complex
Site Visit: Grade Crossings at Millers Reach Road, Natural Gas Access Road, Big Lake Trail #2, Ayrshire Avenue

Attendees: Jessica Miranda, Jeanne Bowie, and Heather Edic with Kinney Engineering (KE)
Rachel Maddy and Gabriel Thomas with the Alaska Railroad Corporation (ARRC)
Jon Knowles and Sarah Riopelle (Meeting and Site Visits: Millers Reach Road, Big Lake Trail #2) with Alaska Department of Transportation and Public Facilities (DOT&PF)
Brad Sworts and Mike Weller with Matanuska-Susitna Borough (MSB)
Heidi Hansen with Cook Inlet Region, Inc. (CIRI)
James Keel (Meeting and Site Visits: Millers Reach Road, Big Lake Trails #2, Natural Gas Access Road) and John Fairchild (Meeting Only) with Western Lakes Fire District (WLFD)
Ray Russell (Meeting and Site Visits: Millers Reach and Big Lake Trail #2) with Houston Public Works
Jené Hodges and Jessie Laub-Elkins (Meeting Only) with First Student
Bob Charles (Meeting Only) with Knik Tribe
Christian Vierhuff (Meeting Only) with Chugach Electric Association Inc. (CEA)

The Diagnostic Team (DT), as listed under Attendees, met at Curtis D. Menard Sports Complex to perform a DT study of the future at-grade railroad-road and railroad-trail crossings at Millers Reach Road, Natural Gas Access Road, Big Lake Trail #2, Papoose Twins Road, Susitna Parkway, Ayrshire Avenue, and CEA Power Lines Access Road along the Port Mackenzie Rail Extension Project. An overview of the purpose and need of the design project was presented, followed by a review and discussion on the existing conditions and proposed design alternatives. Following the discussion, the interested parties performed site visits to Millers Reach Road, Natural Gas Access Road, Big Lake Trail #2, and Ayrshire Avenue to verify existing conditions and further discuss design alternatives. Papoose Twins Road and Susitna Parkway could not be visited due to road conditions. CEA Power Lines Access Road was elected to not be visited because it is a private crossing with existing private gates.

Below is a summary of the comments from the meeting.

General Comments:

- Analysis was completed using two day-trains per day projection, but trains will run whenever vessels arrive at the Port. Even if the scheduled arrival time for vessels is during the day, weather or other conditions may delay a vessel; therefore, there is a possibility of trains running during the night.
- All road crossings need wide enough shoulders to accommodate ATVs at the crossing (Pittman Rd Example).
- All crossing approaches will be paved to edge of Alaska Railroad Corporation (ARRC) right of way except for the trail which will most likely be paved 20 feet on each approach; therefore, appropriate pavement markings are to be added to the alternatives.
- Work required to attain recommended sight distance triangles (Case I or Case II) may need permits, easements, or other clearance from land owners.
- The area of the Port MacKenzie Rail Extension, including the at-grade crossings, is highly used by snowmachines, hunters, fishers, and by out of state and international visitors.

MP K31.9 - Millers Reach Road Crossing Comments:

- Road Ownership: City of Houston
- Crossing Maintenance: City of Houston or Matanuska-Susitna Borough (MSB)
- Train Speed may be intended at 45 mph in this location; however, final train speed designation is still undetermined.
- First Student commented that 7-9 buses would pass this crossing per day
- An industrial park may eventually be located off of Millers Reach beyond the crossing

Condition	Deficiency	Meeting or On-Site Recommendation and/or Comment
Existing	Case I (moving vehicle @ 25 mph) sight distance is not met in all quadrants. Vegetation in all quadrants and the embankment in the northeast quadrant inhibits vehicles from seeing a train at the required case I sight distance down the track.	Clear vegetation within the Case I sight distance triangles, even if extending beyond ARRC right of way. Remove embankment in northeast quadrant within sight distance triangle.
Existing	Skew Angle is less than 75 degree minimum	Realign Millers Reach Road to fix skew angle or add flashing-light signal with automatic gates perpendicular to the roadway. Kinney Engineering to check storage distance maximums. If installing automatic gates does not meet clear storage distance standards, consider installing double gates with a median as a design alternative. City of Houston ROW is typically 30 feet from road centerline. Clear newly established Case I sight distance triangles.

MP K30.2 - Big Lake Trail #2 Crossing Comments:

- Trail Ownership:
- Crossing Maintenance: TBD
- Assumed Trail Speed: According to the Alaska Snowmobile Safety Laws, Rules, and Regulations 2002-3003 per AAC 13.02.275 the maximum speed limit for a roadway other than alley, business, or residential, is 55 mph (40 mph in the dark).
- Main Users: Snowmachines and Dog Musers
- Snowmachines are loud and riders may not be able to hear the train horn.

Condition	Deficiency	Meeting or On-Site Recommendation and/or Comment
Existing	Case I (moving vehicle @ 55 mph) sight distance is not met in all quadrants. Vegetation inhibits a vehicle from seeing a train at the required case I sight distance down the track.	Clear vegetation within the Case I sight distance triangles, even if extending beyond ARRC right of way. Surface permit from Knikatu Inc.
User	Hard to determine speed of trail users: AAC 13.92.275 states no person may drive a vehicle at a speed greater than is reasonable and prudent considering the traffic, roadway, and weather conditions.	Consider adding something to the trail approach similar to a roundabout that would slow down trail users. Consider dog sled team minimum turning radius in design.
Alternative 1: Stop Control, Look, Do Not Stop on Tracks	Snowmachines will most likely not stop at the stop signs.	Yield Control preferred to stop control with clearing of sight triangles and additional signage.
Alternative 2: Yield Control with Flash-Light Signal	Electrical power would be expensive to install at this location. Flashing lights are very expensive to maintain and three phase power would be needed. Lights installed in a remote area are likely to be vandalized.	Yield Control without Flashing-Light Signal. Install all warning signs on both sides on the approach (left and right) and adding additional advanced warning signs.

MP K27.8 - Natural Gas Access Road Crossing Comments:

- Road Ownership: Mental Health Trust Land Office (MHTLO)
- Crossing Maintenance: MHTLO
- Assumed Road Speed: 10 mph
- Private Crossing: There is an existing gate at the beginning of the access road.
- MHTLO requested this crossing, there could be potential development in the future, but for the purposes of this DT the crossing will be designed for current conditions.
- [In a separate phone conversation, MHTLO stated they do not prefer a grade-separated crossing here due to the existing underground gas well at the site.]

Condition	Deficiency	Meeting or On-Site Recommendation and/or Comment
Existing	Case I (moving vehicle @ 10 mph) sight distance is not met in southwest quadrant. Vegetation inhibits a vehicle from seeing a train at the required case I sight distance down the track.	Clear vegetation within the Case I sight distance triangles as needed (all sight triangles within ARRC right of way).
Alternative 1: Yield Control		Good for existing conditions
Alternative 2: Stop Control with Private Gates	Gates would have to be installed at clear storage distance minimums.	There is already a gate at the entrance of the access road; therefore, additional private gates are not needed at this crossing. Additional gates may encourage snowmachines to cross the railroad tracks at locations other than designated crossings, which degrade the railroad track embankment. Case I sight distance will be met after vegetation is cleared, therefore stop control not needed.

MP K20.4 - Papoose Twins Road Crossing Comments:

- Road Ownership: MSB
- Crossing Maintenance: Road is maintained by private owners currently; however, maintenance of the future crossing would be defaulted to MSB.

<i>Condition</i>	<i>Deficiency</i>	<i>Meeting Recommendation and/or Comment</i>
Existing	Case I (moving vehicle @ 35 mph) sight distance is not met in all quadrants. Embankment inhibits a vehicle from seeing a train at the required case I sight distance down the track.	Install Stop Control
Alternative 1: Stop Control		Place Stop Ahead before west side (east bound) curve
Alternative 2: Yield Control	Sight Distance	Case I sight distance cannot be met; therefore, Yield control is not a viable alternative.

MP K19.7 - Susitna Parkway Crossing Comments:

- Road Ownership: MSB
- Crossing Maintenance: Road is maintained by private owners currently; however, maintenance of the future crossing would be defaulted to MSB.

<i>Condition</i>	<i>Deficiency</i>	<i>Meeting Recommendation and/or Comment</i>
Existing	Case I (moving vehicle @ 35 mph) sight distance is not met in all quadrants. Vegetation in all quadrants and the embankment in the northeast quadrant inhibits vehicles from seeing a train at the required case I sight distance down the track.	Clear vegetation within the Case I sight distance triangles, even if extending beyond ARRC right of way. Remove embankment in northeast quadrant within sight distance triangle.
Alternative 1: Yield Control	Sight Distance	Install yield control if sight distance met
Alternative 2: Stop Control	Sight Distance	Install stop control if sight distance not met

MP K13.9 - Ayrshire Avenue Crossing Comments:

- Road Ownership: MSB
- Crossing Maintenance: MSB
- Surface: Ayrshire is paved not gravel: update APV values

Condition	Deficiency	Recommendation and/or Comment
Existing	Case I (moving vehicle @ 45 mph) sight distance is not met in all quadrants. Vegetation inhibits a vehicle from seeing a train at the required case I sight distance down the track, as well as embankments on the southern quadrants.	Clear vegetation within the Case I sight distance triangles, even if extending beyond ARRC right of way. Embankment in southeast quadrant could be removed to improve sight distance. However, sight distance would still be limited due to the road paralleling the tracks.
Existing	Road Surface Paved not Gravel	Add Markings for each alternative
Alternative 1: Stop Control	Vertical Alignment of approaches	Add stop ahead in both directions due to approach vertical alignment.
Alternative 2: Yield Control with Flashing-Lights	Rear-ending (Haz-Mat vehicles are expected to use this crossing, and will be stopping at the crossing before proceeding) Visitors from out of state, and out of country frequently use this crossing on a regular/seasonal basis. Sight Distance	Stop Control: users will be used to stopping, therefore they are less likely to rear end Haz-Mat vehicles stopping unexpectedly. If sight distance can't be cleared and maintained install stop control. Flashing- Light Signal expensive and not recommended.

MP K2.6 - CEA Power Lines Access Road Crossing Comments:

- Road Ownership: CEA
- Crossing Maintenance: CEA
- Assumed Road Speed: 10 mph
- Train speed might be lower than 60 mph in this location due to curve and nearing the end of the rail extension, but track will still be designated at 60 mph.

Condition	Deficiency	Recommendation and/or Comment
Existing	Case I (moving vehicle @ 10 mph) sight distance is not met in east quadrants. Vegetation inhibits a vehicle from seeing a train at the required case I sight distance down the track due to horizontal alignment of track. Case II (stopped vehicle) sight distance is not met in the south quadrants. Just southwest of the crossing, the railroad tracks follow a horizontal curve, in which sight distance along the tracks is inhibited by vegetation between the crossing and the curve.	Clear and maintain vegetation within the Case I and Case II sight distance triangles, even if extending beyond ARRC right of way. Right of way is currently owned by MSB. CEA routinely clears the power line easement and could add clearing the sight triangles to their routine maintenance, as permitted by MSB.
Alternative: Keep Existing Gates	Existing Gate location	Check storage distance between existing gates and track for design vehicle. There should be enough storage room to hold the design vehicle behind the 15-foot dynamic envelope of the train.
Alternative: RR Flagger	ARRC will not permit this crossing if a RR flagger is required.	Clear vegetation within the sight distance triangles; as requiring a RR flagger is not a viable alternative.
Alternative: Stop Control		Change control to yield control, as long as sight distance triangles can be cleared As a private, very low volume crossing, stop signs are not warranted.

Project: Port MacKenzie Rail Extension
Project No. 113405

Meeting: Diagnostic Team Study Follow-Up Meeting

Date/Time: May 30, 2019; 9:00 a.m.

Location: Meeting: MSB Capital Projects Building, Palmer, AK
Site Visit: Grade Crossings at Millers Reach Road, Susitna Parkway, and Papoose Twins Road

Attendees: Jessica Miranda, Jeanne Bowie, and Heather Edic with Kinney Engineering (KE) (meeting & site visits)
Rachel Maddy with the Alaska Railroad Corporation (ARRC)
Scott Thomas with Alaska Department of Transportation and Public Facilities (DOT&PF) (meeting & site visits)
Brad Sworts, Mike Weller, and Jaimie Taylor with Matanuska-Susitna Borough (MSB)

The abbreviated Diagnostic Team (DT), as listed under Attendees, met at the Matanuska-Susitna Borough Capital Projects Building in Palmer, Alaska in reference to the DT Study for Port MacKenzie Rail Extension (PMRE). The purpose of this meeting was to discuss additional comments and possible alternatives that resulted from the Draft DT Study Report.

Future at-grade railroad-road and railroad-trail crossings discussed were at Millers Reach Road, Natural Gas Access Road, Big Lake Trail #2, Papoose Twins Road, Susitna Parkway, Ayrshire Avenue, and CEA Power Lines Access Road along the PMRE Project. A brief overview of the future crossings was mentioned, followed by review of each future crossing in comparison to existing crossings in Alaska with similar characteristics. Site visits to Millers Reach Road, Susitna Parkway, and Papoose Twins Road were conducted by interested parties to verify conditions.

Below is a summary of the comments from this second meeting. Comments from this meeting append to those from the first meeting.

General Comments:

- Because of the future Alberta to Alaska (A2A) rail project, interest in completing the PMRE project has increased. A private developer has expressed a desire to fund the rails, with construction beginning in the very near future. Maintenance and operations at the crossings may not be a responsibility of the Matanuska-Susitna Borough (MSB) or Alaska Railroad Corporation (ARRC); pending lease agreements.
- Alaska has a very low fatal crash rate between trains and vehicles/pedestrians. This could be attributed to the fact that most at-grade crossings on the mainline, and many off the mainline, are actively protected with flashing lights and automatic gates, even though their APV suggests only passive protection is needed. To continue this safety trend, it is highly recommended to install active protection at the future PMRE at-grade crossings where comparison of similar existing crossings also contain active protection.
- Include in the DT Report a table for each alternative that includes four or five most similar existing crossings (Train Speed, Road Speed, Geometry, AADT, Trains per Day). Only include existing crossings that cross the mainline.
- Brad Sworts provided KE with pictures of existing crossings in MSB with designation passive or active.

MP K31.9 - Millers Reach Road Crossing Comments:

- Crossing Maintenance: City of Houston, MSB, or Private Entity (pending lease agreements)

Condition	Deficiency	Meeting or On-Site Recommendation and/or Comment
Short Term	Skew Angle is less than 75 degree minimum	Realign Millers Reach Road to fix skew angle and add Flashing-Light signals with Automatic Gates. AK Policy 4.5.4.5 states new crossings shall not be less than 75 degree skew. The future plan is to construct a grade-separated crossing for Millers Reach Road northeast of the current crossing location. It is beneficial to solve the skew by shifting the alignment of the at-grade crossing to the northeast for least amount of ROW acquisition; affects one property owner and secures ROW for at-grade and grade-separated crossing condition. (ARRC Technical Standards say at-grade crossings must be more than 100 feet from a railroad control point).
Short Term	Traffic Calming, Signal protection	Add Flashing Light Signals with Automatic Gates. Consider low speed crash cushions to shield motorists from gate supports. This will also add a visual effect to slow down motorists.
Long Term	Limited Subdivision Access	Millers Reach Road provides the only access in and out of the residential subdivision to the west of the crossing. Provide an alternative access for this subdivision for emergency use. Perhaps connect to the Big Lake Trails #2 crossing or the Natural Gas Access Road crossing.
Long Term		Grade-separated crossing

MP K30.2 - Big Lake Trail #2 Crossing Comments:

- Remove C St. Paths from similar existing crossing inventory.
- The Snowmachine Trail, Portage crossing is most similar, but the crossing is adjacent to a parking lot, therefore there is more awareness and slower speeds at this crossing.

<i>Condition</i>	<i>Deficiency</i>	<i>Meeting or On-Site Recommendation and/or Comment</i>
Short Term	Snowmachiners are likely to be traveling very fast; in excess of 20 MPH.	Add barriers to Alternative 1, in order to narrow the crossing and slow down users. Barriers: jersey barriers with reflectors on top or guardrails (guardrails allow snow to drift and not build up on barrier). Crossing width should allow passage of grooming equipment.
Long Term	This trail may be on a section line and has potential to be developed into a road in the future.	If the trail is further developed this crossing should be reevaluated.

MP K27.8 - Natural Gas Access Road Crossing Comments:

- Assumed Road Speed: 15 mph (horizontal alignment restricts user speed)

<i>Condition</i>	<i>Deficiency</i>	<i>Meeting or On-Site Recommendation and/or Comment</i>
Short Term		Stop control (Alternative 1) is preferred. Add private gates to crossing (similar to CEA Access Road, check storage for MHTLO work vehicles).

MP K20.4 - Papoose Twins Road Crossing Comments:

- Last posted speed limit, 35 mph, is along Susitna Parkway on a paved straight portion of road. Drivers will most likely be traveling slower on this portion of the road. Except at the crossing, this road is a very narrow, windy, gravel, approximately 1.5 lane road.
- Nenana and Cantwell existing crossings are comparable to this crossing.
- Growth of Papoose Twins Road is restricted due to right-of-way boundaries and soils.

<i>Condition</i>	<i>Deficiency</i>	<i>Meeting Recommendation and/or Comment</i>
Short Term	Moving sight distance is restricted due to embankments.	Install Stop Control due to restricted moving sight distance.
Short Term	Road widens at crossing.	Install median barriers or add an element to crossing that makes a “narrowing” affect to slow down traffic at the crossing and increase STOP compliance. Example: guardrail along approaching side of the crossing, angled towards travel lane. Or guardrail or concrete barriers perpendicular to road from roadway foreslope to edge of travel lane.
Long Term	Growth and Road Improvements at Papoose Twins Road or Susitna Parkway.	Eliminate Papoose Twins Road or Susitna Parkway crossing and combine. Increase traffic control to Flashing-Light Signals with Automatic Gates at the remaining crossing. Most likely to eliminate Papoose Twins Road Crossing by dead ending Papoose Twins Road and connecting to Susitna Parkway. At the time of consolidation, MSB will decide which crossing to close.

MP K19.7 - Susitna Parkway Crossing Comments:

- AADT at Susitna Parkway is much less than the closest PTR, MSB said it is most likely 30 vpd.
- Last posted speed limit, 35 mph, is along Susitna Parkway on a paved straight portion of road. Drivers will most likely be traveling slower on this portion of the road. Except at the crossing, this road is a very narrow, windy, gravel, approximately 1.5 lane road.
- Nenana and Cantwell existing crossings are comparable to this crossing.

Condition	Deficiency	Meeting Recommendation and/or Comment
Short Term	Moving Sight Distance Restricted.	If Sight Distance can be cleared, yield control. If Sight Distance remains restricted, stop control. Add stop ahead on east leg.
Short Term	Road widens at crossing.	Install median barriers or add an element to crossing that makes a “narrowing” affect to slow down traffic at the crossing. Example: guardrail along approaching side of the crossing, angled towards travel lane. Or guardrail or concrete barriers perpendicular to road from roadway foreslope to edge of travel lane.
Long Term	Growth and Road Improvements at Susitna Parkway.	Eliminate Papoose Twins Road or Susitna Parkway crossing and combine. Increase traffic control to Flashing-Light Signals with Automatic Gates at the remaining crossing. Most likely to eliminate Papoose Twins Road Crossing by dead ending Papoose Twins Road and connecting to Susitna Parkway. At the time of consolidation, MSB will decide which crossing to close.

MP K13.9 - Ayrshire Avenue Crossing Comments:

- This crossing has nonlocal drivers, international drivers, and seasonal traffic.
- The following existing crossings are comparable to this crossing:
 - o 2 Mile Lake, Nenana
 - o Usibelli Tipple, Healy
 - o Cantwell Road, Cantwell
 - o Talkeetna Spur, Talkeetna
 - o Pittman Road, Wasilla

<i>Condition</i>	<i>Deficiency</i>	<i>Recommendation and/or Comment</i>
Short Term and Long Term	During the summer there are drivers that are unfamiliar with the area/crossing.	Flashing-Light Signal with Automatic Gates is preferred. Compliance issue with stop control.
Short Term and Long Term	Traffic Calming, Signal protection.	Add crash cushions to gates on approach direction due to speed of road.
Short Term and Long Term	Sag in road on west leg.	Move advanced warning sign further away from crossing on west approach.

MP K2.6 - CEA Power Lines Access Road Crossing Comments:

- Assumed Road Speed: 20 mph (horizontal alignment restricts user speed)

<i>Condition</i>	<i>Deficiency</i>	<i>Recommendation and/or Comment</i>
Short Term		Install Stop control (Alternative 1).

Attachment B
Sight Distance Adjustment Calculations

Case II - Stopped Vehicle

$d_{Ts} = 1.47 \cdot V_t \cdot ((V_g/a_1) + ((L+2D+W-d)/V_g) + J)$			Green book eqn 9-4
$V_t =$	60 mph	speed of train	
$V_g =$	8.8 ft/s ²	max speed of vehicle in first gear	
$a_1 =$	1.47 ft/s ²	acceleration of truck	
$L =$	120 ft	length of vehicle	
$D =$	15 ft	dist from stop bar to near rail	
$W =$	5 ft	dist between outer rails	
$d =$	26 ft	dist vehicle travels while accelerating to max speed in first gear	
$J =$	2 s	sum of perception and time to activate clutch or auto shift	
$d_{Ts} =$	1994 ft		
$d_{Hs} =$	15 ft	(not part of eqn.)	

Case I - Moving Vehicle

$d_{Hm} = 1.47 \cdot V_v \cdot t + ((1.075 \cdot V_v^2)/a) + D + d_e$			Green book eqn 9-3
$d_{Tm} = (V_t/V_v) \cdot (1.47 \cdot V_v \cdot t + 1.075 \cdot V_v^2/a + 2D + L + W)$			
$V_v =$	20 mph	speed of vehicle	
$V_t =$	60 mph	speed of train	
$t =$	2.5 s	perception/reaction time	
$a =$	11.2 ft/s ²	driver deceleration	
$D =$	15 ft	dist from stop bar to near rail	
$d_e =$	8 ft	dist from driver to front of vehicle	
$L =$	120 ft	length of vehicle	
$W =$	5 ft	dist between outer rails	
$d_{Hm} =$	135 ft		
$d_{Tm} =$	801 ft		

Reference: *A Policy on the Geometric Design of Highways and Streets* (PGDHS), American Association of State Highway and Transportation Officials (AASHTO), 2011
Chapter 9

