



PRELIMINARY ENGINEERING REPORT

PROJECT NO. IM-OA4-1(23)/57178

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

Prepared by:

Hattenburg Dilley & Linnell
3335 Arctic Blvd., Suite 100
Anchorage, AK 99503

October 2007



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Prepared for:

STATE OF ALASKA
Department of Transportation and Public Facilities
Central Region Division of Design and Construction
Preliminary Design and Environmental

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INTRODUCTION

The Parks Highway is a rural interstate highway that extends 358 miles from the intersection with the Glenn Highway east of Wasilla to its termination in Fairbanks. This project covers an 8-mile segment of the Parks Highway, beginning on the west end of Wasilla at Lucus Road, and ends just north of Big Lake Road. The location of the project is shown in Figure 1. This portion of the Parks Highway serves local traffic, commuters, tourism, recreational, and commercial transportation. Between Lucus Road and Church Road, the roadway functions as an Urban Arterial, while the remainder is classified as a Rural Principal Arterial, Interstate. The posted speed is 45 MPH in the urban portion and 55 MPH on the rural interstate.

This Preliminary Engineering Report documents and summarizes the purpose and need, development of alternatives, engineering analysis performed, and recommendations for roadway improvements.

HISTORY AND EXISTING CONDITONS

This portion of the Parks Highway was originally built as a pioneer road to access the area homesteads. In 1958, the section from Wasilla to Big Lake Road was upgraded to a two-lane paved highway (Project No. D-0510(5). The highway was overlaid with 2-inch hot asphalt concrete in 1975 (Project No. RF-035-1(22) and seal coated in 1977 (Project No. RF-035-1(23). An upgrade to an urban five-lane was made through the City of Wasilla in 1983 (Project No. F-I-OA4-1(2), ending between Lucus Road and Church Road. In 1994, the roadway was resurfaced and improved using 3R standards (Project 58712/I-OA4-1(7).

Extending from the beginning of the project at Lucus Road for about 2,000 feet, the highway is a four-lane urban roadway with a center two-way left-turn lane. From there, it transitions to a rural two-lane highway. The typical highway has two 12-foot lanes and 8-foot shoulders, for a total pavement width of 40 feet. Side slopes are generally 4:1.

There is a highway bridge structure that crosses over the Alaska Railroad near Museum (Neuser) Road. This structure is a single span structure using concrete bulb-tee girders founded on MSE retaining walls.

The existing alignment has numerous horizontal curves, all of which meet design standards for the posted speed. The vertical alignment generally conforms to the surrounding terrain. There are no grades that are considered steep and the vertical curves are acceptable.

The highway surface is generally smooth and the pavement in fair condition. Prior highway projects have shown the subgrade soil to generally be sandy gravel with organics and peat in wetland areas around the railroad crossing and adjacent to Meadow Creek.

Drainage is provided by drainage ditches along the highway and culverts at the natural low points. Most culverts are 24-in or 36-inch corrugated metal pipes. The highway crosses a 60-inch culvert near the railroad crossing, an 84-inch and 48-inch culvert at Little Meadow Creek just north of Big Lake Road, and a 48-inch culvert on a tributary of Little Meadow Creek just north of Forest Lake Drive. Little Meadow Creek and its tributary are cataloged anadromous fish streams.

There are numerous intersecting driveways and local roads. The intersections at Lucus Road, Church Road, and Pittman Road have traffic signals and the remainders are stop controlled.

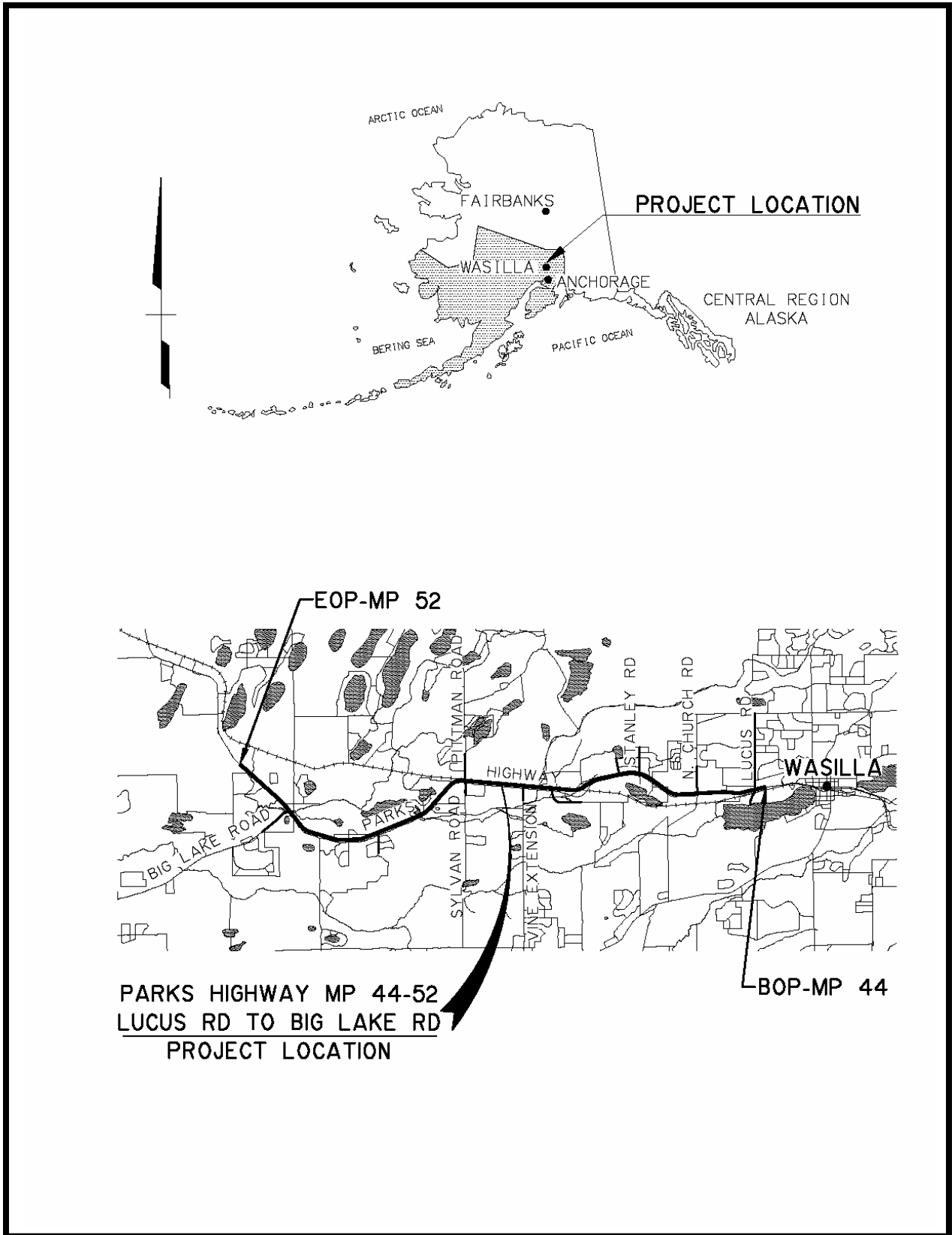


FIGURE 1- PROJECT LOCATION

There are left-turn pockets at the signalized intersections, Museum Road, Vine Road, and Big Lake Road. There is roadway illumination provided along the urban section at the beginning of the project. The rural section has limited illumination at the signalized intersections and at intersections with turn pockets.

The surrounding land along the corridor is primarily rural residential, however, the land adjacent to the highway is generally small commercial businesses consisting of various retail stores, restaurants, lounges, hotels, gas stations, garages, and storage yards. There are concentrations of businesses between Stanley Drive and Lamont Way and in the vicinity of Pittman Road.

The right-of-way from Wasilla to just south of Big Lake Road is generally 64 feet left (south side) and 136 feet right (north side) of the existing highway centerline. From just south of Big Lake Road to the end of the project, the right-of-way is generally 146 feet left and 154 feet right of the highway centerline.

PURPOSE AND NEED

This area of the Matanuska-Susitna Borough has experienced rapid growth in the past few years resulting in a boom in land development and a corresponding increase in highway traffic. DOT&PF has identified a need to improve the Parks Highway, MP 44-52, Lucus Road to Big Lake Road. The purpose of the Parks Highway MP 44-52 project is to make improvements to alleviate traffic problems (enhance through-traffic mobility, local community traffic access, and safety) resulting from recent and projected growth within the corridor.

- **Corridor Growth:** Rapid growth and development in this area are causing congestion. Continued economic and population growth are projected. Conflict occurs between highway through-traffic and local community traffic. Access is not controlled along the project – a feature not consistent with the Parks Highway’s arterial interstate functional classification or with an urban (or suburban) arterial in general. The increasing numbers of vehicles accessing the highway from local roads and adjacent properties contributes to crashes and slows mobility (travel speeds) for through-traffic.
- **Capacity:** This segment of the Parks Highway corridor should operate at the AASHTO minimum desirable levels of service (LOS) designated for urbanized areas – “C” for arterial roads, including intersections, and “D” for collector and local roads, including intersections. Without improvement, travel along the corridor can be expected to decline to LOS “F” for most of the corridor and near LOS “F” for the remaining portions. A LOS “F” condition indicates a highway’s capacity has been exceeded; operations become stop and go with queues forming. In addition to the need in increase capacity for day-to-day traffic operations, because the existing highway is the only through corridor in the area, greater capacity is needed for emergency evacuation capability and to allow detours around road blockages.
- **Corridor Management:** Area plans including the Matanuska-Susitna Borough’s Long Range Transportation Plan and the local Meadow Lakes Comprehensive Plan demonstrate a need and desire to plan for and manage growth in the project area – the fastest growing region in the state. Expanding the highway network to better distribute local traffic and reduce traffic congestion and accidents is a primary element of local planning. To that end, establishing a system signal plan for the Parks Highway project corridor will accommodate development along the corridor while reducing driveway access and the occurrence of associated accidents.

- **Safety:** A total of 912 crashes occurred in the Parks Highway project area in the ten-year period from 1993 to 2004. The proportion of high-severity type crashes (fatality, major injury and minor injury) along the project corridor exceeds the state population proportion with statistical significance. The Big Lake Road intersection crash rate is significantly high while the average population crash rate was exceeded at Pittman Road (before and after traffic signal installation) and at Vine Road. The fatality rate for the project corridor is three times higher than AASHTO's *Strategic Highway Safety Plan* goal of 1 per 100 million vehicle miles (MVM).

The need for improving through-traffic and local community traffic is to:

- Improve highway corridor functionality with increased access control, taking advantage of existing frontage road configurations and expanding them to the extent practicable.
- To increase capacity, mobility, and safety for present and projected traffic.

DOT&PF acknowledges the need to enhance mobility on this stretch of interstate highway while serving local traffic needs until the borough's road system can accommodate the area's rapid growth.

DESIGN DESIGNATIONS / DESIGN CRITERIA

The documents listed below provide the design standards for this project:

1. A Policy on Geometric Design of Highways and Streets (PGDHS), 2001, American Association of State Highway and Transportation Officials (AASHTO).
2. Alaska Highway Preconstruction Manual (PCM), January 2005, State of Alaska, Department of Transportation and Public Facilities (ADOT&PF).
3. Manual of Uniform Traffic Control Devices (MUTCD), 2003, as modified by the Alaska Supplement, December 22, 2005.

The Design Designation report is provided in Appendix A.

The Design Criteria used to develop alternatives is provided in Appendix B.

ALTERNATIVES

A. Alternative 1 - No Action.

Under the no-action alternative, the existing highway would remain unchanged with no improvements. Consequences of this action would be increased congestion along the corridor, with travel declining to LOS "F" indicating the highway's capacity has been exceeded. Operations become stop and go with queues forming. Crash rates will continue to be high. Local traffic and access, especially left turns, will become increasingly difficult. This alternative does not meet the purpose and need for the project.

B. Alternative 2 - 4-Lane Divided Highway with Controlled Access

This alternative would extend the 5-lane urban section from Lucus Road to Church Road, upgrade the existing highway west of Church Road to a 4-lane divided highway with 2-lane, 2-

way frontage roads on each side, and grade separated interchanges at major intersections. This would be similar to the Parks Highway between the Glenn Highway and Seward Meridian Parkway east of Wasilla. This alternative would separate the through traffic traveling the highway and the local traffic accessing the adjacent businesses. It would improve the highway capacity and mobility, obtain full access control, and reduce the conflicts that lead to crashes. This alternative would impact over 100 properties and 50 structures. The initial preliminary estimate for the right-of-way and relocation is over \$50-million. This alternative was considered to be not reasonable and practicable.

C. Alternative 3 - 4-Lane Divided Highway with Limited Access

This alternative would extend the 5-lane urban section from Lucus Road to Church Road, and upgrade the existing highway west of Church Road to a 4-lane divided highway with at-grade intersections spaced every ½-mile. This alternative would provide for increased capacity and improve the level of service. Existing frontage roads will be improved, driveways consolidated and at-grade intersections placed at planned locations where conflicts can be minimized to reduce crash rates. This alternative was considered to be reasonable and practicable. This is the preferred alternative.

D. Alternative 4 - 5-Lane Urban Section

This alternative would extend the 5-lane urban section from Lucus Road to Big Lake Road. This alternative may provide for some increased capacity, but conflicts would occur between highway through traffic and local community traffic. The increased density of vehicles accessing the highway from adjacent properties and side streets would increase crash rates and slow travel speeds for through traffic. This alternative was considered to not meet the purpose and need of the project.

TYPICAL SECTIONS

The five-lane urban section consists of two 12-foot lanes in each direction, 8-foot shoulders on each side, and a center 16-foot two-way left-turn lane. This matches the existing 5-lane urban cross section.

The four-lane divided highway consists of two 12-foot lanes in each direction, 8-foot outside shoulder, 4-foot inside shoulder, and a depressed center median. The center median varies in width between 30-and 42-feet. Side slopes along the highway will be 5:1, with 2:1 slopes outside the clear zone.

Frontage roads will consist of two 11-foot lanes and 5-foot shoulders. Side slopes along the frontage roads will be 4:1, with 2:1 slopes outside the clear zone.

The typical sections are found with the plans in Appendix J.

GENERAL ALIGNMENT

To minimize ROW impacts, the preferred alternative follows the existing horizontal alignment. There are 11 horizontal curves and all have radii that exceed the minimum design standard for new construction. No improvements are required.

The existing vertical alignment generally follows the surrounding terrain which would be classified as level. All vertical curves exceed the minimum design standards for new construction. No improvements are required.

There are no grades that are considered steep. The steepest grade is 2.67% at the railroad crossing, which is well below the 4% standard for new construction.

TRAFFIC AND SAFETY ANALYSIS

A detailed traffic report was prepared for this project. The Traffic Analysis and Alternative Development Report is contained in Appendix C.

A 5-lane urban section for the Parks Highway between Lucus Road and Church Road will operate at a LOS of E/B in 2030 for traffic in the westbound/eastbound directions. This suggests that a third westbound lane would be required to achieve the desirable LOS C. However, the third westbound lane is not recommended at this time since it is not being recommended on the portion east of Lucus Road and the possibility of a Wasilla bypass. Lucus Road has an existing traffic signal that is warranted.

A 4-lane divided section for the Parks Highway between Church Road and Big Lake Road will function at LOS C/B in 2030 for traffic in the westbound/eastbound directions. However, given the number of intersections and access points, the LOS will be controlled by the intersections. A 30-foot minimum median width is recommended to reduce high severity type crashes, provide room for left-turn and u-turn lanes, and provide a pedestrian refuge at intersections.

At-grade intersections are recommended to be spaced on a ½-mile grid, with auxiliary left-turn and right-turn lanes provided. It is recommended that the Museum (Neuser) Road intersection be relocated to the west to conform to the ½-mile grid spacing. Signals are warranted at Church Road, Stanley Road, Vine Extension, and Pittman Road. Other intersections between Church Road and Pittman Road will be stop controlled. Intersections between Pittman Road and Big Lake Road do not warrant signals, but several have enough side street volume that long delays may be experienced by the side street traffic, especially left-turning vehicles. To maintain design consistency, it is recommended that all intersections between Pittman Road and Big Lake Road access the highway with right-turns only and use mid-grid median openings that accommodate u-turns (indirect left-turns).

The proportion of high severity crash types for the Parks Highway exceeds the statewide proportions and fatality crashes exceed the AASHTO strategic plan rate. Big Lake Road, Pittman Road, and Vine Road intersections had the highest accident rates. The segments from Church Road to Museum Road and Pittman Road to Big Lake Road exceeded the statewide average. Based on the recommended 30 to 42 foot separated median, intersection control, and turn lanes, it is estimated that the 60% of the segment crashes and 33% of the intersection crashes should be correctable.

ACCESS CONTROL

The Parks Highway is functionally classified as a Principal Arterial – Interstate whose intended purpose is to provide mobility and as little access as necessary. As such, it is recommended that intersections be limited to a ½-mile grid spacing and allowing the development to infill collector roads to match this spacing. In addition, driveway access should be combined or limited to the extent feasible, and use frontage roads where feasible.

PEDESTRIAN AND BICYCLE FACILITIES

The existing 10-foot paved multi-use pathway serves pedestrians and bicyclists. It generally runs along the north side of the Parks Highway from Lucus Road to Pittman Road. It crosses

under the railroad tracks just west of Museum (Neuser) Road. The pathway cross the Parks Highway at Pittman Road and continues along the south side from Pittman Road to Big Lake Road. The pathway will be relocated as necessary to fit the recommended improvements.

ILLUMINATION

The existing illumination will be extended with the urban 5-lane segment to Church Road. From Church Road to Big Lake Road, the proportion of crashes occurring in dark conditions is between 34% and 57%, which is 4-7 times the statewide average. Of the dark condition crashes, 50% are moose/animal related and 24% are run-off-the-road type crashes. Given the ½-mile grid intersection spacing and the need to illuminate the intersections, and the high number of dark condition accidents, it is recommended that the highway be continuously illuminated.

DRAINAGE

There is an existing storm drain system with catch basins at Lucus Road that discharge into Lake Lucille, approximately ¼-mile to the south. This is the only storm drain system within the project. The remainder of the project uses vegetated ditches to collect and transport storm water. The storm water infiltrates the ground or flows to the natural low points adjacent to the highway. These vegetated ditches also collect water from adjacent properties. The proposed improvements for this project are not anticipated to change this flow regime or any existing drainage pattern. There are minor drainage problems near the Pittman Road and Johnson Road intersections during spring snow melt while the ground is still frozen.

The existing drainage is generally from the northeast to the southwest (right to left). There are approximately 30 crossing culverts and 125 side street and driveway culverts. The culverts are corrugated steel pipes and are generally in fair condition. These culverts will be inventoried during final design for size and condition, and replaced or relocated as necessary. Existing ditches may be deepened and widened to improve drainage and snow storage.

Meadow Creek and two small tributaries are cataloged anadromous fish streams. These are located near the end of the project just north of Big Lake Road. Meadow Creek crosses the highway in an 84-inch culvert and a 48-inch overflow culvert for flood flows. A 1992 Hydrologic and Hydraulics Report prepared for the previous improvement project evaluated these culverts and found that they adequately pass the design flood flows. The 1992 report also found the Meadow Creek culvert passed fish (adult). However, the culvert will not pass a 55mm juvenile salmon due to water velocity. To meet Tier 2 fish passage requirements per the Memorandum of Agreement between ADF&G and DOT&PF for the Design, Permitting, and Construction of Culverts for Fish Passage, an 18'-1" x 11'-10" structural plate pipe arch with a 2-foot layer of Riprap, Class 1 inside the pipe arch is proposed to replace the two existing culverts. The pipe arch is proposed to be shifted slightly north and skewed to better fit the channel flow.

The two small tributaries of Meadow Creek cross the highway in a 36-inch culvert and a 48-inch culvert. The 36-inch culvert has no defined channel and only seasonal flow, making fish habitat questionable. This culvert has no history of drainage problems. The 48-inch culvert was evaluated in the 1992 report and was found to adequately pass the design flood flows. A log weir was constructed just down stream of the outlet in 1997 with the last improvement project. The culvert was reviewed and appears to meets fish passage requirements. This culvert is proposed to be extended about 30 feet on the upstream side. Final design will ensure fish passage requirements are met.

SOIL CONDITIONS

Previous projects along this portion of the Parks Highway have found the subgrade soils to be fairly consistent sandy gravel with fines of 30% or less. The organic material at the railroad crossing is about 5-8 feet thick, with a dense till material underlying the organics. Other small pockets of organics are anticipated to be less than 5-feet thick. The existing embankment has performed fairly well, and no special embankment construction is anticipated.

PAVEMENT DESIGN

DOT&PF prepared a pavement design for Parks Highway, MP 42-44 in 2005. Utilizing this information and previous design along the Parks Highway, the assumed pavement section used for cost estimating is:

Parks Highway

- 2-inches Hot Mix Asphalt, Type V
- 3-inches Asphalt Treated Base
- 4-inches Aggregate Base Course
- 36-inches of Selected Material, Type A

Frontage Road

- 2-inches Hot Mix Asphalt, Type II
- 4-inches Aggregate Base Course
- 24-inches of Selected Material, Type A

A detailed pavement design should be performed during final design to confirm the pavement section.

STRUCTURES

The bridge crossing the railroad will require an additional span to accommodate the additional lanes. The bridge will be at a 62 degree skew from perpendicular to the railroad tracks and will be founded on a concrete faced MSE wall foundation, similar to the existing bridge. A Bridge and Structures Study Report was prepared and is contained in Appendix D. The superstructure alternatives considered were concrete decked bulb-tees, steel plate girders with concrete cast-in-place deck, and spliced post-tensioned concrete girders with cast-in-place concrete deck. Considering the skew angle, span length, construction cost, and maintenance costs, the spliced post-tensioned concrete girder bridge is recommended for this location.

The Bridge and Structures Study Report also reviewed the culvert crossing at Meadow Creek. Alternatives reviewed were extending the existing culverts, structural plate pipe arch culvert, a pre-cast concrete box culvert, and a short span bridge. Based on the cost differential, the structural plate arch pipe is recommended.

RIGHT-OF-WAY

The existing right-of-way from Wasilla to just south of Big Lake Road is generally 64 feet left and 136 feet right of the existing highway centerline. From just south of Big Lake Road to the end of the project, the right-of-way is generally 146 feet left and 154 feet right of the highway centerline. Additional right-of-way is anticipated for this project. Approximately 150 properties will be affected by the proposed improvements, including 22 total takes and 128 partial takes. It is anticipated that 12 structures will be taken and 9 other structures will be damaged. All

acquisitions and relocations will be performed in accordance with the Uniform Relocation and Real Property Acquisition Act. A Corridor Appraisal Study, October 2007, provides preliminary value estimates the proposed acquisitions. The report is contained in Appendix E. Using the value estimates in the report, the estimated cost for right-of-way acquisition and relocation for this project is \$6.2 million. A Conceptual Stage Relocation Study is contained in Appendix F.

UTILITY RELOCATION AND COORDINATION

The existing utilities along the project generally consist of overhead electrical power lines operated by Matanuska Electric Association along one or both sides of the highway, buried fiber optic cable operated by Matanuska Telephone Association near the right-of-way along the left side, natural gas lines operated by Enstar Natural Gas Company, and City of Wasilla water mains near Lucus Road.

Utilities will be affected by this project and relocations will be necessary. A Preliminary Utility Conflict Report is provided in Appendix G. The estimated cost for utility relocations is \$5.4 million.

ENVIRONMENTAL CONSIDERATIONS

Scoping and coordination with the general public and various federal, state, and local agencies occurred according to the National Environmental Policy Act. The Scoping Summary Report dated March 15, 2006 details the scoping activities and is provided in Appendix H.

The proposed improvements will impact about 4 acres of wetlands, the fish habitat in Meadow Creek and its tributaries, and moose migration routes. Environmental commitments could include:

1. If contaminated materials are discovered during construction, all work near the contaminated site will be stopped until ADEC is contacted and an action plan is approved.
2. The Contractor will stop work if archeological or cultural resources are encountered during exploration, excavation, or construction. Work at the specific site will not resume until the Project Engineer and SHPO have been notified and a clearance from SHPO is issued to the Project Engineer.
3. Use guardrail and 2:1 slopes in areas of wetlands to reduce impact.
4. Replace the culverts at Meadow Creek with a larger structural plate pipe arch that will meet the ADF&G and ADOT&PF MOA for Tier 2 culverts in streams for fish passage.
5. Protect adjacent wetlands, streams, and lakes with Best Management Practices during construction.
6. Install continuous illumination to improve night visibility and reduce moose crashes.
7. Paving frontage roads to reduce dust.

MAINTENANCE CONSIDERATIONS

The Parks Highway is maintained by the ADOT&PF and frontage roads/side streets are maintained by the Matanuska-Susitna Borough or City of Wasilla. The additional lanes, culverts, traffic signals, and channelization will increase the maintenance costs.

COST ESTIMATE

The cost estimates for this project is as follows:

Design Engineering	\$	2,500,000
Right of Way	\$	6,200,000
Utilities	\$	5,400,000
Construction & CE	\$	52,500,000
<hr/>		
Total	\$	66,600,000

PRELIMINARY PLANS

The proposed improvements are shown on the preliminary plans included as Appendix J.