

## II. ALTERNATIVES

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### A. No-Build Alternative

The existing facility would remain a two-lane roadway and existing problems would continue. Based on the LOS analysis, this would not support projected traffic volumes. Traffic congestion would continue during rush hour periods in the Palmer area. Throughout the remainder of the project, slower moving vehicles would continue to hinder traffic flow; there are few opportunities for vehicular passing or emergency pulloffs. Safety concerns which include narrow shoulders, limited sight distance, and rockfall would not be improved. Maintenance would require the placement of riprap to counter erosion of the roadway embankments along the Matanuska River.

### B. Transportation System Management (TSM) Alternative

The TSM Alternative would increase existing highway efficiency through one or a combination of options which include ride sharing and fringe parking, bus and/or high occupancy vehicle (HOV) lanes, rail services, traffic signal timing optimization, and resurfacing and rehabilitation. However, this alternative is most practicable in urban settings with populations of 200,000 or greater.

As most of the project area is considered rural, and high volumes of trucks and Recreational Vehicles (RV's) exist throughout the project corridor, the TSM Alternative would not be cost effective. There would be minimal potential for reducing congestion and improving roadway conditions with this alternative.

### C. Proposed Action

During the past two decades, numerous location alternatives north and south of the Matanuska River were evaluated for the Glenn Highway. These alternatives were based upon projections which indicated that there would be a substantial traffic increase in the future. At that time, the proposed facility was a multi-lane bypass. Major intersections, interchanges, and frontage roads were proposed along much of the project.

The Department revised traffic analysis in 1991 to reflect ISER population growth

rates and development activities. With the reduced traffic projections, it was determined that the existing Glenn Highway could be upgraded to acceptable standards except in those areas where terrain conditions were prohibitive and required alignment shifts. The project was segmented to develop options according to the needs of each section because of the varying roadway conditions and terrain. Only 14.3 miles of the project would require realignment with the proposed action. Approximate cost estimate for this project is \$191,000,000.

~~Advantages of remaining on the existing alignment are:~~ 1) reduced construction costs per mile when compared to building an entirely new corridor; 2) the possibility of staged construction; 3) less impacts to winter moose habitat, wetlands, and anadromous streams; 4) ROW acquisitions would be minimized; 5) less disruption would be caused to existing residences and businesses; 6) because continued services and access to communities and residences along the existing route are required, costs to maintain two roadways would be substantial; and 7) the deficiencies in the old alignment would need to be addressed where it remains open to public travel.

For the above reasons, the proposed action would optimize the existing facility according to current desirable design standards while providing the desired LOS and improving safety.

**1. Parks Highway-Glenn Highway Interchange to Arctic Avenue Segment (MP 35 to MP 42.1)**

Characteristics of this area are gently rolling terrain and rural to suburban development. Gravel based silt and sandy loam soils are well-drained, excellent for agricultural and other development purposes. The Alaska Railroad bounds the Glenn Highway to the east.

A divided four-lane facility is proposed, having partial control of access. Partial control would provide median breaks at important intersections, but minimize driveway access. As a result, it may be necessary to acquire access rights from some adjacent properties.

The proposed facility would consist of two 12-foot lanes in each direction, 8-foot outer shoulders and 4-foot inner shoulders, and a 32-foot wide depressed median (Figures 2, 3-1, and 3-2).

In the Kepler-Bradley Lakes area, retaining walls would be needed to avoid encroaching into the lakes. From Colleen Street (MP 38) through Arctic Avenue (MP 42.1) the existing alignment would be retained for northbound traffic. A frontage road would be constructed west of the Glenn Highway, from the Cienna Avenue/Inner Springer Loop (MP 39) to the Valley Street/South Colony Way intersections (MP 41). The frontage road would separate the higher speed through traffic from the business/residential property traffic.

Right-of-way acquisition based on the conceptual design would impact 16 residences and 12 business properties (Figures 6-1 and 6-2). This alternative would also require approximately 0.28 acre of right-of-way from a historic property considered eligible by the Matanuska-Susitna Borough (MSB) for the National Register of Historic Places (Refer to Section R. Historic and Archaeological Preservation).

## **2. Arctic Avenue to Fishhook-Willow Road Segment (MP 42.1 to MP 49)**

The terrain is rolling, the area has mixed commercial and residential development. Soils are wind deposited silts over loose coarse sand and gravel.

The proposed action would resurface the existing roadway (Figures 2 and 3-3). A separate 3R project (refer to page 3) scheduled for construction in 1992 would provide an improved two-lane highway with a northbound climbing lane. The paved width of the highway would be 48 feet: three 12-foot lanes with shoulders of 8 feet to the west and 4 feet to the east. No additional right-of-way would be required.

## **3. Fishhook-Willow Road to Milepost 109 Segment (MP 49 to MP 109)**

For the remainder of the project area, the terrain is rolling to mountainous. Roadway gradients in some areas are 6 to 8 percent. Development is considered rural.

Through the Chickaloon area, soils are associated with broad terraces and moraines. Bedrock lies under thick deposits of very gravelly and sandy glacial drift, capped with windblown silt and fine sand loess. The foothills, high ridges, and valleys east of Chickaloon are gravelly soils formed in glacial till or loamy colluvial sediments. For the most part, these soils present limitations for roads and structures.

Between Sutton and Chickaloon, the Matanuska River channel is subject to shifting, requiring placement of riprap to armor adjacent roadway embankments. East of Sutton, the roadway crosses the alluvial fan of Granite Creek (Figure 3-6). Aggradation from high water periods has built up the creek bed elevation and floodwater discharge now exceeds the capacity of the existing bridge, threatening the structure.

Talus type slopes exist along the highway, most notably in the Long Lake and Caribou Creek areas where the existing alignment necessitated road cuts into sidehills. Rock, snow, and mud slides are encountered in these areas, creating safety and maintenance problems.

Upgrading the two-lane roadway to meet current design standards would provide an acceptable LOS for this segment. The total surface width of the facilities would be 40 feet: two 12-foot lanes and two 8-foot shoulders. Where needed, a 12-foot climbing lane with a 4-foot outer shoulder would be provided (Figures 2, 3-4 through 3-12).

According to the conceptual design, the proposed action between MP 49 and MP 109 would relocate 16 single family residences and 5 business properties (Figures 6-4 through 6-7).

The following areas required alignment shifts due to prohibitive terrain conditions:

**a. Moose Creek Hill Alternatives (MP 54)**

The existing road follows the steep bluffs along the Matanuska River and the Tsadaka Canyon, through which flows Moose Creek. Sharp horizontal curves of 11, 14, and 19 degrees, and grades exceeding 7 percent exist in this area. A road cut into the gravel bluff on the west side of the canyon has caused erosion with resultant maintenance problems. Jersey barriers are used along the shoulder to contain loose gravel and rock.

Independent of the proposed project is the State funded improvement between MP 54 and 56 to address existing road conditions. This project is under construction and will add 5-foot shoulders and a southbound climbing lane on Moose Creek Hill and construct turn lanes at the Moose Creek Wayside and the proposed Wishbone Hill Mine

access road. However, because of the limited project scope, the steep grades and sharp horizontal curves would remain.

**Alternative 1** would upgrade the existing roadway. Wetlands would not be impacted. However, this would not improve the alignment or reduce the grades. The Moose Creek State Recreation Site entrance is located in an area of limited sight distance where through traffic encounter slower vehicles accessing this site. This alternative is not viable because acceptable geometrics cannot be obtained with the existing alignment.

**Alternative 2** would involve an approximate ten mile realignment through presently undisturbed areas from Moose Creek to King River. Maintenance of the existing road for local service would still be needed, problems of the existing alignment would not be eliminated. The projected traffic does not require two roadways for an acceptable LOS. Based on the above considerations, this alternative was rejected.

**Alternative 3**, the preferred, would replace the existing Moose Creek Hill alignment with a tangent having a grade of 5 percent (Figure 3-4). Climbing lanes would be provided. The proposed straight roadway section would leave the existing highway at an acceptable location off a west bluff bench and cross the valley, bisecting the Moose Townsite. The designated Moose Townsite Park Reserve would be bypassed. A new bridge would be constructed across Moose Creek, not requiring the placement of piers within the stream bed. No fill or dredging activities would occur within Moose Creek. Approximately 0.01 acre of Palustrine wetlands would be impacted. Proposed right-of-way acquisition could impact 2 residences.

With this action, through traffic would be moved away from the Moose Creek State Recreation Site, thus reducing noise levels at the park. A portion of the existing roadway would be maintained for campground access. For the remainder of the segment, the existing road would be abandoned. This action would minimize erosion problems and improve sight distance and roadway geometrics.

**b. Ida Lake Alternatives (MP 72)**

Terrain is rolling through this area, steep slopes consistently rise above and fall below the existing road grade. The roadway alignment contains sharp horizontal and vertical curves, limiting sight distance and highway speeds. Ida Lake is adjacent to the roadway on the north. A number of driveways access the highway since much

of the area is residential in development. On the east side of Ida Lake, the Fish Lake Road intersects the Glenn Highway.

**Alternative 1** would upgrade the existing roadway. Wetlands would not be impacted. However, changes in roadway gradients would be required to improve sight distances. Grades of some existing driveways would be increased to match the improved roadway elevations, creating access difficulties for homeowners especially during the winter. This alternative was eliminated from further consideration for these reasons.

**Alternative 2**, the preferred, is an approximate one mile realignment (Figure 3-7) which shifts for the most part south of the existing highway. This action would reduce curvature and increase sight distance. Grades would not exceed 4 percent and climbing lanes would be provided.

The existing roadway would become a frontage road. Higher speed through traffic would be removed from the residential development. Opportunity for vehicular passing would be created with the straight roadway segment and climbing lanes. The Fish Lake Road intersection would be improved. Approximately 1.81 acres of Palustrine wetlands would be involved with this action.

**c. Chickaloon River and Hill Alternatives (MP 77)**

The existing roadway alignment follows along the Matanuska River for approximately one half mile at the toe of a steep bluff before reaching the Chickaloon River Canyon. Road cuts into the bluff have created an erosion problem with gravel and rock slides which require continued maintenance. In this vicinity, the Matanuska River floodplain abuts the roadway and the river is eroding the embankment. Riprap to arrest the erosion is being provided with the Glenn Highway Erosion Control project.

Through Chickaloon proper, the roadway is a straight segment and accessed by numerous private driveways. Safety is a concern as local traffic must merge with highway traffic. Higher speed traffic frequently utilize this tangent within the community for vehicular passing opportunities. The Chickaloon Branch Road intersection is hidden from northbound traffic by the high bluff, skirted by a 10-degree curve. Limited passing sight distance occurs at this site and eastward up

the Chickaloon Hill where curvatures are sharp and grades exceed 7 percent. Traffic congestion and reduced travel speeds are typical through this section.

**Alternative 1** would upgrade the existing alignment while remaining within the current right-of-way. A large portion of the bluff at the Chickaloon Branch Road would be excavated to flatten the curve and improve intersection sight distance. Higher speed traffic would continue through the community proper, merging with local traffic. However, throughout the remainder of the segment, limited passing sight distance would not be eliminated, nor would the problems associated with the steep gradients of the Chickaloon Hill. These combined factors have eliminated this alternative.

**Alternative 2** is a three and three quarters-mile realignment (Figure 3-8) which would leave the existing highway 4,000 feet before the Chickaloon Branch Road intersection. A proposed bridge structure, about 350 feet in length and 100 feet in height, would cross over the Chickaloon Branch Road and the Chickaloon River, climbing to a saddle approximately 1,000 feet upstream of the existing Chickaloon River Bridge.

The realignment would rejoin the existing Glenn Highway around MP 78.5, beyond the summit of Chickaloon Hill, avoiding the edge of the steep eroding bluff. Grades up the Chickaloon Hill would be flattened to about 5 percent and a northbound climbing lane provided, reducing traffic congestion. Chickaloon Branch Road access would be maintained for local traffic. Through traffic would be removed from the Chickaloon Branch Road intersection, but would continue through the community proper. Problems with local traffic merging with higher speed traffic would remain.

This site is included within the Glenn Highway Erosion Control, MP 61-78 Project. There would not be any placement of bridge piers, fill, or dredging activities within Chickaloon River. Based on the above considerations, this alternative was eliminated.

**Alternative 3**, the preferred, is a realignment of approximately four and a quarter miles (Figure 3-8). This action would leave the existing roadway north of the King Mountain Recreation Site and cross behind the community proper, joining the proposed alignment of Alternative 2 on the ridge west of the Chickaloon River Canyon.

Benefits of the alternative would be similar to those discussed with Alternative 2. In addition, through traffic would be removed from the community proper, thus enhancing safety conditions, and the highway would be shifted away from the Matanuska River floodplain. According to conceptual design, one residence would be relocated. This alternative would impact 1.61 acres of Palustrine wetlands.

**d. Long Lake Hill Alternatives (MP 85)**

The existing alignment traverses the 480-acre Long Lake State Recreation Site (SRS) (Figures 10-1 and 10-2). A 10-acre State Wayside development, which encroaches within the existing right-of-way, and some private inholdings exist on the west side of Long Lake. The lake is located at the toe of the sidehill.

Mountainous terrain prevails through this segment. The existing alignment is cut into a steep sidehill and climbs for a considerable distance, ascending to the highest elevations within the Long Lake SRS. The highway separates Long Lake and the large cliff to the north, the two primary natural features of the park, creating a visual scenic detraction. The steep terrain and talus slopes restrict development of pulloffs along the cliff and limit scenic viewing opportunities for travelers.

Adjacent slopes are 1:1 and 1.5:1 and drop several hundred feet to and from the roadway. The total roadway width is approximately 22 feet. Adequate shoulders are lacking and grades exceed 7 percent. Heavy trucks operate at crawl speeds to overcome the gradients while climbing this hill, causing interference with other traffic.

The 10-year accident history for years 1979 through 1989 was checked for the Long Lake hill, MP 85 through 87. Altogether, there were 20 recorded accidents involving 25 vehicles, with 1 fatality and 5 injuries. Five accidents were collisions with another vehicle, 5 were overturns, and 10 were collisions with fixed objects, (i.e., embankments, ditches, rocks).

In some parts of the hill, Jersey barriers are used to minimize rockfall debris from reaching the roadway. Talus slopes typical in this segment are considered to comprise some of the most hazardous rock slide zones of the entire project corridor. Ongoing maintenance is required to clear rock and large boulders from the road surface. Winter conditions compound these problems. Snow removal and rockfall maintenance operations hinder vehicular flow in a restricted traffic area.

The Long Lake SRS is considered a Section 4(f)/6(f) property. Section 4(f) of the Department of Transportation (DOT) Act of 1966 applies to the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance. When a project uses land from a Section 4(f) property, an evaluation must be prepared to demonstrate that there is no feasible and prudent alternative to the use of the property.

Section 6(f) of the Land and Water Conservation Funds (L&WCF) Act states that no property acquired or developed with L&WCF assistance shall be converted to other than public outdoor recreation use unless recreation property of equivalent value is substituted. (Refer to the Section 4(f)/6(f) Evaluation.)

The Department evaluated four alternatives to avoid and/or minimize impacts to the Section 4(f) property. Two actions involved the existing highway alignment within the park, the No-Build Alternative and Alternative 1. Two realignments were also considered. Alternative 2 traverses parkland south of Long Lake and Alternative 3 avoids parkland by passing around its southern boundaries. As the project now stands, the preferred action is Alternative 2.

The No-Build Alternative would not involve the use of Section 4(f) property. However, according to the Division of Park and Outdoor Recreation (DPOR), the existing road detracts from the quality of the recreational experience of the Long Lake SRS, especially on users of the lake. With this alternative there would not be any highway improvements and the issue of safety would remain. The highway and through traffic would continue to be adjacent to the existing public use area and the lake, an area which lacks natural screening buffers. This alternative does not meet the purpose and need for the project.

Alternative 1 would upgrade the existing alignment between MP 85 and MP 92 but not alleviate the severe erosion conditions nor the excessive grades of the Long Lake hill. This action would not require additional right-of-way from the park, although, as previously described, reconstruction of the existing highway alignment would affect the quality of the recreational experience at the Long Lake SRS.

There are two conceptual designs for this alternative along the 8,500-foot long hill segment beginning at the Long Lake SRS wayside. Both designs involve sheet pile retaining walls which would be driven into the slope to minimize excavation.

**Alternative 1A retaining walls** would add an estimated \$39.6 million to the overall construction cost. For the entire highway segment, the total cost would be approximately \$61.6 million.

This design would require two retaining walls (Appendix D). A downslope retaining wall would support the proposed 48-foot wide surface roadway embankment which would include a 12-foot climbing lane. The wall would extend about 4 feet above the roadway surface, roughly 15 feet above the slope. Concrete jersey barriers, curved to deflect the wheels of any impacting vehicles, would be placed along the entire wall length.

Another retaining wall would be required to support the slope on the uphill side and placed approximately 16 feet from the edge of the highway shoulder. The existing slope would be cut back this distance to provide a ditch to function as a safety clear zone, facilitate snow storage, and contain errant rocks. The uphill wall would extend about 20 feet above the highway.

**Alternative 1B retaining wall** would add an estimated \$27.8 million to the overall construction cost. For the entire highway segment, the total cost would be approximately \$49.8 million.

This design would require the downslope retaining wall to contain the 48-foot wide roadway surface embankment (Appendix D). Concrete jersey barriers would be placed along the entire wall length. On the uphill side, a 20-foot ditch would contain rock slides and provide for snow storage.

With either design, safety would still be a problem due to rockfall slides onto the roadway. Steep grades would not be reduced. High construction and continued slope and ditch maintenance costs of such a facility are prohibitive. Expected rock slides could affect the long term stability of the roadway. In addition, the presence of these retaining walls could affect scenic viewing from the roadway and present an additional visual scenic intrusion along the cliff. Based on the above, Alternative 1 was eliminated from further consideration.

**Alternative 2, the preferred,** is a 6.3 mile realignment which would involve Section 4(f) property. This action initially crosses a series of saddles and benches immediately south of Long lake and within the Long Lake SRS (Figures 3-9 and 3-10). The proposed road would leave the existing roadway southwest of the park

wayside (MP 85). Access to this recreation development and private in-holdings adjacent to the south would be provided at this vicinity. Within the park, approximately 43 acres of right-of-way would be required, a portion of which contains an existing utility line and service road. About 66 acres of abandoned highway roadbed and right-of-way would be relinquished to DPOR.

Near the southeast corner of the park, the proposed realignment would gradually descend and traverse a valley between two steep ridges which terminates at the Purinton Creek Canyon. A series of palustrine wetlands are encountered within this valley and a bridge is proposed to span the canyon. Eastward, the realignment would continue to climb, merging with the existing roadway near the Cascade Maintenance Station at MP 92 (Figures 3-9 and 3-10).

Since the realignment does not traverse steep sidehills retaining walls would not be needed. Grades would be reduced substantially from the existing and not exceed 3.5 percent within the Long Lake SRS or 4.5 percent for the remainder of the alternative. Overall, safety conditions would be improved. Access to Weiner Lake (which is stocked by Alaska Department of Fish and Game) and residential properties would be allowed from a portion of the existing road east of Long Lake hill. The amount of roadway to be maintained for access would be determined during design.

The southern shift of the proposed highway would reduce existing noise levels at the wayside development and remove through traffic from the wayside development [See Section 4(f)]. It would provide opportunities for future park development. This alternative is supported by the DPOR. Approximately 17.30 acres of palustrine wetlands would be impacted, of which 1.25 acres are within the Long Lake SRS. The estimated total cost for this entire roadway segment is approximately \$22 million.

**Alternative 3** would be a realignment through presently undisturbed areas south of the existing Long Lake SRS. There would not be any Section 4(f) property involvement with this action, providing the corridor was established prior to park expansion. The terrain is mountainous and abrupt. Excessive earthwork would be required to negotiate the high ridges and deep ravines. A cost effective and feasible roadway corridor to the south of the Long Lake SRS could not be defined. Based upon these factors, this alternative has been eliminated from further consideration.

**e. Hicks Creek Area Alternatives (MP 96)**

Vertical bluffs and severe terrain restrict the highway corridor. The existing alignment follows the bluff west of Hicks Creek and the canyon walls of Pinochle Creek, which flows east to west, parallel to the roadway on the north side. The alignment has extreme curvatures and gradients which limit sight distances and reduce traffic speeds. A lodge, located at Hicks Creek, is adjacent to the existing road.

Several alignments were investigated to attain the desired geometrics while avoiding the lodge. However, cost effective construction requires relocation of the lodge. This action (Figure 3-11) would improve roadway conditions by softening curves, requiring cuts into the rock knob southeast of the existing bridge. On the realignment, a replacement bridge structure would be constructed over Hicks Creek. Pinochle Creek crossings would consist of culverted fill embankments. Approximately 0.86 acre of wetlands would be involved. Of this total, 0.72 acre would be Riverine (Matanuska River) and 0.14 acre would be Palustrine.

**f. Pinochle Hill Alternatives (MP 97)**

The existing roadway is cut into the face of the steep rock bluff of Pinochle Hill. This area has gradients of 6 to 8 percent and curvatures to 26 degrees, the roadway containing some of the steepest grades and sharpest curves within the state. Desirable sight distances are not available throughout this winding segment. Much of the adjacent area was homesteaded and is now residential in development.

**Alternative 1** would upgrade the existing facility to desirable geometrics but would require large quantities of earthwork (Figure 3-11). Modification of the existing alignment would be required to improve the roadway conditions, reducing gradients and curves. Through traffic would continue through the residential area. One structure located at approximately MP 97 would be within the proposed right-of-way. Approximately 0.20 acre of wetlands would be involved. Based on these considerations, this alternative was eliminated.

**Alternative 2**, the preferred, is a 2-mile realignment south of the hill and the focus of residential development (Figure 3-11). This proposed alignment would be constructed on a bench along the Matanuska River, departing from MP 97 and rejoining the existing highway at the summit near Hundred Mile Lake (MP 99).

Grades of this facility would be about 6 percent, requiring a northbound climbing lane. Through traffic would be removed from the residential properties, with local access provided by retaining a portion of the existing roadway. One residence would be relocated with this alternative. Approximately 0.71 acre of Palustrine wetlands would be involved.

**g. Caribou Creek Crossing Alternatives (MP 106)**

Rugged, mountainous terrain is indicative of the Caribou Creek Canyon. Road conditions and safety concerns are similar to those described for the Long Lake Hill area. Existing grades are in excess of 7 percent. Overall, this roadway segment has a low speed alignment; it follows canyon walls, crossing the creek with a low speed bridge on a curve. Geometrics are consistent with a 35 mph design speed. The canyon has talus type slopes and a hazardous slide zone exists along the east canyon wall. Adjacent slopes drop several hundred feet to and from the roadway.

**Alternative 1** would upgrade the existing roadway necessitating cuts exceeding 200 feet in height along both sides of the canyon. This alternative would not reduce the grades, improve the alignment, or avoid the avalanche area. Safety would still be a problem. Therefore, this alternative is not considered further.

**Alternative 2**, the preferred, is a realignment across the Caribou Creek Canyon having a 5 to 6 percent grade (Figure 3-12). This proposed bridge structure would accommodate a 50 mph design speed at a cost of \$23.9 million and be about 400 feet in height. The 50 mph design is recommended because it is consistent with mountainous terrain design standards. Approximately 0.15 acre of Riverine wetlands would be involved with this alternative.

**Alternative 3**, would be a straight alignment (Figure 3-12), designed for 60 mph speeds, crossing the mouth of Caribou Creek. This major structure would be 2,200 feet in length and 400 feet in height. Estimated cost would be about \$27.7 million. Approximately 72,600 cy of fill would be placed in roughly 5.10 acres of Palustrine and Riverine wetlands. This action would impact a Section 4(f) property, the Caribou Creek Recreational Mining Area, enacted in 1990 by the State Legislature. Based on the cost of construction and the presence of a feasible and prudent alternative not affecting a Section 4(f) property, this alternative was eliminated from further consideration.