Eklutna River Bridge Replacement Project
Old Glenn Highway to Eklutna Lake Road

PRE-FINAL Design Study Report

January 2014
MOA Project No. 12-40

Prepared by:
R&M CONSULTANTS, INC.
PRE-FINAL DESIGN STUDY REPORT

Eklutna River Bridge Replacement at Old Glenn Highway

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EXECUTIVE SUMMARY

Overview

The Municipality of Anchorage Project Management and Engineering (MOA PM&E) has contracted with R&M Consultants, Inc. (R&M) to provide professional services to evaluate bridge alternatives for the replacement of the Eklutna River Bridge and upgrading the Old Glenn Highway from Thunderbird Drive to Eklutna Lake Road. This project is being done in partnership with the Alaska Department of Transportation & Public Facilities Bridge Section for bridge-related design. The bridge approach road is the Old Glenn Highway, a two-lane, east-west rural collector without shoulders or pedestrian facilities.

The objectives of the Eklutna River Bridge Replacement project are:

- Remove and replace the existing 78 year-old Eklutna River Bridge with a new 254 foot long bridge that will accommodate vehicle, pedestrian and bicycle traffic;
- Upgrade the roadway to current municipal road standards;
- Provide pedestrian and bicycle facilities in the roadway corridor;
- Upgrade access to the Chugach State Park Thunderbird Falls day-use parking lot including relocating parking stalls and landscape boulders and adding an interpretive kiosk near the trail entrance;
- Increase safety by:
  - Improving horizontal and vertical geometry;
  - Separating vehicles from pedestrians and bicyclists;
  - Reconnecting emergency vehicle access to Thunderbird Falls Subdivision;
  - Improving sight distance by clearing vegetation with the Right-Of-Way (ROW);

The proposed roadway improvements will be designed to current municipal standards for a Rural Collector, upgrade access to Thunderbird Falls day-use parking lot and provide pedestrian and bicyclist safety within the project area.

Design challenges associated with this project are:

- MOA standard typical section for a rural collector is approximately 74 feet, wider than the existing 60’ Public Use Easement (PUE) along the roadway. Acquiring additional PUEs along the Old Glenn Highway will be necessary to upgrade to current design standards.
- Drainage and pedestrian access between the Chugach State Park Thunderbird Falls Trailhead parking lot and the roadway. The parking lot is typically full during peak hours. Overflow parking is along the roadway.
Evaluation Process

Project development for the Eklutna River Bridge Replacement project followed the MOA Context Sensitive Solutions (CSS) process and involved agency and public stakeholders. Selection of a preferred roadway and bridge alternative was an iterative process based on engineering judgment and stakeholder input. Analysis of the roadway alternatives was limited by constraints such as the existing roadway alignment, substructure and existing ROW in the form of a PUE. Four bridge structure types were considered during the concept design process; 1.) two-span bulb-tee girders; 2.) single-span cast-in place (CIP) box girder; 3.) single-span steel plate girder; and 4.) open spandrel steel arch. Stakeholder input was solicited at a public open house, agency meeting, mailings, project web page and e-newsletters. The bridge alternatives were analyzed to evaluate cost, constructability, construction methods, impacts, timeframe, and long term maintenance costs.

Recommended Alternatives

Based on the evaluation criteria, the Two-Span Bulb-Tee Girder Bridge Alternative and the Separated Multi-Use Pathway Typical Section were identified as the Preferred Alternatives. Each Alternative is described in more detail in the Design Study Report (DSR), but the Two-Span Bulb-Tee Girder Alternative and the Separated Multi-Use Pathway Typical Section were generally preferred because:

- Roadway typical section meets current MOA design standards.
- Bridge alternative is least expensive, requires very little maintenance, bridge type is commonly constructed within the state, can be quickly built and requires the least amount of cast-in-place concrete, satisfying the project objectives.

The figures on the following page summarize graphically the preferred road and bridge typical sections.
Figure 0.1 Recommended Old Glenn Highway Typical Section

Figure 0.2 Recommended Eklutna River Bridge Typical Section
The estimated costs for the preferred alternative are summarized in the table below:

### Table 0.1 Estimated Total Project Costs

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<td>A</td>
<td></td>
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<tr>
<td>Roadway, Pathway, Parking Lot Construction</td>
<td>B</td>
<td></td>
<td>$1,800,000</td>
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<tr>
<td>Bridge Construction</td>
<td>C</td>
<td></td>
<td>$4,500,000</td>
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<td>Subtotal Construction (Basic Bid)</td>
<td>D</td>
<td>A+B +C</td>
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<td>Contingency</td>
<td>E</td>
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<td>Construction Engineering</td>
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<td>D+E+F</td>
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<td>Utilities</td>
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<td>Right-of-Way Acquisition</td>
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<td>J</td>
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1.0 INTRODUCTION

1.1 General

The Municipality of Anchorage, Public Works Department, Project Management and Engineering Division (MOA PM&E), in partnership with the Alaska Department of Transportation and Public Facilities (DOT&PF) Bridge Design Section, has contracted with R&M Consultants, Inc. (R&M) to provide professional services to evaluate bridge and roadway alternatives for the replacement of the Eklutna River Bridge and to upgrade the Municipally-owned Old Glenn Highway from Thunderbird Drive to Eklutna Lake Road. Improvements will reconnect users on both sides of the bridge to emergency services as well as shorten commute times.

The Eklutna River Bridge is located in Chugiak-Eagle River’s Eklutna Valley within the Municipality of Anchorage (MOA) near the Chugach State Park (CSP) Thunderbird Falls Trailhead, approximately 25 miles north of Anchorage. The bridge was originally built in 1935 as a one-lane pioneer bridge to connect Anchorage to the Matanuska-Susitna Valley and expanded to two lanes in 1952 to accommodate two-way traffic. The bridge has been important for local use by residents of the Thunderbird Heights neighborhood, Eklutna Village and Eklutna Valley residents, the Anchorage School District and CSP Thunderbird Falls trail visitors. Since May 2012, the 78-year old bridge has been closed to vehicular traffic due to widespread structural deterioration. The bridge is currently open for pedestrian and bicycle traffic. See Figures 1.1 and 1.2 for Location and Vicinity Maps.

This project will construct a new bridge over the Eklutna River, in the same alignment as the existing bridge, and upgrade Old Glenn Highway between Thunderbird Drive and Eklutna Lake Road to current MOA rural collector standards. Roadway improvements are expected to include pedestrian/bicycle facilities and widened roadway shoulders. The project will also upgrade the driveway access to the Thunderbird Falls Trailhead parking lot to provide better sight distance to the bridge from the entrance on the south approach to the bridge.
Figure 1.1 Location Map

Figure 1.2 Vicinity Map
1.2 Project History

The 257-foot Eklutna River Bridge was built in 1935 as a one lane, two truss steel spandrel arch bridge to connect Anchorage to the agricultural Matanuska Valley. In 1941-1942 the Anchorage-Matanuska Road was incorporated into the Glenn Highway, providing an alternative route from the Port of Valdez to Fort Richardson in Anchorage. The bridge was widened to two-lanes in 1952 by moving the original upstream truss further upstream and adding a new third arch between the original two and placing a concrete deck. The Eklutna River Bridge continued to serve as an essential transportation link until 1975 when the new Glenn Highway was constructed. The federal government originally built and owned the bridge until the late 1950s when ownership responsibility was transferred to the state of Alaska. In 1978, the DOT&PF conveyed the Eklutna River Bridge to Eklutna, Inc. In 1985, Eklutna, Inc. conveyed the bridge to the Municipality in as-is condition. Since 1985, Chugiak-Birchwood-Eagle River Rural Road Service Area (CBERRRSA) Street Maintenance has maintained the bridge.

Beginning in 1998, federal funding was available for a design study that evaluated rehabilitating or replacing the Eklutna River Bridge. The 2001 design study recommended rehabilitating the existing bridge structure and upgrading the deck and related rail system. Preliminary engineering analysis determined the bridge could not be feasibly rehabilitated and the project was subsequently discontinued due to a lack of funding for further work. Preliminary engineering studies and field work such as roadway mapping and surveying and hydrology studies conducted during the federal aid project phase are carried forward as important and relevant studies to this project.
A scheduled inspection in 2010 documented and recommended the bridge be replaced due to widespread deterioration and cracks in the welds and truss members, missing connections, member damage and section loss, rust, pack rust and paint failure. The inspection report also rated the concrete deck in poor condition with multiple areas of spalling, exposed reinforcing steel and joint failures. The Municipality held an Open House in February 2012 to inform residents the Eklutna River Bridge will be closed to vehicle traffic in May 2012. The bridge is currently open for pedestrian and bicycle traffic only.

2.0 BACKGROUND & EXISTING CONDITIONS

2.1 Purpose and Need

The MOA is replacing the 78 year-old Eklutna River Bridge in the Eklutna Valley area of Chugiak-Eagle River (Figure 1). The purpose of this project is to:

- Reestablish mobility and connectivity to residents and area users;
- Improve non-motorized opportunities and recreational access to Chugach State Park;
- Decrease emergency response time by providing a viable alternate access from the Glenn Highway across Eklutna River;
- Support future land use and development; and
- Minimize long-term maintenance and operations costs to the CBERRRSA.

The MOA Public Works Department, PM&E Division, will supervise the environmental approval, preliminary and final design, and construction of the improvements. The DOT&PF Bridge Design Section will design the new bridge structure. PM&E has retained R&M to lead the planning, public involvement, design and permitting effort. The overall goal of this project is to replace the existing Eklutna River Bridge which has been closed to vehicle traffic since May 2012. Improvements are anticipated to include a new bridge, improved approach road surfacing, non-motorized pedestrian and bicycle facilities, improvements to the adjacent CSP parking lot and landscaping.

The project was funded in 2012 with a $14 million state grant to replace the existing, closed bridge with a new bridge across the Eklutna River that will accommodate two vehicle lanes and a multi-use trail. Historic documentation of the existing bridge will be included with this project. Construction is planned to begin in 2015.
2.2 **Context Sensitive Solutions (CSS) Summary/Project Goals**

The Eklutna River Bridge Replacement Project began in 2013 and follows the Municipality’s Context Sensitive Solutions (CSS) Policy guidelines. CSS policy goals include involving stakeholders during the early stages of the project to help define the problems to be solved and to provide input on conceptual solutions to the problems. The Concept Report documents and summarizes the planning and conceptual design phase of the project (see Appendix E). Goals identified from input from the public and agency stakeholders include:

- Restore connectivity with a new bridge that accommodates vehicles;
- Provide pedestrian and bicycle facilities on the bridge;
- Improve pedestrian, bicyclist and motorist safety;
- Improve the curvature of the road, if necessary;
- Provide shoulders;
- Include street lighting if warranted for increased safety and visibility;
- Design and build a bridge that minimizes long-term maintenance and operational costs;
- Improve safety and connectivity for pedestrians from Thunderbird Falls trailhead parking lot to the bridge;
- Provide a display with the history of the bridge and the Dena’ina peoples’ connection with the area;
- Preserve the environmental and scenic values of the Eklutna River and surrounding area during removal and construction of the new bridge.

The design study phase and the Design Study Report (DSR) evaluates the improvements to the roadway, within the CSS policy framework, the Design Criteria Manual (DCM), the Official Streets and Highways Plan (OS&HP), Title 21 Land Use and Development Regulations and other adopted plans and standards to achieve these goals. The design study did not consider the No Action Alternative as viable as it would not solve or resolve the problems identified. The CSS project development process will continue through the design phase and will include opportunities for stakeholders to participate, evaluate and provide input through open houses, the project website, e-mails, phone calls, user group and community council presentations.

2.3 **Guiding Plans**

Under the Municipality’s CSS Policy for transportation project development, adopted plans and policies are reviewed for consistency with the project’s recommended alternatives. For the Eklutna River Replacement Project, over 15 guiding plans were reviewed in detail. A summary of the relevant plans and guiding objectives and goals relating to the Eklutna River Bridge replacement are summarized as part of the Concept Report in Appendix E.
2.4 Facility Description, Context, and Setting

The Old Glenn Highway is a rural collector roadway with two 12-foot travel lanes and no shoulders or pedestrian/bicycle facilities. The public Right-of-Way (ROW) is contained within a 60-feet Public-Use Easement (PUE). Overhead telephone and electric utilities and underground gas line and fiber optic cables exist within the project area. No roadway lighting or bridge lighting currently exists. There is an existing light pole at the intersection of the Old Glenn Highway and Eklutna Lake Road, located within State of Alaska ROW. The Thunderbird Heights subdivision is served by Anchorage Water and Wastewater Utility (AWWU) public water only. All homes within the subdivision have individual on-site septic systems. The subdivision is not part of the Eagle River Street Light Service Area.

The Eklutna River Bridge Replacement is a top priority for the Chugiak and Eklutna Valley Community Councils and a high priority for the MOA and CBERRRSA board and maintenance staff. Since the bridge closure in 2012, area residents have approximately 1.5 miles of out-of-direction travel to either Anchorage or to Palmer/Wasilla.

2.5 Traffic Conditions

Kinney Engineering performed a Traffic, Safety and Alternatives Analysis in October and November 2013. The analysis is summarized below and the full version is included in Appendix D.

The Eklutna River Bridge was closed to vehicular traffic in May 2012. The northbound approach is blocked just north of the Thunderbird Falls Trailhead parking area. The southbound approach is blocked just south of Denaina Elders Road and Eklutna Lake Road intersection. Because the Glenn Highway exit at Thunderbird Falls functions with a right-in-right-out configuration in the northbound direction only, with no southbound exit or interchange, area residents living in the Thunderbird Heights subdivision and park users of the Thunderbird Falls Trailhead are required to detour around the closure by utilizing either the Eklutna interchange to the north or the Mirror Lake interchange to the south.

The Old Glenn Highway is a paved, two lane roadway with no shoulders or pedestrian facilities. At both the Thunderbird Drive and Eklutna Lake Road intersections, the Old Glenn Highway has free-flowing movement while the minor roadways have stop control. Both intersections are three way approaches, two on the Old Glenn Highway and one on the minor roadway. The intersection of the Old Glenn Highway, Denaina Elders...
Road, and Eklutna Village Road is also a three way approach. The Old Glenn Highway is free-flowing with yield control on the right-turn bypass lane on Denaina Elders Road and stop control on Eklutna Village Road. The northbound off-ramp of the Glenn Highway at the Thunderbird Falls exit intersects with the Old Glenn Highway under a yield condition. The Old Glenn Highway is free-flowing with the westbound lane turning into the Glenn Highway northbound on-ramp and merging with northbound traffic.

There are two additional accesses along the Old Glenn Highway. The first is the entrance to the Thunderbird Falls Trailhead parking area located just south of the Eklutna River Bridge. The second is a utility access for a cellular phone tower located just south of the the Old Glenn Highway/Eklutna Village Road intersection.

The portion of Eklutna Village Road located within the study area is a paved, two lane roadway with variable width shoulders and no pedestrian facilities. The north and southbound Glenn Highway off-ramps intersect with Eklutna Village Road on either side of the highway overpass. The off-ramps are single lanes with stop control at Eklutna Village Road. The north and southbound Glenn Highway on-ramps are single lane merge ramps. Eklutna Village Road has a right turn bypass lane at the southbound on-ramp.

### 2.5.1 Traffic Volumes

This analysis utilizes historic and predicted Annual Average Daily Traffic (AADT) volumes along with current turning movement patterns to prepare construction and design year traffic forecasts. The methodology is described below.

Historic AADT volumes were collected for the last ten years from the DOT&PF annual volume reports for 2002 through 2012. Volumes were not available through DOT&PF or MOA for Thunderbird Drive or Denaina Elders Road. The historic AADT volumes show an average growth in the Eklutna area of approximately one and a half percent per year for the eleven year period. This average does not include growth along the Glenn Highway.

In comparison, predicted AADT volumes were obtained from the 2035 Metropolitan Transportation Plan (MTP) Travel Demand Model. Using the DOT&PF AADT volumes for 2012 as the base year, the model predicts an average annual growth rate of approximately five percent. Historic and predicted AADT volumes are shown in Table 2.1.
### Table 2.1 Historic and Predicted AADT

<table>
<thead>
<tr>
<th>Segment</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2035 TDM</th>
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<tbody>
<tr>
<td>Eklutna Village Road (CDS 135700)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Glenn End of Road</td>
<td>817</td>
<td>810</td>
<td>800</td>
<td>810</td>
<td>854</td>
<td>870</td>
<td>850</td>
<td>762</td>
<td>903</td>
<td>900</td>
<td>759</td>
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<td>Glenn Highway NB Off Ramp at Eklutna (CDS 135701)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Glenn Highway NB Eklutna Village Road</td>
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<td>210</td>
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<td>288</td>
<td>290</td>
<td>280</td>
<td>290</td>
<td>300</td>
<td>401</td>
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<tr>
<td>Glenn Highway SB Off Ramp at Eklutna (CDS 135702)</td>
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<td></td>
</tr>
<tr>
<td>Glenn Highway SB Eklutna Village Road</td>
<td>220</td>
<td>210</td>
<td>210</td>
<td>210</td>
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<td>210</td>
<td>284</td>
<td>290</td>
<td>267</td>
<td>270</td>
<td>1,202</td>
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<td>Glenn Highway NB On Ramp at Eklutna (CDS 135703)</td>
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<td></td>
</tr>
<tr>
<td>Eklutna Village Road Glenn Highway NB</td>
<td>280</td>
<td>214</td>
<td>210</td>
<td>210</td>
<td>214</td>
<td>200</td>
<td>190</td>
<td>200</td>
<td>200</td>
<td>275</td>
<td>270</td>
<td>86</td>
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<tr>
<td>Glenn Highway SB On Ramp at Eklutna (CDS 135704)</td>
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</tr>
<tr>
<td>Eklutna Village Road Glenn Highway SB</td>
<td>660</td>
<td>548</td>
<td>540</td>
<td>550</td>
<td>660</td>
<td>676</td>
<td>660</td>
<td>690</td>
<td>710</td>
<td>716</td>
<td>720</td>
<td>1,648</td>
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<td>Eklutna Lake Road (CDS 135730)</td>
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<td></td>
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<tr>
<td>Old Glenn Chugach State Park</td>
<td>482</td>
<td>490</td>
<td>373</td>
<td>445</td>
<td>450</td>
<td>460</td>
<td>510</td>
<td>540</td>
<td>550</td>
<td>572</td>
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<td>1,400</td>
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<tr>
<td>Old Glenn Highway at Eklutna (CDS 135750)</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Glenn Highway Eklutna Lake Road</td>
<td>720</td>
<td>710</td>
<td>467</td>
<td>470</td>
<td>568</td>
<td>580</td>
<td>560</td>
<td>626</td>
<td>640</td>
<td>640</td>
<td>784</td>
<td>2,598</td>
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<tr>
<td>Eklutna Lake Road Eklutna Village Road</td>
<td>740</td>
<td>730</td>
<td>651</td>
<td>660</td>
<td>773</td>
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<td>780</td>
<td>820</td>
<td>789</td>
<td>790</td>
<td>790</td>
<td>2,639</td>
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<tr>
<td>Glenn Highway NB Off Ramp at Thunderbird Falls (CDS 135751)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glenn Highway NB Old Glenn</td>
<td>470</td>
<td>480</td>
<td>423</td>
<td>430</td>
<td>416</td>
<td>420</td>
<td>410</td>
<td>477</td>
<td>490</td>
<td>480</td>
<td>480</td>
<td>576</td>
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<tr>
<td>Glenn Highway NB On Ramp at Thunderbird Falls (CDS 135752)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Glenn Glenn Highway NB</td>
<td>80</td>
<td>80</td>
<td>64</td>
<td>70</td>
<td>69</td>
<td>70</td>
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<td>136</td>
<td>140</td>
<td>137</td>
<td>140</td>
<td>1,976</td>
</tr>
</tbody>
</table>
2.5.2 Speeds

Speed limits on roadways within the project area were obtained from the MOA Traffic Data Management System. The speed limit on Old Glenn Highway is 30 mph north of the intersection with Eklutna Lake Road and 35 mph south of the intersection. The speed limit on the portion of Eklutna Village Road located within the study area is 30 mph. It should be noted that not all of the speed limits are posted.

A speed study was conducted in September 2013 along the Old Glenn Highway between the Glenn Highway on-off ramps and Thunderbird Drive. Data was collected using continuous automatic traffic data recorders. This speed study shows an 85th percentile speed of 39 mph. This is approximately five miles per hour over the MOA speed limit identified for this roadway segment. The 85th percentile speed indicates that 40 mph should be used for the traffic analysis. Speed limits and collected speed data are shown in Table 2.2.

Table 2.2 Speed Limits and Collected Speed Data

<table>
<thead>
<tr>
<th>Street</th>
<th>Posted Speed Limit</th>
<th>85th Percentile Speed</th>
<th>Speed Used for Traffic Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Glenn Highway – Glenn Highway to Eklutna Lake Road</td>
<td>35 mph</td>
<td>39 mph</td>
<td>40 mph</td>
</tr>
<tr>
<td>Old Glenn Highway – Eklutna Lake road to Denaina Elders Road/Eklutna Village Road</td>
<td>30 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Eklutna Village Road</td>
<td>30 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Glenn Highway</td>
<td>65 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Thunderbird Drive</td>
<td>25 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Eklutna Lake Road</td>
<td>35 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Denaina Elders Road</td>
<td>25 mph</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Source: MOA Traffic Data Management System and September 2013 Speed Study

2.5.3 Turning Movements

Turning movement counts were collected during September 2013 at the intersection of the Old Glenn Highway with the northbound Glenn Highway on-off ramps at the Thunderbird Falls exit; the intersections of the Old Glenn Highway and Thunderbird Drive, Eklutna Lake Road, and Denaina Elders Road/Eklutna Village Road; and the intersections of the north and southbound Glenn Highway on-off ramps at the Eklutna interchange with Eklutna Village Road. These counts were taken between 4:00 PM and 6:00 PM on varying weekdays. As such, the peak hour varied slightly at each intersection. The intersections of Old Glenn Highway with Thunderbird Drive and Old Glenn Highway with Eklutna Lake Road both had a peak hour between 4:30 and 5:30 PM. The other four intersections had a peak hour between 5:00 and 6:00 PM. To account for these variations in weekday traffic and peak hour times, the turning
movement counts were manually balanced. Balancing the counts provides for continuity along the study corridor between key intersections. This consistency allows us to better model the capacity of each intersection.

Assumptions for redistributing traffic based on reopening of the Eklutna River Bridge also needed to be made. Using the average distribution of traffic moving along the Old Glenn Highway as shown by the DOT&PF historic volumes, turning movement directions for vehicles entering the Old Glenn Highway from Thunderbird Drive and Eklutna Lake Road were adjusted. These adjustments required redistribution of turning movements along the entire corridor.

Figure 2.2 shows the balanced field counts, addressing weekday and peak hour variations in the data, and the adjusted counts, addressing reopening of the bridge.

The adjusted counts were used to develop design PM peak hour turning movement volumes. These volumes are used for modeling intersection operations and are the volumes for which Measures of Effectiveness (MOE) are reported. The design turning movement volumes were developed by applying a growth rate of five percent per year to the adjusted counts. As previously mentioned, this growth rate was developed using the 2012 AADT reported by DOT&PF and the 2035 Anchorage Metropolitan Area Transportation Solutions (AMATS) MTP Travel Demand Model. This rate is significantly higher than the historic DOT&PF traffic volumes would indicate, but is based on future planning for the study area and is an appropriate estimate for use in forecasting future traffic. Figure 2.3 summarizes the design peak hour turning movement counts at each intersection in the study area for both 2015 and 2035.
Figure 2.2 2013 Peak Hour Turning Movements, Balanced and Adjusted Counts

2013 Balanced Counts

2013 Adjusted Counts
Figure 2.3 2015 and 2035 PM Peak Hour Turning Movements

<table>
<thead>
<tr>
<th></th>
<th>Glenn Hwy SB On</th>
<th>Glenn Hwy SB Off</th>
<th>Glenn Hwy NB Off</th>
<th>Glenn Hwy NB On</th>
</tr>
</thead>
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</tr>
<tr>
<td>Glenn Hwy NB Off</td>
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<td>0</td>
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<td>0</td>
</tr>
<tr>
<td>Old Glenn Hwy</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Eklutna Village Road</td>
<td>0</td>
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<td>Denaina Elder’s Road</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thunderbird Drive</td>
<td>32</td>
<td>12</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Eklutna Lake Road</td>
<td>15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Glenn Hwy SB On</th>
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<th>Glenn Hwy NB Off</th>
<th>Glenn Hwy NB On</th>
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</thead>
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</tr>
<tr>
<td>Old Glenn Hwy</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Eklutna Village Road</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Denaina Elder’s Road</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thunderbird Drive</td>
<td>85</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Eklutna Lake Road</td>
<td>38</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>
2.5.4 Crash Experience

Crash data for the study area was collected from DOT&PF for the eleven-year period from 2000 to 2010. Three crashes were reported during this period, two on Eklutna Village Road and one on the northbound Glenn Highway on-ramp at the Eklutna interchange. Note that the data excludes crashes occurring on the Glenn Highway since the highway itself is not included in the study.

The first crash on Eklutna Village Road occurred in June 2004 at the intersection with the northbound Glenn Highway off-ramp. The roadway was dry and the crash occurred on a clear day. The driver was traveling north at an unsafe speed, skidded out of control and went into the roadside ditch, colliding with a utility pole. This was a single vehicle incident and the driver sustained minor injuries. The driver was cited with careless driving.

The second crash on Eklutna Village Road occurred in September 2004 at the intersection with the southbound Glenn Highway off-ramp. The roadway was dry and the crash occurred on a clear day. The driver was traveling south and did not have control of the vehicle. The vehicle went into the roadside ditch, colliding with a fence. No injuries were sustained and the driver was not cited.

The crash on the northbound Glenn Highway on-ramp occurred approximately 100 feet north of Eklutna Village Road in October 2008. The roadway was covered with some sort of substance such as mud, oil, sand, or gravel. The crash occurred after dark, at approximately 1:45 AM, on a cloudy morning. The driver was traveling north at an unsafe speed. The vehicle left the roadway, hit a fence, and overturned. No injuries were sustained. The driver was cited with failure to exercise due care, causing damage to the highway.

Only three incidents occurring in the study area in eleven years suggests a low accident rate with no significant trends. The study period is prior to 2012 when the bridge was closed to vehicular traffic, so the bridge was operational when all three crashes occurred. This means that there is no parallel between diverted traffic and accident occurrence and reopening the bridge would not change the conditions that were in place at the time of the accidents.

2.5.5 Operations

Each roadway segment, intersection, and freeway ramp in the study area was analyzed for PM peak hour capacity in both the construction and design years using the HCM2000 method in the McTrans Highway Capacity Software. American Association of State Highway & Transportation Officials (AASHTO) guidance suggests that an acceptable Level of Service (LOS) for rural collector roads should be LOS C or better, that an acceptable LOS for rural local roads may be LOS D, and that suburban freeways should operate at LOS C or D.
Roadway segments, intersections and on-off ramps are predicted to have adequate capacity during the design year. After a thorough traffic study, the Old Glenn Highway is predicted to have LOS B, the intersection at Thunderbird Drive a LOS A, and the intersection at Eklutna Lake Road a LOS A.

2.6 Land Use, Zoning and Ownership

The adjacent residential area is the Thunderbird Heights subdivision, a low-density single-family neighborhood served by public water and on-site septic systems. The area is also served by telephone, cable, gas and electric. Thunderbird Drive is the only access to the approximately 100 homes in the neighborhood and terminates in a cul-de-sac at Raven Court. School-aged children attend Chugiak Elementary, Mirror Lake Middle School and Chugiak High School. The area is served by Anchorage School District buses.

General land use for the area includes low-density residential, vacant, undeveloped land and Chugach State Park Thunderbird Falls Trailhead. Zoning for the area includes R-7 Intermediate residential, T (Transition), Chugach State Park (Watershed), R-10 Alpine/Slope Residential and B-3 (General Business). See Figure 2.4 Land Use Map. There is a small section of Class B wetlands mapped just south of the intersection of Thunderbird Drive and The Old Glenn Highway and beyond the project limits. Vegetation in the area is mature growth of poplars, cottonwoods, birch, white spruce and alders. Eklutna, Inc. owns the large tracts of undeveloped vacant land in the project area including the land occupied for the Thunderbird Falls trail easement. See Figure 2.5 Ownership and Zoning Map.

North of the Eklutna Lake Road, several areas have existing industrial land uses including the MEA Power Plant north of the Eklutna Interchange.

The Old Glenn Highway serves as the only access to Thunderbird Heights Subdivision (R6), a low density, large lot, rural neighborhood. Lands adjacent to the project are undeveloped and owned by Eklutna, Inc. and zoned as Transition (T). Eklutna, Inc. has expressed a near-term interest to develop Phase II of Thunderbird Heights Subdivision.

Thunderbird Falls Trailhead is located between Thunderbird Drive and the bridge to the east and serves as one of the entry points into Chugach State Park and the Thunderbird Falls. The park, parking lot and trailhead are owned by the Alaska Department of Natural Resources (DNR), CSP.
FIGURE 2.5 LAND OWNERSHIP AND ZONING MAP
MOA PRJ. NO. 12-40

Land Ownership
- Private - Eklutna, Inc.
- Private - Native Village of Eklutna
- Private
- State
- Zoning (MOA)
- Trails
- Watercourse

Zoning Districts
- R-5 Rural Residential District
- R-6 Suburban Residential District (large-lot)
- R-7 Intermediate Rural Residential District
- R-10 Residential Alpine/Slope District
- R-O Residential Office
- B3 SL General Business District (with Special Limitations)
- I1 Light Industrial District
- PC Planned Community District
- PLI Public Lands and Institutes
- T Transition
- W Watershed District
2.7 Landscaping

The Thunderbird Heights neighborhood at the south limits of the project includes a large monument sign with ornamental plantings at its base. The Thunderbird Trail and associated parking area just north of the Thunderbird Drive intersection is very well used, especially in summer. The Thunderbird Falls trailhead parking area is asphalt pavement and has large boulder delineators at its edge with small cottonwood saplings interspersed between them. Street signage for the trailhead exists at the edge of the Old Glenn Highway directing visitors to the trailhead and additional signage, including interpretive signs and a fee station, is included within the parking area and trailhead development. Views to/from the bridge to the Thunderbird Falls trailhead are non-existent due to obstructions from existing mature vegetation.

![Figure 2.6 View from existing Eklutna River Bridge looking North](image)

Views to and from the bridge are localized due to mature vegetation in the area and marginalized by overhead utility lines both to the east and west. Views from the Glenn Highway do not exist during summer months due to leaf-out of deciduous vegetation and are limited during the winter months because of dormant vegetation and the design speed of the highway. Distant views from the Old Glenn Highway to the northwest do exist from the bridge but are marginalized by overhead utilities and partially obstructed by vegetation. There are excellent views of the exposed bedrock and mature forest from the bridge deck looking east up the Eklutna River valley. The exterior of the bridge nor its substructure below the deck is viewable from any commonly accessible area.
Figure 2.7 View of Eklutna River Bridge from Glenn Highway looking Southeast
Figure 2.8 Existing Vegetation and Viewshed
2.8 Drainage

Existing drainage within the project area consists of sheet flow from the paved surface of the Old Glenn Highway, which has no ditches within the project limits. Runoff flows down fill embankments and into existing low areas, where it infiltrates. No culverts exist within the project limits. Cross-culverts are present at Thunderbird Drive and Eklutna Lake Road.

2.8.1 Eklutna River Basin Overview

The basin of the Eklutna River extends from elevations of greater than 8,000 feet within the Chugach Mountains to sea level along the Knik Arm of Cook Inlet. The upper portion of the basin is rugged and glaciated, with a total of approximately 6 square miles of the basin being covered by glaciers. The largest of these is the 6.5-mile long Eklutna Glacier.

The basin above the bridge replacement project covers an area of approximately 171 square miles. The upper portion of the basin is dominated by a deep, glacially-carved valley occupied by Eklutna Lake. The lake is approximately 6.5 miles long, 1.2 miles wide, and has an average depth of 120 feet. The lake has formed behind the terminal moraine of the prehistoric Eklutna Glacier. The drainage basin of the lake covers approximately 122 square miles. Two glaciated headwater tributaries – the East and West Forks of the Eklutna River, 38.2 and 25.4 square miles in area, respectively – occupy about half of the Eklutna Lake basin, but contribute more than 80% of the flow received by the lake.

Below the lake, the river is joined by Thunderbird Creek approximately 0.5 miles upstream from the bridge replacement project. The Thunderbird Creek basin covers approximately 30 square miles and is unglaciated.

2.8.2 History of Dams on the Eklutna River

Flow in the Eklutna River has been regulated to some degree by dams since the 1920s. Construction of a two-dam hydropower project was completed in 1929. The project was owned and operated by Anchorage Light and Power, and supplied electricity to Anchorage. The project included an upper dam at the outlet of Eklutna Lake that raised the lake level to increase lake storage and moderate flood flows, and a lower diversion dam that directed flows through an 1,800-foot long tunnel and 850-foot long penstock to a powerhouse located on the lower end of river. The project diverted up to 140 cubic feet per second (cfs) into the tunnel and the rest of the flow of the river spilled over the crest of the diversion dam – a 61-foot high concrete arch structure. The diversion dam is still in place, but has been abandoned, and the area above the dam has completely filled with sediment. The dam is located approximately 1.7 miles upstream from the bridge replacement project site.
The increased need for electrical power in Anchorage in the 1940’s spurred the construction of a new hydropower project – the Eklutna Lake Hydroelectric Facility - in the 1950s. The project, designed by the U.S. Bureau of Reclamation, was completed in 1955. The project reconstructed the old storage dam to form a 555-foot long earth- and rock-filled structure at the outlet of Eklutna Lake. A concrete box intake structure on the bottom of the lake routes flow into a 4.5-mile long tunnel and 1,088-foot long penstock under Goat Mountain to a power plant located on the Old Glenn Highway along the Knik River. The tunnel and penstock system has a hydraulic capacity of 640 cfs.

The 1964 Earthquake damaged the Eklutna Lake dam, and a new 815-foot long earth- and rock-filled dam was constructed in 1965 approximately 1,400 feet downstream of the old dam location. The dam was built with a crest elevation of 891 feet (16 feet higher than the crest of the damaged dam), and with an ungated spillway with a crest elevation of 871 feet, which significantly increased the storage of the lake.

Besides supplying hydropower, Eklutna Lake also serves as the primary drinking water source for the MOA. Water is withdrawn below the same intake that provides water to the hydroelectric project, and is then treated at the AWWU’s Eklutna Water Treatment Plant.

2.8.3 Project Site Hydrology

The U.S. Geological Survey (USGS) has operated a number of gages within the Eklutna River basin. Relevant gages to this study include:

- 15280000 – Eklutna Creek near Lake Outlet (10/1/46 – 9/30/62)
- 15278000 – Eklutna Lake (6/22/83 – present)
- 15280200 – Eklutna River at Glenn Highway (5/1/02 – 9/30/07)

The Eklutna Lake dam has a profound effect on the hydrology of the lower Eklutna River. Due to the withdrawals for hydropower and water supply, there is no outflow from Eklutna Lake into the Eklutna River except during extremely rare high water events.

The Eklutna River gage at the Old Glenn Highway was located at the bridge replacement site. During the approximately 6 years that the gage was in operation, there was no spillover from the lake. With no outflow from the lake, the effective drainage area above the project site is reduced from 171 square miles to 49 square miles. Most of the flow at the bridge site comes from the 30-square mile Thunderbird Creek basin, which is generally lower in elevation and likely receives significantly less precipitation than the basin above Eklutna Lake. Thunderbird Creek also lacks the influence of glacial melt that the lake receives from the East and West Forks of the Eklutna River.
The effects of the lack of outflow from the lake can be seen in the generally low flows recorded at the gage during the brief period of record. During most years, the maximum mean daily flow was less than 150 cfs. The highest recorded mean daily flow was 255 cfs, which occurred in 2006, and the maximum instantaneous peak flow of 304 cfs was recorded that same year.

Water has only been documented to have crested the spillway of the existing dam on 10 occasions. The lake spilled over in both 2012 and 2013, but prior to that, the most recent spillover event had occurred in 1997. The flood of record occurred in 1995 when water in the lake reached an elevation of 877.6 feet, which is more than 6 feet higher than the top of the spillway. A flow over the spillway of 1,000 cfs has been estimated for that event.

Spillover events typically occur late in the flow season of extremely wet years when lake storage is at a maximum. The spillover in 2013 was likely the result of runoff from late summer rains occurring at a time when lake levels were already high due to glacial melt associated with record warm temperatures during the early part of the summer.

On the rare occasions when the lake does spill over, the character of flows entering the Eklutna River is controlled to a large degree by the buffering effects of the lake. Peak flows over the spillway occur later than for floods occurring in nearby basins. For example, during the flood of record in 1995, the peak flow over the spillway occurred a number of days after the occurrence of the peak flows in neighboring basins, some of which were experiencing floods well in excess of the 100-year recurrence interval flood. Also, high flow periods persist for much longer for flows spilling over the dam than for floods occurring in nearby basins. In contrast to dam spillway flows, flood flows in the Thunderbird Creek basin and in the 19-square mile basin between the dam and the Thunderbird Creek confluence are expected to have a relatively flashy character due to the steepness of the basins and the lack of significant storage. Because of this, the magnitude and timing of peak flows at the bridge replacement site are expected for the most part to be the result of the flooding characteristics of Thunderbird Creek and the basin below the dam, even when spillover is occurring.

### 2.8.4 Flood Frequency

Because of the presence of the Eklutna Lake dam within the Eklutna River watershed, and the brief gage record at the bridge replacement site, the performance of a flood frequency analysis will not be straightforward. Flood frequency analyses will be performed using a weighted combination of peak flow analyses and regional regression equations, and will also account for rare events when spillover of the dam occurs.
2.8.5 Hydraulic Analyses

The results of the flood frequency analysis will be used in a HEC-RAS water surface profile model to estimate flood elevations at the bridge site. The hydraulic model will also be used to compute scour for the preferred bridge alternative that has piers or abutments located within the floodplain of the river.

2.9 Utilities

Existing utilities within the project perimeter consist of water mains, natural gas, electricity, and communication. All properties within the Thunderbird Heights Subdivision have on-site septic systems.

The locations of the utilities were recorded during field surveys along with record drawing research. A brief description of each utility is found below. A more detailed utility conflict report will be prepared during the design phase. Scoping letters were sent to each utility company requesting information on existing facilities and any planned upgrades. There were no reported planned upgrades and no known utility conflicts within the project area. See Appendix B, Plan Sheets for location of existing utilities.

2.9.1 Water

An AWWU owned 8-inch ductile iron pipe (DIP) transmission main (installed in 1999) enters the project limits from the west at the Thunderbird Drive intersection with the Old Glenn Highway, crosses the roadway and then necks down to a 4-inch DIP before running parallel to Thunderbird Drive along the southern ROW limit. This system serves the Thunderbird Heights Subdivision.

A 54-inch DIP main that supplies drinking water to the Municipality crosses the Old Glenn Highway at the Eklutna Lake Road intersection. No water pipes are expected to be impacted during construction of this project.

There are no fire hydrants within the project limits.

2.9.2 Natural Gas

ENSTAR Natural Gas company facilities in the project area consist of underground plastic gas pipe service lines. South of the bridge site, a 4-inch gas pipe crosses the Old Glenn Highway at Thunderbird Drive and is buried along the north side of the Thunderbird Drive ROW until exiting the project area. North of the bridge site, another 4-inch gas line crosses the Old Glenn Highway at Eklutna Lake Road running along the south ROW until exiting the project area.
2.9.3 Telephone

Matanuska Telephone Association (MTA) owns buried fiber optic (F/O) and overhead telephone lines along the project corridor. An underground F/O cable crosses The Old Glenn Highway near the southern edge of the Thunderbird Falls parking lot.

AT&T owns buried F/O located just north and south of the project limits.

2.9.4 Electric Utilities

Matanuska Electric Association (MEA) owns an overhead electric utility line and poles approximately 100 feet east of and parallel to The Old Glenn Highway.

The only illumination within the project limits is located at the Eklutna Lake Road intersection with the Old Glenn Highway and consists of a luminaire mounted on a wooden pole. The power for the luminaire is supplied via underground cable.

2.10 Geotechnical Investigations Summary

Preliminary geotechnical work consisting of rock mapping and geophysical testing was performed in October 2013. The preliminary findings are expected to be completed by December 2013 but it is not anticipated that they will affect the selection or cost of the bridge alternatives. A geotechnical investigation, including exploration and analysis, has not started but is anticipated to be completed in spring 2014.

2.11 Environmental

The Eklutna River drains from Eklutna Lake down to Knik Arm of Cook Inlet. It is classified by the Alaska Department of Fish and Game (ADF&G) as an anadromous stream hosting all five species of salmon. The river is also considered a water of the United States by the U.S. Army Corps of Engineers (USACE), under Section 404 of the Clean Water Act. Eklutna River is not considered navigable by the definition of either the USACE or the U.S. Coast Guard. Eklutna River is also considered a regulated floodway.

Apart from the Eklutna River, the only other water of the U.S. or wetland mapped in the immediate project area is located just southwest of the intersection of Thunderbird Drive and the Glenn Highway. This small isolated wetland is mapped as Class B on Map 12 of the 2008 Eagle River Wetlands Atlas, but is not found on the National Wetlands Inventory maps. This wetland, if it exists, is not anticipated to be within the footprint of this project.
The existing bridge may be coated with lead-based paint, requiring special handling during demolition and disposal. This will be analyzed during the design phase of this project. There are no known contaminated sites within or adjacent to the project corridor; the closest documented contaminated site is over 0.5 miles away, on the other side of the Glenn Highway.

Permitting considerations for this bridge replacement project include the following:

- Any work below ordinary high water (OHW) in the Eklutna River requires authorization from:
  - ADF&G under a Title 16 Fish Habitat Permit
  - USACE under a Section 404 Permit
- Under the Migratory Bird Treaty Act, there are timing windows during which projects should avoid vegetation clearing activities to avoid “taking” migratory birds, or their eggs or nests. For the project area, the “no clearing” window is May 1st to July 15th.
- Work in the floodplain of Eklutna River requires a Flood Hazard Permit from the MOA Flood Hazard Administrator.
- Ground disturbing activities associated with the bridge replacement and related efforts will require erosion and sediment control measures. Depending on the size of ground disturbance (including removal/replacement of existing pavement), the project will likely require compliance with the Alaska Pollutant Discharge Elimination System (APDES) General Permit for Storm Water Discharges from Construction Activities, in addition to Municipal storm water requirements.
- The permanent storm water management features of the project will require engineering plan review from the MOA’s Watershed Management Section and/or the Alaska Department of Environmental Conservation (ADEC). This will depend on the ultimate storm water design.

### 2.12 Historic Documentation

The existing Eklutna River Bridge at Old Glenn Highway is eligible for listing on the National Register of Historic Places (NRHP). Because this bridge replacement project is not a Federal undertaking and does not currently require any Federal approval, Section 106 of the National Historic Preservation Act does not apply. However, given the historical significance of the bridge and role it has played in the history of the area, this project will consider the historic character of the structure and seek to mitigate for its removal in an appropriate way.
Mitigation for the removal of the historic Eklutna River Bridge will be negotiated with the State Historic Preservation Office (SHPO), the Native Village of Eklutna (NVE), the Anchorage Historic Commission, the Chugiak-Eagle River Historical Society, and other consulting parties. Coordination with SHPO began in early November 2013 and no issues have been identified for the demolition and replacement of the bridge. Coordination and discussions will continue and be ongoing. Appropriate mitigation will be documented in a Memorandum of Agreement/Understanding between the MOA and these historic entities.
3.0 DESIGN CRITERIA

3.1 General

The Old Glenn Highway is designated as a rural collector by the OS&HP. The project design year is 2035, assuming a construction year of 2015. The bridge design life is 75 years.

The roadway ROW width between Thunderbird Drive and Eklutna Lake Road is approximately 60-feet but varies to approximately 80-feet including slope easements.

3.2 Design Standards

The design guidelines and references used for this project include the following:

<table>
<thead>
<tr>
<th>Author</th>
<th>Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>Guide for Development of Bicycle Facilities</td>
<td>2012</td>
</tr>
<tr>
<td>AASHTO</td>
<td>A Policy on Geometric Design of Highways and Streets</td>
<td>2011</td>
</tr>
<tr>
<td>AASHTO</td>
<td>Roadside Design Guide</td>
<td>2011</td>
</tr>
<tr>
<td>AASHTO</td>
<td>LRFD Bridge Design Specifications</td>
<td>2012</td>
</tr>
<tr>
<td>AMC</td>
<td>Title 21 Land Use Planning</td>
<td>current</td>
</tr>
<tr>
<td>DOT&amp;PF</td>
<td>Standard Specifications for Highway Construction</td>
<td>2004</td>
</tr>
<tr>
<td>DOT&amp;PF</td>
<td>Bridge Foundation Report Policy</td>
<td>2011</td>
</tr>
<tr>
<td>DOT&amp;PF</td>
<td>Geotechnical Procedures Manual</td>
<td>2007</td>
</tr>
<tr>
<td>FHWA</td>
<td>Manual on Uniform Traffic Devices (MUTCD)</td>
<td>2009</td>
</tr>
<tr>
<td>MOA</td>
<td>Standard Specifications (MASS)</td>
<td>2009</td>
</tr>
<tr>
<td>MOA</td>
<td>Design Criteria Manual</td>
<td>2007</td>
</tr>
<tr>
<td>MOA</td>
<td>Drainage Design Guidelines</td>
<td>2007</td>
</tr>
<tr>
<td>MOA - AMATS</td>
<td>2035 Metropolitan Transportation Plan</td>
<td>2012</td>
</tr>
<tr>
<td>MOA - AMATS</td>
<td>Anchorage Bicycle Plan</td>
<td>2010</td>
</tr>
<tr>
<td>MOA - AMATS</td>
<td>Anchorage Pedestrian Plan</td>
<td>2007</td>
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<td>MOA - AMATS</td>
<td>Official Streets and Highways Plan</td>
<td>2005</td>
</tr>
<tr>
<td>MOA - AMATS</td>
<td>Areawide Trails Plan (ATP)</td>
<td>1997</td>
</tr>
<tr>
<td>TRB</td>
<td>Highway Capacity Manual</td>
<td>2010</td>
</tr>
<tr>
<td>TRB</td>
<td>Practices for Resurfacing, Restoration and Rehabilitation</td>
<td>1987</td>
</tr>
</tbody>
</table>
3.3 Design Criteria

All geometric features of the roadway, including horizontal and vertical geometry, typical section configuration, non-motorized facilities such as pedestrian pathways and bicycle shoulders are controlled by the selected design criteria. The design criteria was developed based on the functional classification of the roadway, current and projected traffic characteristics (volume, speed), Title 21 Land Use Regulations and public involvement input. Table 3.2 provides a listing of the critical design criteria. Complete design criteria are presented in Appendix A.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>THUNDERBIRD DRIVE TO EKLUTNA LAKE ROAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Year (2035) AADT</td>
<td>2,598</td>
</tr>
<tr>
<td>Design Vehicle</td>
<td>WB-50</td>
</tr>
<tr>
<td>Design Speed</td>
<td>40 mph</td>
</tr>
<tr>
<td>Posted Speed</td>
<td>35 mph</td>
</tr>
<tr>
<td>Lane Width</td>
<td>11 ft</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td>4 ft</td>
</tr>
<tr>
<td>Multi-Use Pathway</td>
<td>N/A</td>
</tr>
<tr>
<td>Buffer Width</td>
<td></td>
</tr>
<tr>
<td>Multi-Use Pathway Width</td>
<td>8 ft</td>
</tr>
<tr>
<td>Clear Zone</td>
<td>14 ft</td>
</tr>
</tbody>
</table>

A multi-use pathway will be added to only one side of the roadway, as required by the DCM for rural collectors. A multi-use pathway, separated from the roadway, has been selected to optimize roadway snow storage and increase safety and comfort of pedestrians and bicyclists.

According to the DCM, Figure 1-12 and Section 4.2 I, paved multi-use pathways for rural collectors are typically 8 feet wide. Except during peak park use season, a low volume of users is anticipated on the multi-use pathway due to its rural location and low density development. The multi-use path was located on the east side of the roadway/bridge to connect to the existing Thunderbird Falls Trailhead parking lot and the Thunderbird Drive and Eklutna Lake Road intersections. An 8-foot wide multi-use...
pathway along the east side of the Old Glenn Highway is recommended to meet the needs of local residents and park visitors.

### 3.4 Accessibility Guidelines

The project will be designed and constructed in accordance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG), as adopted per the MOA’s DCM Section 1-11. The project uses ADAAG criteria but also incorporates the Public Right-of-Way Accessibility Guidelines (PROWAG) when possible. Below are the most relevant accessibility guidelines that apply to this project:

- Pedestrian travel route cross slopes not to exceed 2%;
- Minimum pathway width of 5 ft. with minimum 3 ft. wide bypasses at driveways;
- Maximum sustained slope of 5% or equal to the parallel road grade;
- Minimum vertical clearance of 80 inches;
- Maximum ramp slope of 8.33%; and
- Detectable warning tiles at street crossing boundaries.
4.0 ROADWAY TYPICAL SECTION ALTERNATIVES

4.1 General

Roadway typical section alternatives were investigated for the Eklutna River Bridge Replacement project. This design study did not consider the No Action Alternative as viable as it would not solve or resolve the problems identified. The typical section alternatives are discussed in greater detail in the subsequent subsections.

4.2 Roadway Only Typical Section

A typical section with 4-foot shoulders and 10-foot lanes was considered for this roadway segment due to low projected traffic volumes and limited ROW for construction of a separated multi-use pathway. The shoulders can be utilized by pedestrians and bicyclists.

Very little existing vegetation would be disturbed by application of the desirable elements of the curbed typical section as shown in the DCM. The roadway footprint will require very little ROW acquisition and be contained within the existing public use easement.
4.3 Roadway with Separated Multi-Use Pathway Typical Section

Figure 4.1 shows the rural collector typical section as shown in the DCM. The rural collector typical section consists of 10 to 11-foot lanes with 4-foot shoulders and a separated pathway. 11-foot lanes were selected for this project due to low projected traffic volumes and nearby residential and state park use. The existing roadway is primarily built up with fill which does not require ditches like those shown in Figure 4.1. The pathway separation shown in the rural collector typical section is based on a 2.5-foot deep ditch. In fill situations, the edge of pathway closest to the road will be 10 feet closer, narrowing the project footprint and reducing the need for ROW acquisition. Roadway clear zone and pathway separation are met for this modified typical section.

![Figure 4.1 Separated Multi-Use Pathway Typical Section (Preferred Alternative)](image)

Existing vegetation will be disturbed by application of the desirable elements of the separated multi-use pathway typical section as shown in the DCM. Additional PUEs will be necessary to accommodate the wider section.

This configuration was presented to the project stakeholders through the public and agency involvement process. Positive feedback from the public, stakeholders and agency representatives, indicated the proposed typical section was acceptable.
5.0 BRIDGE ALTERNATIVES

5.1 Removal of Existing Bridge

The existing Eklutna River Bridge will require removal prior to the construction of a new structure. The demolition process for removing a bridge can vary and will be finalized by the contractor. The following is a potential sequence for demolition of the existing Eklutna River Bridge:

1. Place containment system under the bridge to catch falling debris;
2. Remove wearing surface, bridge railing and chain link fencing;
3. Cut the concrete deck into pieces and remove;
4. Construct temporary access to area below bridge;
5. Drive crane(s) onto temporary work structure/causeway;
6. Connect crane to the centermost girder segment;
7. Unbolt or flame cut the centermost truss on arch segment;
8. Using crane(s), move the girder piece onto a truck for shipping and disposal;
9. Repeat steps 6-8, deconstructing bridge in the reverse erection order (from middle to ends);
10. Demolish abutment and pull piles;
11. Repeat step 10 for remaining abutment;
12. Site preparation, cleanup and riprap placement (if necessary) for new bridge.

Removal of the existing bridge not including weather delays, fish windows (if applicable), and unforeseen problems will be coordinated concurrently with construction of the new bridge to minimize the overall timeframe of construction-related activities.

5.2 General

Bridge design alternatives were investigated for the Eklutna River Bridge Replacement project by the DOT&PF Bridge Design section. This design study did not consider the No Action Alternative as viable as it would not solve or resolve the problems identified. All of the bridge alternatives have a length of 254 feet and a top width of 45’-4" as shown in Figure 5.1. The bridge typical section will consist of two 12-foot lanes and 4-foot shoulders in addition to one 8-foot raised concrete pathway with a 2-foot shy distance from the bridge rail. The shoulders, though not designed as bike lanes, can also be used by pedestrians and bicyclists.

Preliminary construction costs for the four bridge alternatives vary between $4.5 and $6.0 million, not including mobilization/demobilization and other contingencies. The bridge alternatives are summarized in the following table and discussed in greater detail in the subsequent subsections. A bridge type selection report is located in Appendix C.
Table 5.1 Bridge Section Alternatives

<table>
<thead>
<tr>
<th>Feature</th>
<th>Two-Span Bulb Tee</th>
<th>Single-Span Cast-in Place Box Girder</th>
<th>Single-Span Steel Plate Girder</th>
<th>Open Spandrel Steel Arch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Least</td>
<td>Moderate</td>
<td>Greatest</td>
<td>Moderate</td>
</tr>
<tr>
<td>Pier on the valley floor</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Temporary false work</td>
<td>Least</td>
<td>Greatest</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Level of complexity</td>
<td>Least</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Greatest</td>
</tr>
<tr>
<td>Requires a bridge contractor outside of Alaska</td>
<td>No*</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time to construct</td>
<td>Least</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Greatest</td>
</tr>
<tr>
<td>Long term maintenance costs (including inspection &amp; monitoring)</td>
<td>Least</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Greatest</td>
</tr>
<tr>
<td>Preferred Bridge Alternative</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

Legend: ✗ not recommended ✔ preferred

*Would require a specialty subcontractor with expertise in drilled shaft foundation construction.
5.3 Two-Span Bulb-Tee Girder Alternative

This bridge alternative is constructed with concrete bulb-tee girders and requires a two-span structure over the Eklutna River due to the bridge length. At $4.5 Million, this alternative is the least expensive of the four bridge options and requires the least amount of maintenance. The bulb-tee girder alternative has been successfully constructed throughout the state, and can likely be built more quickly than the other three options while requiring the least amount of cast-in-place (CIP) concrete which helps reduce cost and improve durability.

Some disadvantages of this alternative are that it requires a pier in the valley floor, a larger crane(s) to place the girders, temporary work in the floodplain during construction for the pier and specialty contractors to build the drilled shaft foundations supporting the pier.
5.4 Single-Span Cast-in-Place Box Girder Alternative

This bridge alternative is constructed with cast-in-place concrete box girders and will be a single-span structure over the Eklutna River. Estimated costs for this alternative are $5.5 Million. Advantages of this alternative are that a pier is not required adjacent to the river and the structure requires very little future maintenance.

Disadvantages of this alternative are:

- Uncommon structure type requiring subcontractors from outside Alaska;
- Deep girders may not be visually appealing (not visible from roadway or bridge deck);
- CIP concrete bridges take longer to construct than the more standard precast bulb-tee girder alternative;
- Requires extensive falsework below the bridge to support the concrete until the bridge becomes self-supporting; and
- Span length is at the practical limits for this type of bridge.

![Figure 5.2 Single-Span Cast-in-Place Box Girder Alternative](image-url)
5.5 Single-Span Steel Plate Girder Alternative

This bridge alternative is constructed using steel plate girders and will be a single-span structure over the Eklutna River. Estimated costs for this alternative are $6 Million. Advantages of this alternative are that a pier is not required adjacent to the river and the structure requires infrequent maintenance.

Disadvantages of this alternative are:

- Most expensive of the 4 bridge alternatives;
- Deep girders may not be visually appealing;
- Requires temporary work structure in the valley floor during construction;
- Span length is at the practical limits for this type of bridge; and
- Uncommon structure type requiring fabrication outside Alaska and would require a longer lead time than concrete girders.

![Figure 5.3 Single-Span Steel Plate Girder Alternative]
5.6 **Open Spandrel Steel Arch Alternative**

This bridge alternative is a steel arch structure that will be a single-span over the Eklutna River. Estimated costs for this alternative are approximately $5.5 million. Advantages of this alternative are that a pier is not required within the waterway and the structure is considered the most aesthetically pleasing of the four bridge options.

Disadvantages of this alternative are:

- Bridge features would not be seen as the location is surrounded by heavy trees and brush;
- Complicated construction and unusual for Alaskan bridge contractors;
- Requires temporary work structure on the valley floor during construction;
- Relatively expensive structure;
- Requires more maintenance, inspection and monitoring than conventional bridges;
- Likely require the greatest amount of time to construct;
- Most seismically vulnerable structure type requiring special and uncommon details and features.

![Figure 5.4 Open Spandrel Steel Arch Alternative](image)

*Figure 5.4 Open Spandrel Steel Arch Alternative*
6.0 EVALUATION AND RECOMMENDATION

6.1 General

This DSR evaluated several alternatives that reasonably represent the range of options available for a bridge replacement project. The No-Action Alternative does not meet the purpose and need for this project. The preferred alternative includes the following:

6.2 Roadway Typical Section

Recommendations for the roadway improvements are based on MOA’s DCM. Lane width should be 11 feet with a minimum of 4.0 foot shoulders with a separated pedestrian pathway or 5.0 feet if the pathway is adjacent to the roadway. Passing zones or auxiliary turning lanes are not required.

The separated multi-use pathway typical section alternative improves the roadway to current DCM standards for a rural collector. The addition of shoulders increases safety by buffering the edge of pavement and traveled way. The shoulders also provide room for snow storage during the winter. The shoulders will allow bicyclists to travel outside of the roadway lane while reducing conflict with pedestrian along the separated path along the project corridor.

The separated multi-use pathway typical section increases safety and enhances the experience for pathway users and is the preferred alternative roadway typical section.

Additional design designations are as follows:

- Design Functional Classification: Rural Collector
- Construction Type: New
- Design Life: 20 years
- Design Hour Volume Percent: 12.8%
- Peak Hour Factor: 0.88
- Directional Distribution Percent: 70%/30%
- Heavy Vehicles: 3%
- Equivalent Single Axle Loads: To be determined.

6.3 Bridge Alternative

The two-span bulb-tee girder alternative provides the lowest cost to construct and maintain and can be constructed in the shortest time compared to the other three bridge alternatives and is therefore the preferred alternative.
7.0  SOILS AND PAVEMENT DESIGN

Based on the design methodology presented in the DCM, Chapter 1.10, the total required sub-structural pavement thickness would be 8 feet. However, previous experience and calculations using the Reduced Subgrade Strength method indicate that a 4-foot thick sub-structural section will be adequate for the proposed roadway and pathways. The existing structural section is less than 2 feet thick in some areas, and there is no past history of significant frost heaving. Additionally, the area is generally well drained. This section will be updated once field studies are complete.
8.0 NON-MOTORIZED ACCESS

8.1 Non-Motorized Facilities

The Old Glenn Highway and the Glenn Highway does not currently have pedestrian or dedicated bicycle facilities. Bicyclists using the Old Glenn Highway share the narrow roadway with motorized vehicles traveling within the project corridor, even though it is typical to see bicyclists, runners and walkers using the road. The proposed typical section includes a multi-use pathway on one side of the roadway, with more than adequate separation from the roadway. Additionally, the pathway will connect the Thunderbird Falls trailhead to the bridge. As there is no dedicated pedestrian facility along the Glenn Highway at its intersection with the Old Glenn Highway, it was decided to limit the pathway between the Thunderbird Drive and Eklutna Lake Road intersections. The pathway will have detectable warning tiles at all intersections with public approaches and will conform to current Americans with Disabilities Act (ADA) standards. MOA’s People Mover public transportation does not currently serve the project area.

The MOA’s adopted 1997 Areawide Trails Plan (ATP) identifies a separated multi-use pathway along the Old Glenn Highway to accommodate a variety of non-motorized users including in-line skaters, bicyclists, joggers and pedestrians. The 2007 Pedestrian Plan supports completing and connecting non-motorized facilities such as trails and pathways. Standards for multi-use paved trails recommend a separated 8-foot wide trail. As there are no curbs required for a rural collector, a 7-foot setback does not apply. However, the pathway will be setback due to the need for ditches to control drainage and snow storage. According to the ATP, a multi-use paved trail will follow The Old Glenn Highway.
9.0  DRAINAGE

9.1  Eklutna River Hydrology

At this time, data collection and a flood frequency analysis has been completed. Final hydrology analysis is ongoing and will be completed with final design activities. Results will be available under a separate report.

9.2  Evaluations and Recommendations

The total disturbed area is approximately 2.5 acres, which includes the extents of the clearing and grubbing for the new roadway footprint. According to the DCM, Table 2-1, the project can be classified as a minor drainageway due to its contributing area of less than 40 acres. Therefore, culverts must accommodate the 24 hour, 10 year design storm. All proposed recommendations are to maintain existing patterns on or around the project area. Mitigation for the additional discharge will be developed with the affected property owners.

The total impervious (asphalt or concrete surfaced) area will increase from 0.79 acres to 1.20 acres; a 52% increase. However, the increase in storm runoff will minimally impact the existing drainage patterns through the use of flattened fill slopes, roadway ditches, and rock outfalls along the roadway.

The preferred roadway alternative will sheet flow surface runoff into ditches and then to existing low areas. The proposed roadway profile generally follows the existing vertical and horizontal geometry. The proposed bridge will carry all the drainage from the bridge to the north end where ditches will convey the stormwater away from the Eklutna River.

Due to lack of ROW between Thunderbird Drive and the driveway to the Thunderbird Falls Trailhead, the roadway will be graded to the west at 2% to avoid the need for ditches along the east side within this stretch of the project. A culvert for the Thunderbird Falls Trailhead driveway will not be necessary. For more detail, see the plans located in Appendix B.
10.0 UTILITY IMPACTS

10.1 General

Utility companies with facilities located within the proposed Eklutna River Bridge Replacement project area have been contacted to coordinate utility conflicts and identify any facility relocations that may be necessary. The locations of utilities within the project corridor were recorded during field surveys and record drawing research. Additional surveys will be performed during the design process to supplement current information as necessary.

At this time, it is not anticipated that any utilities will require relocation prior to construction of the roadway and bridge. CSP has requested a power drop be provided for use at the Thunderbird Falls Trailhead. Discussions and design for this power drop are on-going. A rough estimate of costs to construct a power drop to the Trailhead is summarized below in Table 10.1.

Roadway plans that show existing utilities can be reviewed in Appendix B, Plan Sheets.

<table>
<thead>
<tr>
<th>UTILITY</th>
<th>ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEA</td>
<td>$30,000</td>
</tr>
<tr>
<td>Utilities Total:</td>
<td>$30,000</td>
</tr>
</tbody>
</table>
11.0 ACCESS AND RIGHT-OF-WAY CONSIDERATIONS

11.1 Access Control

The intersections of Thunderbird Drive and Eklutna Lake Road as well as the Thunderbird Falls Trailhead parking lot approach feature stop control of all entering traffic. The preferred alternative does not propose changes to the existing access control.

11.2 Right-of-Way

The proposed roadway improvements extend beyond the existing PUEs in various locations along the project corridor, most notably between the bridge and Eklutna Lake Road on both sides of the existing roadway, and will require additional PUEs. The new bridge will be constructed in the existing alignment and will not require additional PUEs. Temporary construction permits and/or temporary construction easements will be required for contractor access during construction. The horizontal and vertical geometry, along with the fill and cut slopes, have been optimized to minimize ROW impacts.

The Thunderbird Falls Trailhead driveway will be relocated to accommodate the proposed improvements. The proposed driveway relocation and general PUE needs are identified on the Plan sheets in Appendix B. Table 11.1 identifies and describes all permanent easements that are required for the proposed improvements.

<table>
<thead>
<tr>
<th>Location (in relation to bridge)</th>
<th>PUBLIC USE EASEMENT (SF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest</td>
<td>8,200</td>
</tr>
<tr>
<td>Northeast</td>
<td>13,700</td>
</tr>
<tr>
<td>Southwest</td>
<td>0</td>
</tr>
<tr>
<td>Southeast</td>
<td>600</td>
</tr>
<tr>
<td>Total</td>
<td>22,500</td>
</tr>
</tbody>
</table>

11.3 Parking

The driveway access for Thunderbird Falls Trailhead parking will be relocated as well as a limited number of parking stalls and landscape boulders. Design of this parking lot is on-going but it is intended that there will be a no-net loss in parking stalls. There are currently 29 stalls in the parking lot including two ADA accessible stalls. No on-street parking facilities exist or are proposed within the project perimeter.
12.0 MAINTENANCE CONSIDERATIONS

The MOA owns and will maintain the Eklutna River Bridge and the Old Glenn Highway within the project limits. Once the bridge and roadway construction is completed and is open to the public, the CBERRRSA Street Maintenance will continue their maintenance responsibilities on the roadway and bridge.
13.0 STREET ILLUMINATION

13.1 Street Lighting

There is one existing street light located within the project area at the Eklutna Lake Road and the Old Glenn Highway intersection. Eklutna Lake Road is a State of Alaska roadway as is the light at the intersection. The Thunderbird Drive intersection is not lighted and the area of the bridge is not included in the Eagle River Street Lights Service Area. Any improvements to this intersection would require that residents approve annexation into the Eagle River Street Lights Service Area and then be approved by the Service Area before finally being approved by the Anchorage Assembly.

Table 1-1 of the DCM summarizes required improvements in urban and rural zoning and private road districts. As the project area is predominately rural zoned, Table 1-1 does not require streetlights be included as part of this project. The Rural Lighting Ordinance has recently been adopted by the Anchorage Assembly. The Old Glenn Highway within the project limits is a Rural Collector and will not see a substantive change with the adopted rural lighting ordinance. However, the public involvement process has highlighted the public’s desire for parking lot lighting at the Chugach State Parks Thunderbird Falls Trailhead to improve safety and visibility and minimized documented vandalism. For further information regarding lighting comments, see Appendix E Concept Report.

Discussions of the extent of lighting improvements at the trailhead are ongoing at this time.
14.0 LANDSCAPING

14.1 Viewshed

Views from the Old Glenn Highway to the bridge tend to be blocked by thick natural vegetation. The bridge site is set back from the Glenn Highway and separated by native forest, so the bridge is barely visible. Views to the road from adjacent Thunderbird Heights Subdivision properties vary.

14.2 Climatic Zone

USDA maps the Eklutna River Bridge project location in a Plant Hardiness Zone 4b (-25° to -20°F). Based on our local experience and supported by a discussion with arborists at the Alaska Division of Forestry Community Forestry Program this specific project site may be more appropriately characterized as Plant Hardiness Zone 4a (-30° to -25°) due to its elevation, location and relationship to the mountains immediately to the south. Plant material native to the area and hardy to USDA Plant Hardiness Zone 4a will be recommended, if landscape plantings will be installed.

14.3 Landscaping Recommendations

Public and stakeholder input to date has included recommendations for including pedestrian facilities, pedestrian and parking lot lighting and coordination or expansion of the existing Thunderbird Falls trailhead parking area to accommodate increasing use and overflow parking.

The overall goal of the landscape design is to limit impacts to existing vegetation where feasible and provide new native landscape plantings as is appropriate based on the extents of disturbance for the bridge reconstruction project. The project design will strive to protect existing mature trees, to the extent practicable, adjacent to the proposed improvements within the ROW.

Although not required for rural collectors, the limited use of lighting along the pedestrian pathway and at the intersections may be proposed in response to public input. Lighting would help provide safe routes of passage for pedestrians during periods of fog and darkness.

Initial recommendations for the mitigation of the replacement of the bridge structure include interpretive signage that discusses the history of the bridge. The interpretive signage could be integrated into the landscape design. Input from the public suggested interpretive panels or sculptural elements be considered along new pedestrian facilities.
15.0 WORK ZONE TRAFFIC CONTROL

Traffic control during construction will be minor as the existing bridge and approaches are currently closed and traffic patterns will not change for local residents and users of the Thunderbird Falls Trailhead. Access to Thunderbird Drive, Thunderbird Falls Trailhead and Eklutna Lake Road will be maintained during construction to reduce the inconvenience to the residents and park users as much as possible. Coordination with stakeholders prior to and during construction will be ongoing. Refinement of the traffic control plan will continue through final design.
16.0 PUBLIC INVOLVEMENT SUMMARY

Table 16.1 below summarizes the public involvement completed as of this DSR.

Table 16.1 Public Involvement Activities Summary

<table>
<thead>
<tr>
<th>Method/Tools</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Website (<a href="http://www.EklutnaRiverBridgeReplacement.com">www.EklutnaRiverBridgeReplacement.com</a>)</td>
<td>August 2013</td>
</tr>
<tr>
<td>Post Card &amp; E-Newsletter Invite to Open House #1</td>
<td>September 2, 2013, September 5, 2013,</td>
</tr>
<tr>
<td></td>
<td>September 11, 2013</td>
</tr>
<tr>
<td>CBERRRSHA Board Presentation &amp; Invite to Open House #1</td>
<td>August 26, 2013</td>
</tr>
<tr>
<td>Concept Phase - Open House #1 at Mirror Lake Middle School</td>
<td>September 12, 2013</td>
</tr>
<tr>
<td>Open House Concepts and Materials Website Posting</td>
<td>September 15, 2013</td>
</tr>
<tr>
<td>Agency Stakeholder Meeting and Presentation</td>
<td>September 17, 2013</td>
</tr>
<tr>
<td>Chugiak/Eklutna Valley Community Council Presentation</td>
<td>September 19, 2013</td>
</tr>
<tr>
<td>Native Village of Eklutna (NVE) Coordination Meeting</td>
<td>September 20, 2013</td>
</tr>
<tr>
<td>Chugach State Parks Stakeholder (CSP) Coordination Meeting</td>
<td>October 10, 2013</td>
</tr>
<tr>
<td>Concept Report Reviewed by Planning and Zoning Commission</td>
<td>November 4, 2013</td>
</tr>
<tr>
<td>Eklutna, Inc. Adjacent Landowner/Stakeholder Coordination</td>
<td>December 5, 2013</td>
</tr>
<tr>
<td>Meeting</td>
<td></td>
</tr>
<tr>
<td>CBERRRSHA Board Meeting Presentation – Preferred</td>
<td>November 18, 2013</td>
</tr>
<tr>
<td>Alternative &amp; Invitation to Open House #2</td>
<td></td>
</tr>
<tr>
<td>Chugiak/Eklutna Valley Community Council Presentation &amp;</td>
<td>November 21, 2013</td>
</tr>
<tr>
<td>Invitation to Open House #2</td>
<td></td>
</tr>
<tr>
<td>Post Card &amp; E-Newsletter Invite to Open House #2</td>
<td>November 25, 2013, December 5, 2013,</td>
</tr>
<tr>
<td></td>
<td>December 6, 2013</td>
</tr>
<tr>
<td>Design Study Phase - Open House #2 at Chugiak Elementary</td>
<td>December 11, 2013</td>
</tr>
<tr>
<td>School</td>
<td></td>
</tr>
<tr>
<td>Project Website Updates</td>
<td>• key milestones</td>
</tr>
<tr>
<td></td>
<td>• public involvement opportunities</td>
</tr>
<tr>
<td></td>
<td>• new documents posted</td>
</tr>
<tr>
<td>Individual Stakeholder Phone Calls and Emails</td>
<td>On-going</td>
</tr>
</tbody>
</table>
16.1 Design Study Phase Public Involvement

A public open house was held on December 11, 2013 at Chugiak Elementary to review and solicit public input on the preferred alternative for the bridge and the roadway. The open house summary including comments received on the preferred alternative is included in the Public Involvement Summary Appendices.

16.2 Coordination with Future Projects

Several proposed zoning changes are underway that will require continued coordination. The Chugiak-Eagle River Land Plan Map Amendment is currently proposed to reflect land use changes in the area since the Plan was updated and adopted in 2006. While, no substantive changes to the Eklutna River Bridge Replacement project are foreseen with this Map Amendment, close coordination will continue to ensure consistency and compliance with adopted plans and policies.

Another known land use issue is the proposed rezoning of approximately 107 acres by Eklutna, Inc. for Eklutna, Inc. owned lands adjacent to the Old Glenn Highway south of the Bridge and vacant land north of the bridge. The Eklutna, Inc. rezoning has the potential to increase industrial and commercial truck traffic to the area north of the bridge once those parcels are developed for commercial and industrial use. The Old Glenn Highway within the project corridor is functionally classified as a rural collector in the OS&HP. Permitted truck routes are determined by the Municipal Traffic Engineering Division and are based on roadways that are functionally classified as Commercial Collectors or a higher classification in the OS&HP.

The MOA’s 2035 MTP identifies two projects along the Glenn Highway that could impact the study area:

- MTP Project 137 calls for an operational analysis of the Glenn Highway from Muldoon Road, in the Anchorage Bowl, to the Old Glenn Highway interchange, north of Eklutna. The analysis will review roadway capacity, freight movement, and safety along the corridor. This project will provide an in depth look at potential future congestion along the Glenn Highway. Future congestion will have operational impacts on the ramps at the Thunderbird Falls exit and the Eklutna Interchange. The project is listed under short term in the MTP and is planned for completion before 2023.

- MTP Project 204 plans to widen the Glenn Highway to add an additional non-standard occupancy vehicle lane in each direction from Artillery Road to the Peter’s Creek interchange. The project is proposed to ease the Glenn Highway commute and will include interchange improvements at the Peter’s Creek Bridge. This project will improve the primary access route to the study area from the Anchorage Bowl. This project is listed under long term in the MTP and is planned for completion before 2035.
16.3 Agency Stakeholder Coordination

The project team met with CBERRRSA street maintenance staff and Road Board Members to ensure that the recommended alternative meets their purpose, goals and maintenance responsibility guidelines. Meeting summaries from CBERRSSA Board meetings will be included in the Public Involvement Summary Appendices.

The project team has begun coordination meetings with Chugach State Parks, a co-beneficiary of the state grant for coordinated improvements to Chugach State Park trailhead improvements, including the Thunderbird Falls parking lot, as part of the bridge replacement process.

Coordination with the SHPO on the historic documentation and mitigation for the bridge removal has begun and will continue. See also Section 2.12 Historic Documentation.

16.4 Native Village of Eklutna (NVE) Coordination

As a special stakeholder to the project, the Project Team has begun an initial coordination effort with the NVE, honoring their memorandum of understanding with the MOA for projects coordination and through AMATS Transportation Planning for transportation-related projects. The project team will continue to coordinate with NVE throughout the project phases.

16.5 Future Public Involvement

The Eklutna River Bridge Replacement process will continue to follow the MOA’s CSS policy and will continue to include community outreach and input during the next phases of the project: preliminary (65%) design and construction. The schedule for Public Involvement through Construction can be found in Appendix F, Public Involvement Plan.

Additional public outreach opportunities will be planned for the preliminary design (65%) phase and the preconstruction phase of the project prior to bridge removal and construction starting in 2015.
17.0 DESIGN VARIANCES

The table below summarizes the proposed design variances that will be sought based on the recommended alternatives for the Eklutna River Bridge Replacement upgrade:

Table 17.1 Design Variances

<table>
<thead>
<tr>
<th>ITEM</th>
<th>REFERENCED STANDARD</th>
<th>CRITERIA</th>
<th>REQUESTED VARIANCE</th>
<th>REASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement Section</td>
<td>DCM 1.10 D</td>
<td>Limited frost penetration method</td>
<td>Reduced subgrade strength method</td>
<td>Adequate for proposed roadway</td>
</tr>
<tr>
<td>Lane Width</td>
<td>DCM Table 1-4</td>
<td>10'-11'</td>
<td>12' lane width</td>
<td>Maintain existing road width of 12' south of bridge for continuity of traveled way</td>
</tr>
<tr>
<td>Posted Speed</td>
<td>DCM 1.5E/ Table 1-4</td>
<td>Design speed should exceed posted speed by 5 MPH/ Posted speed should be 30 MPH for a Rural Collector.</td>
<td>Posted Speed = 35 MPH</td>
<td>Match the existing posted speed limit of 35 MPH.</td>
</tr>
<tr>
<td>Design Speed</td>
<td>DCM 1.5E/ Table 1-4</td>
<td>Design speed should exceed posted speed by 5 MPH/ Design speed should be 35 MPH for a Rural Collector.</td>
<td>Design Speed = 40 MPH</td>
<td>Increase design speed to be consistent with 85\textsuperscript{th} percentile speed 39 MPH, determined from a field study.</td>
</tr>
<tr>
<td>Cross slope</td>
<td>DCM Figure 1-12</td>
<td>2% crowned at centerline</td>
<td>2% graded from right shoulder to the left for entire roadway width</td>
<td>Inadequate ROW and existing grades prevent meeting the preferred typical section as shown in the DCM</td>
</tr>
</tbody>
</table>

Additional design variances may be required as the design progresses. All appropriate design variances will be documented.
18.0 COST ESTIMATE

The estimated costs for the preferred alternative are summarized as follows:

Table 18.1 Cost Estimate

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>ITEM</th>
<th>CALCULATION</th>
<th>ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design, Project Management, Public Involvement &amp; Overhead</td>
<td>A</td>
<td></td>
<td>$1,900,000</td>
</tr>
<tr>
<td>Roadway, Pathway, Parking Lot Construction</td>
<td>B</td>
<td></td>
<td>$1,800,000</td>
</tr>
<tr>
<td>Bridge Construction</td>
<td>C</td>
<td></td>
<td>$4,500,000</td>
</tr>
<tr>
<td>Subtotal Construction (Basic Bid)</td>
<td>D</td>
<td>A+B +C</td>
<td>$8,200,000</td>
</tr>
<tr>
<td>Contingency</td>
<td>E</td>
<td>30% of D</td>
<td>$2,460,000</td>
</tr>
<tr>
<td>Construction Engineering</td>
<td>F</td>
<td>20% of D+E</td>
<td>$2,132,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td>G</td>
<td>D+E+F</td>
<td>$12,792,000</td>
</tr>
<tr>
<td>Utilities</td>
<td>H</td>
<td></td>
<td>$30,000</td>
</tr>
<tr>
<td>Right-of-Way Acquisition</td>
<td>I</td>
<td></td>
<td>$250,000</td>
</tr>
<tr>
<td><strong>Total Project Cost (rounded)</strong></td>
<td>J</td>
<td>G+H+I</td>
<td><strong>$13,072,000</strong></td>
</tr>
</tbody>
</table>