Reconnaissance Report for Red Cove Road (School Loop Road)

Sand Point, Alaska

Prepared for:

City of Sand Point

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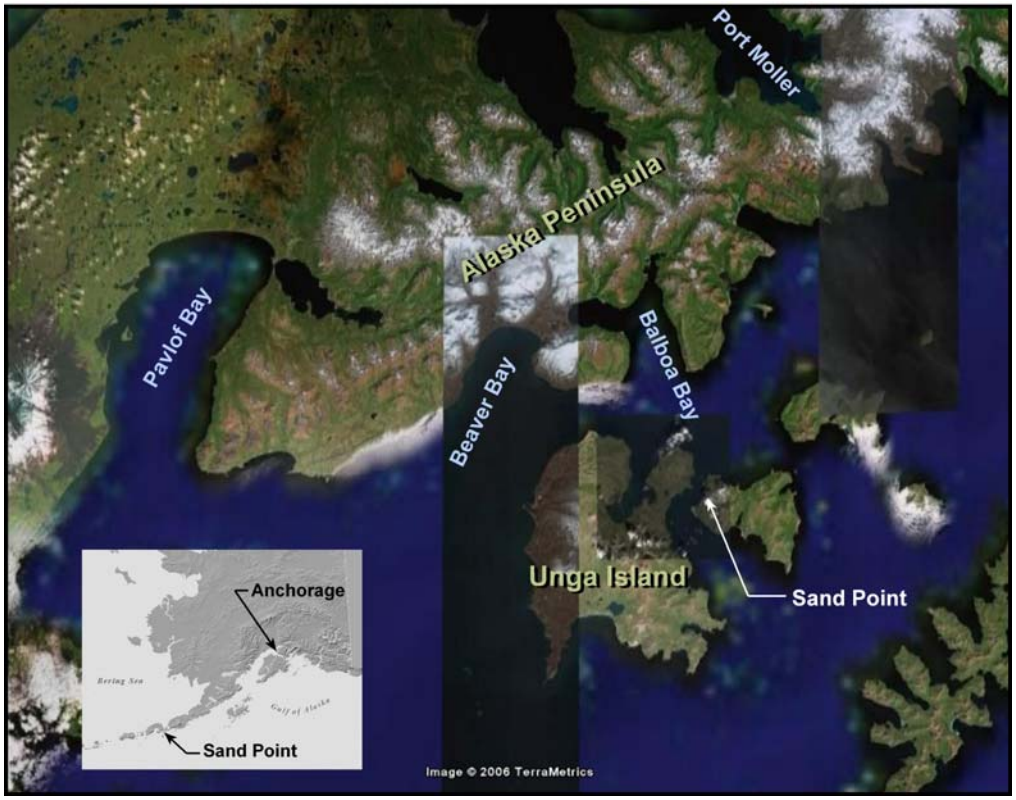
1.0 Scope

At the request of the City of Sand Point, *HDR Alaska* (HDR) engineers conducted a field investigation on September 19th and 20th of the Red Cove Road, known locally as "School Loop Road" located in the town of Sand Point, Alaska. The purpose of this investigation was to perform a visual assessment of the current condition of the roadway, to provide design recommendations and develop construction cost estimates to improve the facility.

The School Loop Road (Loop) is approximately 2.3 miles in length and is a vital resource to the City. Besides providing access to many local residences, the Loop also provides access to numerous important community service buildings including the school, which also acts as the emergency shelter, the recently constructed clinic, the headstart center, and property that will contain the new cemetery. Additionally the School Loop Road provides the only connection to the 2.7 mile road leading to the City's landfill. This report represents the findings of the field investigation, design recommendations to improve the facility, and an estimate of associated construction costs to bring the roadway back to a paved surface.

2.0 Background

Sand Point is located approximately 570 miles to the southwest of Anchorage on Popof Island, which is part of the Shumigan Islands off the south coast of the Alaska Peninsula. The town and streets are located on the northwest portion of the island extending into Popof Strait. Aleuts and surrounding fisherman were some of the first residents in the community when it was founded in 1898. The local economy and culture center around the fishing industry and currently, both Peter Pan Seafoods and Trident Seafoods have operations in the city of Sand Point.



Vicinity Map

The School Loop Road was paved in 2001 as part of a project that included construction of the approximate 2.7 miles of roadway to the new landfill location. The project was funded by the Bureau of Indian Affairs (BIA) through a partnership program that allows tribes to build roads utilizing the local workforce. The project included the construction of the new dirt road leading to the landfill and paving of the existing School Loop Road with reportedly, new asphalt oil specifically oriented for cold climates.

3.0 Procedure

HDR conducted a visual assessment of the existing School Loop Road and surrounding area that included photographs, video, measurements, and interviews with both the Sand Point Mayor, Glen Gardner and the acting Sand Point public works director, Paul Karlsen. Once arriving on-site, HDR initially drove the road to get an overview of the area. HDR then walked its entire length (in a clockwise direction) performing a visual assessment of the overall condition of the roadway including in-place culverts and existing embankment and cut slopes. GPS was used to locate pertinent areas of the roadway and to tie specific locations to photographs. HDR also spent time inspecting the various material pit sources on the island including evaluation of material type, quantity, and associated royalty costs. Finally HDR researched various completed infrastructure projects in the area and used current industry standards to develop a construction cost estimate to improve the School Loop Road.

4.0 Observations

4.1 Roadway

The roadway is a typical embankment type construction over the native topography with the fill ranging from 1-2 feet in some areas to the deepest section approaching 20 feet. There were no guardrails or roadside barriers present at the time of the assessment and the width of the roadway was measured in several locations to be approximately 22 feet.

The horizontal geometry of the roadway consisted of long curves and generally short tangent sections running in and around the neighborhood houses. The roadway was generally flat with the steepest grade occurring near the entrance of the school. There appeared to be only one area, near the entrance to the clinic, where sight distance may be of concern. During improvement of the facility, it appeared that normal re-grading and re-shaping of the roadway embankment in this area may alleviate the problem. The surface of the roadway varied from a partially deteriorated asphalt surface to a completely deteriorated asphalt surface, resembling that of a gravel roadway. This variance can be seen in Figure 1 below.

Partially Deteriorated Asphalt Surface

Completely Deteriorated Asphalt Surface

Figure 1

In the areas that exhibited a completely deteriorated asphalt surface, the existing embankment appeared recently maintained, shaped, graded, and overall in good condition. The continual upkeep and maintenance of the roadway has kept the embankment material in adequate condition and will allow it to be used for any proposed improvements to the facility. Figure 2 depicts the entire Loop and the approximate locations of the partially and completely deteriorated asphalt surfaces. Figure 2 also shows the locations of the culverts along the roadway.

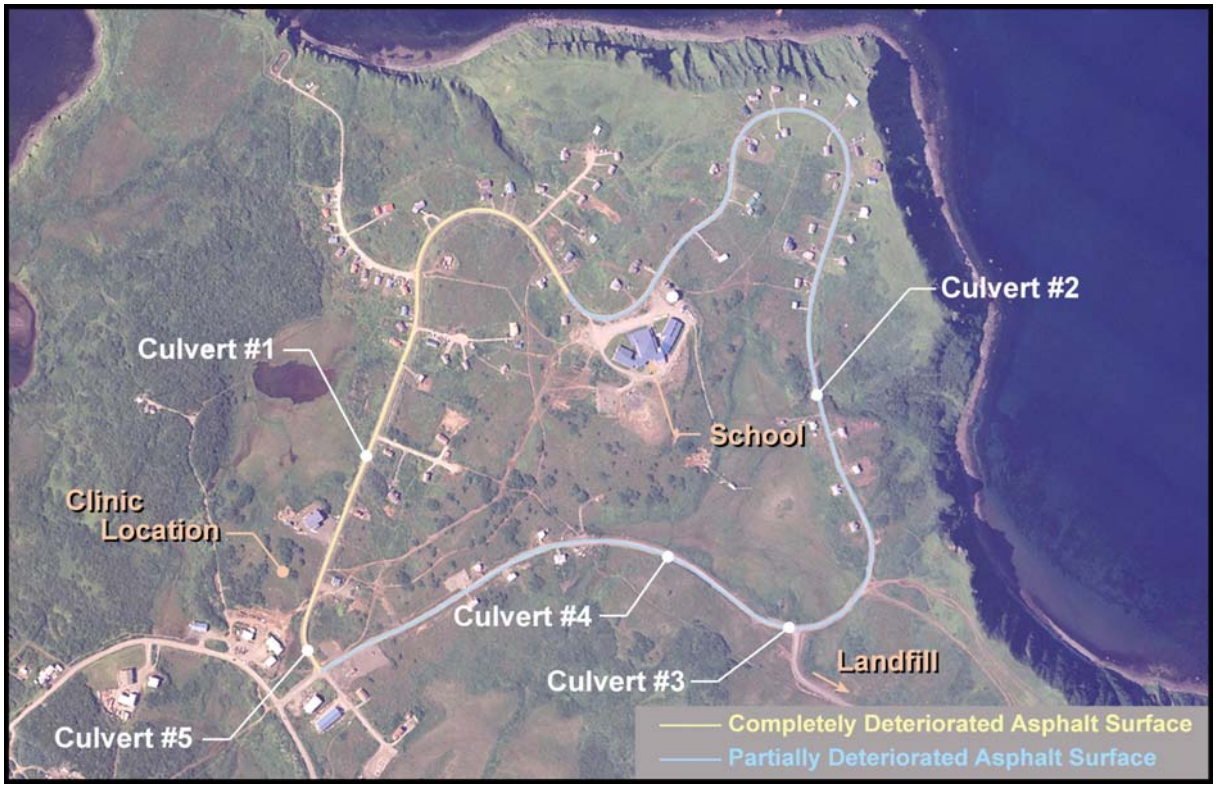


Figure 2

The entire Loop was initially an asphalt pavement surface. In the areas where the asphalt was completely deteriorated, the asphalt material appeared to break down and separate into its

aggregate components leaving behind a surface consistent with a gravel roadway. The surface material in these areas appeared well graded with angular coarse aggregate. This type of material, once adequately consolidated, is similar to an aggregate base course material that is often used in the structural section immediately below the asphalt surface.

There were several locations along the Loop with evidence of trenching across the roadway to facilitate utility installations throughout the community. These areas exhibited pavement breakdown, potholing, and uneven surfaces. These trenches were all repaired with a compacted gravel material leaving behind a break in the asphalt pavement. A re-grading of the embankment and a paving of the surface will allow these trench sections to be completely repaired leaving behind a smooth continuous asphalt surface. Figure 3 below depicts an area that was trenched and repaired.

Figure 3

In both the partially and completely deteriorated asphalt surface sections, a substantial amount of potholes were observed along the entire length of the roadway. While driving around the Loop, it was almost impossible to avoid hitting numerous potholes. Several sections of the Loop require drivers to either drive on the wrong side of the road, or significantly decrease speed in an attempt to avoid or minimize the impacts with potholes. Figure 4 depicts several of locations along the roadway where significant potholing was observed.

Figure 4

Potholes form from a multitude of factors including insufficient asphalt thickness, poor quality of asphalt, inadequate compaction of the structural section, and poor drainage. Water will seep into any cracks in the asphalt, and through freeze/thaw cycles, weaken both the sub structure and asphalt. The heavy wheel loads then break up the weak asphalt creating the potholes. The formation of potholes is accelerated in wet and cold climates similar to the climate of Sand Point. Quality construction practices combined with good maintenance can minimize the development of potholes.

Maintenance Concerns: Due to the varying types of surfaces, maintenance of the roadway becomes almost impossible. If the roadway was just a gravel surface, or just a paved surface, it would become much easier for the City to maintain. The uneven, and varying types of surfaces require different types of maintenance. The completely deteriorated sections of the Loop can be treated much like a gravel roadway with regular grading and reshaping of the surface. Conversely, regular grading and reshaping cannot be performed on the sections where both decent asphalt and deteriorated asphalt exist as the equipment used will damage the remaining decent asphalt sections. In addition, there appeared to be attempts at applying additional gravel to the surface and grading sections of the roadway similar to how a normal gravel road would be maintained. Because the Loop was initially a pavement surface, the additional gravel has difficulty adhering to the existing sub surface and is fairly quickly pushed to the side of road by traffic.

Maintenance on the varying surfaces during snow removal is also difficult as the blade used to remove snow often gets caught on the decent asphalt sections causing damage. During interviews with the acting public works director, the varying surfaces creates a lot of difficulties in keeping the blade from damaging the asphalt sections.

Finally, the maintenance of the existing potholes is extremely difficult due to the climate of Sand Point, and the fact that there is not a permanent asphalt plant on the island. Attempts had been made to patch the existing potholes with both a cold mix asphalt and concrete. Even after the patchwork, these areas appeared to have additional pothole problems with the original asphalt failing adjacent to the patchwork and forming a new pot hole.

Overall, the difficulties in maintaining a roadway with varying surfaces creates an added expense for the City of Sand Point.

Culverts

There is a total of 5 culverts in-place along the School Loop Road, including three at 24” in diameter, one at 36” in diameter, and one at 60” in diameter. Based on the condition of the culverts and areas surrounding the culverts, they all appeared adequately sized for the types of flows and flood events encountered. Additionally, they all meet the Department of Transportation’s minimum size requirement of 24”. Various measurements were taken during the site investigation that included the length, cover depth, diameter, and adjacent roadway embankment side slope. The locations of these culverts can be seen on the above Figure 2.

4.1.1 Culvert #1

Culvert #1 is 24" in diameter with approximately 5-6 feet of cover material on the down stream side, and 2-3 feet of cover on the upstream side. The side slopes on the downstream side were measured at approximately 1.2:1 (Horizontal: Vertical). The overall length of the culvert is approximately 50 feet. This culvert appeared in good condition and should not need any additional work during the improvement of the facility. Figures 5 and 6 below depict the upstream and downstream sides of Culvert #1, respectively.

Figure 5
(Upstream Side)

Figure 6
(Downstream Side)

4.1.2 Culvert #2

Culvert #2 is the largest culvert along the Loop at 60" in diameter with approximately 10 feet of cover material on the downstream side and approximately 3.5 feet of cover material on the upstream side. The embankment slope on the downstream side was measured at approximately 1.3:1 (H:V). The overall length of the culvert is approximately 80 feet. The large and steep embankment slope on the downstream side warrants the investigation of a possible guardrail installation. Analysis and recommendations for this area are shown under the Recommendations portion of the report. Figures 7 and 8 below depict the upstream and downstream side of Culvert #2, respectively.

Figure 7
(Upstream Side)

Figure 8
(Downstream Side)

4.1.3 Culvert #3

Culvert #3 is 24" in diameter located next to the intersection of the landfill road and the School Loop Road. There was approximately 1-2 feet of cover material on both the upstream and downstream sides of the culvert. The overall length of the culvert was approximately 50 feet and the culvert was dry at the time of the inspection. This culvert appeared in good condition and should not need any additional work during the improvement of the facility. Figures 9 and 10 depict the upstream and downstream side of Culvert #3, respectively.

Figure 9
(Upstream Side)

Figure 10
(Downstream Side)

4.1.4 Culvert #4

Culvert #4 is 36" in diameter with approximately 2-3 feet of cover on the upstream side and 3-4 feet of cover on the down stream side. The overall length of this culvert was approximately 60 feet. This culvert appeared in good condition and should not need any additional work during the improvement of the facility. Figures 11 and 12 depict the upstream and downstream side of Culvert #4, respectively.

Figure 11
(Upstream Side)

Figure 12
(Downstream Side)

4.1.1 Culvert #5

Culvert #5 is 24" in diameter with approximately 4-5 feet of cover material on both ends of the culvert. This culvert terminated at the toe of the fill slopes and was located in an area with standing water on both sides of the roadway embankment. At the time of the inspections, the culvert was approximately 2/3 full with standing water and did not appear to have an obvious *upstream* or *downstream* side. Overall, the culvert was in good condition. Figures 13 and 14 depict the southwest and northeast side of Culvert #5, respectively.

Figure 13
(Southwest Side)

Figure 14
(Northeast Side)

4.2 Other Existing Features:

4.2.1 Lighting

The Loop had limited lighting that appeared to be along approximately 75% of its length and was contained only in the areas with houses or buildings. The lighting system consisted of single wooden poles with single lights spaced on the order of 1000 feet. Figure 15 depicts the typical lights found along the roadway.

Figure 15

4.2.2 Signage

The signing along the Loop included mainly stop signs, school related cross walk signs, speed limit signs, and Tsunami evacuation route signs. The signs appeared in good condition and may require only minimal upgrading during improvement of the facility.

5.0 Improvement Recommendations

5.1 Roadway

The School Loop Road is a vital facility within the city of Sand Point. It provides access to numerous homes and important community services including the town school which also acts as the emergency shelter, a headstart center, and the newly constructed health clinic. It also provides a link to the 2.7 mile road accessing the city landfill. The roadway was also listed in the City of Sand Point Comprehensive Community Development Plan, September 2004, as the first order of priority concerning the paving of all city roads.

Embankment Recommendations: To reconstruct this roadway back to a paved surface, initially, the existing asphalt should be completely removed exposing the original native fill material. Through conversations with Paul Karlsen and from observations of the general condition of the asphalt, removing the asphalt should be a fairly easy task. Once the existing asphalt is removed, the remaining material should be a well-graded angular gravel material that can be used for the roadway embankment. Once this material is adequately compacted in place, it can act as a good sub base. Then a standard Aggregate Base Course meeting the proper gradation requirements (D-1), can be placed and compacted on the sub base. An overall improved structural section results, that's ready to accept asphalt. With this improved structural section and properly placed and compacted asphalt, the roadway surface should not deteriorate as quickly as before, should be more resistant to the development of potholes, and should reduce the City's maintenance effort.

Typical Section Recommendations: Additional improvements include slight modifications to the typical section. During the site visit, the Loop contained one 11 foot lane in each direction with an approximate total width of 22 feet. The typical section can be improved by providing the standard 12 foot lanes and 2 foot gravel shoulders on each side for a total width of 28 feet. The additional shoulders provide added safety for the drivers, and help improve the quality of the asphalt surface by providing a wider structural base.

Additional Roadway Recommendations: During the reconstruction and paving effort, surrounding issues can be addressed to ensure a high quality finished product. Sight distance and visibility concerns in the vicinity of the clinic entrance can be improved through regarding of the embankment while preparing the sub grade for pavement. Also, future utility and related improvements in and around the community should be coordinated so that any crossings or trenching of the roadway can be completed prior to paving operations.

5.2 Culverts

Overall, the five culverts along the roadway appeared to be in good condition. If the embankment height is increased during improvement of the facility, the culverts appear adequately long enough to deal with wider slope limits except for Culvert #5 where end sections may need to be installed to withstand the wider embankment.

5.3 Safety

5.3.1 Culvert Safety

Culverts #2 and #5 are located in sections where the roadway embankment slopes are relatively steep and high. In the area of Culvert #2, the slope was measured at approximately 1.3:1 on the downstream side with an embankment height approaching 20 feet. There are two options to try and improve safety at this location. A guardrail may be warranted at this location, although a cost-effective analysis in accordance with the State Highway Preconstruction Manual would need to be performed to confirm the need. Alternatively, additionally embankment material can be placed on the downstream side to flatten the slope to a transversable 3:1 slope. This would require an extension of the existing culvert, but would alleviate any future maintenance concerns associated with a guardrail.

A similar situation exists with culvert #5. The embankment height is approximately 4-5 feet, the slopes are relatively steep, and there is standing water on both sides of the roadway. Once again, a cost effective analysis can be performed, or the existing culvert can be lengthened to allow flattening of the side slopes to a transversable 3:1 slope.

Due to the additional costs associated with guardrail maintenance and replacement, and the readily available land adjacent to both Culverts #2 and #5, it would be our recommendation to simply flatten the slopes to a transversable 3:1 and lengthen the culverts as needed. At the same time it would be beneficial to undertake additional drainage improvement in this area.

5.3.2 Lighting

Presently, the lighting on the Loop is only contained in the areas with existing homes and buildings. The existing lights have significant spacing in certain areas and provide light from a fairly low elevation minimizing their effectiveness. To improve the current roadway lighting, additional light poles can be provided near the Landfill Road intersection, the frequency of lights poles can be increased, and the existing lights can be replaced with taller poles and more up to date lighting methods. With these improvements, the type, quantity, efficiency, and overall height of the lighting is enhanced, which ultimately provides increased illumination along the Loop and improved safety.

5.3.3 Signage / Striping

The existing roadway signage appeared complete in the areas of the residential homes and school. Improving the roadway surface with pavement generally increases driver speeds, therefore, additional safety signage regarding the speed limit, upcoming sharp curves, pedestrian crossings, etc. will be required. Existing signage may be salvaged for re-use with the new improvements.

6.0 Summary / Cost Estimate

To develop a cost estimate in accordance with the recommendations outlined above, the Departments of Transportation's Bid Summaries were studied and three representative projects were used to assist in determining unit and lump sum costs. The Chiniak Road Paving Program in 2004, Pasagshak Road Spot Repairs and Paving 2003, and the Airport Beach Road Paving project in Unalaska represent projects of similar location, construction and magnitude to the recommendations outlined in this report. The information obtained from the site investigation combined with the unit and lump sum costs for these three projects escalated to 2006 dollars were used to determine estimated costs for this project.

The estimate provides total costs for construction of the main roadway that includes costs for the recommended slope flattening near Culvert #2 and #5. Additional alternate costs for guardrail safety improvements in the area of Culvert #2 and #5 are also provided.

Construction Cost Estimate

Item	Unit	Unit Cost	Quantity	Amount
Earthwork / Grading Removal of existing asphalt Grading and shaping of existing asphalt Correcting sights distance and vertical curve issues Compaction of sub-base prior to placement of D-1	**LS**	**$200,000**	**All Req'd**	**$200,000**
Driveways Grading and shaping approach driveways	**Each**	**$500**	**65**	**$32,500**
Aggregate Base Course – D-1 Placement and compaction of D-1 (6") along entire length	**yd^3**	**$60**	**5,500**	**$330,000**
AC Pavement Asphalt pavement Asphalt cement PG-58-28 Tack coat for asphalt	**Ton**	**$100**	**8,000**	**$800,000**
Pavement Markings	**LS**	**$50,000**	**All Req'd**	**$50,000**
Erosion and Pollution Control Implementation pan Administration Temporary control measures	**LS**	**$20,000**	**All Req'd**	**$20,000**
Construction Surveying	**LS**	**$25,000**	**All Req'd**	**$25,000**
Traffic Control Traffic maintenance Flagging Temporary signage	**LS**	**$50,000**	**All Req'd**	**$50,000**
Recommended Slope Flattening Downstream side Culvert #2, both sides Culvert #5				
Slope Flattening – Borrow A	**Ton**	**$20**	**4500**	**$90,000**
Slope Flattening – Culvert Ext.	**Each**	**$700**	**3**	**$2,100**
Lighting Upgrade and Replacement of Existing	**Pole**	**$10,000**	**25**	**$250,000**
Mobilization & Demobilization	**LS**	**$750,000**	**All Req'd**	**$750,000**
Office / Materials Testing Lab	**LS**	**$25,000**	**All Req'd**	**$25,000**
ROADWAY CONSTRUCTION SUBTOTAL				**$2,625,000**
Design – Approx. 15% of Roadway Construction Subtotal				**$395,000**
Construction Administration – Approx. 15% of Roadway Subtotal				**$395,000**
Contingency – Approx. 10% of Roadway Subtotal				**$265,000**
PROJECT CONSTRUCTION SUBTOTAL				**$3,700,000**

Alternate Guardrail Safety Improvements

Optional Guardrail at Downstream Side Culvert #2 and Both Sides Culvert #5				
Guardrail – W Beam	**Lin Ft**	**$45**	**900**	**$40,500**
Guardrail – Terminal (ET-2000)	**Each**	**$3000**	**6**	**$18,000**