Gravina Access Project

Utilities Assessment Technical Memorandum

Draft

Agreement 36893013
DOT&PF Project 67698
Federal Project ACHP-0922(5)

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November 2001

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1.0 Summary

The existing conditions of water, sewer, electric, and telephone utilities were investigated to determine how these systems would potentially be affected by the proposed alternatives of the Gravina Access Project. The results of this investigation are summarized as follows:

- Existing water and sewage disposal systems would be unaffected by Alternatives C3(a)/(b) and F3. However, telephone and electric service transmitted via overhead lines on poles in the Signal Road area and on Pennock Island may be affected by Alternatives C3(a)/(b) and F3, respectively. Either alternative could require the relocation of up to two poles and associated electric and telephone lines.
- The existing water, sewage disposal, electric, and telephone systems in the Cambria Drive area could be affected by the placement of buried facilities, such as lighting and signaling conduits, associated with the bridges for Alternatives C4 and D1. Relocation of up to 100 feet each of water, sewer, electric, and telephone lines may be required under each of these alternatives.
- Alternatives G2, G3, and G4 would have no effect on existing water, sewer, electric, or telephone utilities.
- Future development on Gravina Island and (for Alternative F3) Pennock Island would require provisions for water, sewer, electric, and telephone facilities.
    - The existing water system has the capacity to supply water to Gravina and Pennock islands under low-, medium-, and high-development scenarios. New transmission lines would be needed to transport water to Gravina and Pennock islands, and storage facilities on the islands would be needed to meet fire flow needs.
    - The existing wastewater treatment plant has the capacity to treat wastewater from Gravina and Pennock islands under low-, medium-, and high-development scenarios. However, it may be more cost-effective to establish "on-lot" disposal systems for low-density residential development and, for core area developments of commercial and/or industrial facilities on Gravina Island, a small "package" wastewater treatment plant and outfall.
    - The existing electrical system has sufficient capacity to support the additional demand of low-, medium-, or high-development scenarios on Gravina and Pennock islands. This would require a new substation in Ketchikan and a substation on Gravina Island connected by a submarine line across Tongass Narrows.
    - The existing telephone system on Revillagigedo Island has sufficient capacity to support the additional demand of low-, medium-, or high-development scenarios on Gravina and Pennock islands. A new (submarine) fiber optic cable across Tongass Narrows would be needed.

2.0 Utilities Background

2.1 Water System

Water is currently provided to the City of Ketchikan and the Ketchikan International Airport by Ketchikan Public Utilities (KPU), a wholly owned subsidiary of the City of Ketchikan. The KPU water system consists of several pump stations and water storage tanks to provide water to the higher elevations in town and to meet fire flow demands. The water treatment system has a production capacity of approximately 11 million gallons per day and current water use is about 8 million gallons per day.

KPU currently provides water to the airport by a submarine water main. The distribution system piping is generally adequate to meet current demands, but has not been sized to handle the quantities that a regional water system outside the City limits would require.

Most residences and small businesses outside of the KPU service area have rainwater roof catchment systems for their water supply. During dryer months, tanker trucks transport and deliver water to these areas.

2.2 Sewer System

The City of Ketchikan Public Works Department operates a sewage collection and wastewater treatment system serving the City. The City's wastewater treatment plant has a design capacity of about 7.0 million gallons per day. It currently is treating about 1.5 million gallons on an average day and 4.0 million gallons per day during peak flows in wet weather.

Outside of the City limits, there are a number of smaller package wastewater treatment systems operating in the Ketchikan area. They range in size from systems serving individual residences with on-site disposal of treated wastes to ocean outfalls to the system serving the City of Saxman, which has a capacity of about 115,000 gallons per day.

The airport has its own wastewater treatment facilities.

2.3 Electrical System

KPU provides electricity to the Ketchikan area, including the City of Ketchikan, the City of Saxman, Gravina Island, and Pennock Island. KPU has an annual average energy generation of about 65 million kilowatt-hours (kWh) from several hydroelectric projects. It also purchases power produced at the Swan Lake Project, which produces about 76 million kWh per year. In addition, KPU owns diesel generators capable of generating an additional 100 million kWh per year. The total power currently available to KPU is about 241 million kWh per year.

Power usage from this system is currently about 55 percent of the generating capacity (about 133 million kWh per year).

2.4 Telephone System

KPU Telecommunications (one of three divisions of KPU) currently has over 11,000 subscriber lines. Work is continuing on building a fiber optic network. The telephone system includes service to Ketchikan International Airport by submarine cable, but there is no service to Pennock Island.

3.0 Direct Impacts on Existing Facilities

3.1 Bridge Alternatives C3(a)/(b)—Airport Area to Signal Road

Water: Potable water systems in the Signal Road area consist of roof catchment systems or hauled water. No water distribution system exists at Signal Road; therefore, no impact on the existing water system would occur. The water supply main to Ketchikan International Airport would not be affected by Alternatives C3(a)/(b).

Sewer: Sewage disposal in the Signal Road area typically consists of on-site disposal systems. No sewage collection system exists at Signal Road; therefore, no impact on the existing sewer system would occur. The wastewater treatment facilities at the airport would not be affected by Alternatives C3(a)/(b).

Electric: Electric service in the Signal Road area is provided via overhead lines on poles. Depending on the final alignment of the bridge approach, there may be some interference with the power poles or lines on Signal Road. Relocation of up to two power poles and associated lines may be required.

The main electrical lines are located on poles along Tongass Avenue, but the bridge overpass of Tongass Avenue is expected be high enough to clear these power poles and lines. Electric service to the airport would not be affected by Alternatives C3(a)/(b).

Telephone: Telephone service in the Signal Road area is provided via overhead lines on poles that are also used by the electric system. Depending on the final alignment of the bridge approach, there may be some interference with the power poles or lines on Signal Road. Relocation of up to two power poles and associated lines may be required. (The estimated cost of relocating two poles and associated electric and telephone lines is $40,000.)

The main telephone lines are located on poles along Tongass Avenue, but the bridge overpass of Tongass Avenue is expected to be high enough to clear these poles and telephone lines. Telephone service to the airport would not be affected by Alternatives C3(a)/(b).

3.2 Bridge Alternatives C4 and D1—Airport Area to Cambria Drive Area

Water: The potable water system in the Cambria Drive area consists of a buried 8-inch water line. It is highly unlikely that there would be any direct impact on this existing water line. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as lighting and signaling conduits, would interfere with the water line. Relocation of up to 100 feet of water line may be required. (The estimated cost of relocating 100 feet of water line is $10,000). The water supply main to Ketchikan International Airport would not be affected by Alternatives C4 and D1.

Sewer: The sewage collection system in the Cambria Drive area consists of a buried 8-inch line. It is highly unlikely that there would be any direct impact on this existing sewer line. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as lighting and signaling conduits, would interfere with the sewer line. Relocation of up to 100 feet of sewer line may be required. (The estimated cost of relocating 100 feet of sewer line is $10,000). The wastewater treatment facilities at the airport would not be affected by Alternatives C4 and D1.

Electric: Electric service in the Cambria Drive area is in underground conduits. It is highly unlikely that there would be any direct impact on the existing underground electrical system. However, depending on the final alignment of the bridge approach, there is a remote possibility that other buried facilities associated with the bridge approach, such as lighting and signaling conduits, would interfere with the existing buried electrical conduits. Relocation of up to 100 feet of buried electrical conduit may be required. (The estimated cost of relocating 100 feet of electrical conduit is $10,000).

The main electrical lines are located on Tongass Avenue, but the bridge overpass of Tongass Avenue is expected to be high enough to clear these power poles and lines. Electric service to the airport would not be affected by Alternatives C4 and D1.

Telephone: Telephone service in the Cambria Drive area is in underground conduits. It is highly unlikely there would be any direct impact on the existing underground telephone system. However, depending on the final alignment of the bridge approach, there is a remote possibility other buried facilities associated with the bridge approach, such as lighting and signaling conduits, would interfere with the existing buried telephone conduits. Relocation of up to 100 feet of buried telephone conduit may be required. (The estimated cost of relocating 100 feet of telephone conduit is $10,000).

The main telephone lines are located on Tongass Avenue, but the bridge overpass of Tongass Avenue is expected to be high enough to clear these power poles and lines. Telephone service to the airport would not be affected by Alternatives C4 and D1.

3.3 Bridge Alternative F3—Pennock Island Crossing

Water: Potable water systems on Pennock Island consist of roof catchment systems or hauled water. No water distribution system exists on Pennock Island, so there is no expected impact on existing facilities. The water supply main to Ketchikan International Airport would not be affected by Alternative F3.

Sewer: Sewage disposal on Pennock Island typically consists of on-site disposal systems. No sewage collection system exists on Pennock Island, so there is no expected impact on existing facilities. The wastewater treatment facilities at the airport would not be affected by Alternative F3.

Electric: Electric service on Pennock Island is provided via overhead lines on poles. Depending on the final alignment of the bridge approaches and the road on Pennock Island, there may be some interference with the power poles or lines on Pennock Island. Relocation of up to two power poles and associated lines may be required. (The estimated cost of relocating two poles and associated electric and telephone lines is $40,000.) Electric service to the airport would not be affected by Alternative F3.

Telephone: Telephone service on Pennock Island is provided via overhead lines on poles also used by the electric system. Depending on final alignment of the bridge approaches and road on Pennock Island, there may be some interference with the power poles or lines on Pennock Island. Relocation of up to two power poles and associated lines may be required. (The estimated cost of relocating two poles and associated electric and telephone lines is $40,000.) Telephone service to the airport would not be affected by Alternative F3.

3.4 Ferry Alternatives G2, G3, and G4

There are combinations of water, sewer, electric and telephone service at the Revillagigedo Island landings of each of the proposed ferry routes. However, because the improvements required for the ferry alternatives are seaward of these utilities, there is no expected impact on the existing water, sewer, electric, or telephone utilities at any of the three sites. None of the existing utilities on Gravina Island would be affected by Alternative G2, G3, or G4.

4.0 Projected Utilities Requirements for Gravina Island

4.1 Assumptions

The Ketchikan Gateway Borough Economic Forecasts draft report (September 2001) projected total land use requirements on Gravina Island based on low-, medium-, and high-development scenarios for the Gravina Access Project. These estimates are provided in Table 1.

Table 1—Total Projected Land Use Requirement on Gravina and Pennock Islands, 2000-2025

	Additional Acres Needed by Scenario		
Type of Land	*Low-Development*	*Medium-Development*	*High-Development*
Alternatives C3(a)/(b), C4, D1, G2, G3, and G4:			
Commercial	2	4	7
Industrial	5	43	86
Residential	62.5	122.5	272.5
Community	0	1	2
Total	69.5	170.5	367.5
Alternative F3:			
Commercial	2	6	10
Industrial	5	43	86
Residential	62.5	197.5	475.5
Community	0	1	4
Total	69.5	247.5	575.5

The development scenarios listed above were based on the assumption that residential development on Gravina Island would be comprised of 2.56 persons per household and residential lots would be 1 acre in size. Commercial and industrial development for the most part was considered to be light commercial, retail, storage, etc. However, under the high development scenario, a fish processing facility was included in the industrial development.

4.2 Water Requirements

According to KPU, the City of Ketchikan currently uses approximately 500 gallons of potable water per person per day. This is much higher than the 130 gallons per person per day typically used by most communities because of the need to protect shallow buried pipes from freezing by continuously running water.

The predominant use for the land on Gravina Island is projected to be residential development, with water use expected to be 500 gallons per person per day. Based on conservative estimates, light commercial and industrial development on Gravina Island would have water usage rates similar to the residential demand, unless there is a known industry with high water demand, such as a fish processor.

Based on the assumptions used to determine the development scenarios, the potable water demand per acre is 1,280 gallons (2.56 persons/household multiplied by 1 household/acre multiplied by 500 gallons water demand/person/day = 1,280 gallons/acre). A fish processing facility, which is projected under the high growth scenario, would use an estimated 500,000 gallons per day.

Table 2 provides the projected water demand for the project alternatives under each development scenario.

The current KPU water system has the capacity to produce the total demand for additional water under any alternative for any development scenario (current capacity = 11 million gallons/day; current demand = 8 million gallons/day). However, because there is no existing water system at Signal Road or on Pennock Island, and the one at Cambria Road is small (8-inch), new transmission facilities (most likely a submarine transmission line) would be needed to transport the water to Gravina and Pennock islands, and water storage facilities should be provided on the islands to meet fire flow needs.

Table 2—Total Projected Water Demand on Gravina and Pennock Islands, 2000-2025

	Water Demand by Scenario		
Type of Demand	*Low Development*	*Medium Development*	*High Development*
Alternatives C3(a)/(b), C4, D1, G2, G3, and G4			
Total Acres	69.5	170.5	367.5
Residential Water Demand (gpd)	88,960	218,240	470,400
Fish Processing (gpd)	0	0	500,000
Total Demand (gpd)	88,960	218,240	970,400
Alternative F3			
Total Acres	69.5	247.5	575.5
Residential Water Demand (gpd)	88,960	316,800	736,640
Fish Processing	0	0	500,000
Total Demand (gpd)	88,960	316,800	1,236,640

4.3 Wastewater Requirements

A general assumption used in determining wastewater requirements is that one gallon of wastewater is produced for each gallon of water used (excluding the fish processor water demand). Consequently, the amount of wastewater produced is expected to range from approximately 88,960 gallons per day for the low-development scenario to approximately 736,640 gallons per day under the high-development scenario for Alternative F3. The existing wastewater treatment plant has a capacity of approximately 7 million gallons per day and has peak flows of about 4 million gallons per day. Consequently, the existing plant has enough capacity to handle additional flows from Gravina and Pennock islands.

However, connection of developments on Gravina and/or Pennock islands to the existing system via a new force main may be cost-prohibitive. Low-density residential development could be served by "on lot" disposal systems, depending on subsurface soil

conditions, and core area developments of commercial and/or industrial facilities could be served by a small "package" wastewater treatment plant and outfall on Gravina Island.

4.4 Electric Requirements

Electric needs were discussed with KPU and it was concluded that a 35- to 50-kV-line would be needed to meet the demand presented by future development on Gravina Island. This would involve construction of a new electrical substation in Ketchikan and a substation on Gravina Island. The line would most likely be a submarine line laid across Tongass Narrows. The existing electrical system has sufficient capacity to support this additional demand.

4.5 Telephone Requirements

Telephone needs were discussed with KPU and it was concluded that a new fiber optic cable to Gravina Island would be needed to meet any future development demand on Gravina Island. The line would most likely be a submarine line laid across Tongass Narrows. The existing telephone system has sufficient capacity to support this additional demand.