

# PORT INFRASTRUCTURE CONDITIONS MEMO

## SEC High Efficiency Ferry Blueprint

FINAL | January 23, 2026

Prepared by:

**kpff**

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### Appendix A- Reference List

## Introduction

This memo summarizes the infrastructure assessment conducted for ferry terminal sites in Southeast Alaska as part of the AMHS High Efficiency Ferry Blueprint development. The assessment incorporated both desk-level literature reviews and on-site visits to each terminal. Data sources included past studies, utility records, and stakeholder input, as outlined in the project scope. Site visits provided direct observations of infrastructure conditions, upland space, power feed locations, and operational characteristics while the desk-level reviews contributed information on current utility capacity, maritime operations, and community energy needs. This document combines findings from both the desktop review and the site visits, summarizing existing conditions, opportunities, and constraints at each location. These results will inform the development of recommendations for the charging approach and conceptual layouts for potential infrastructure upgrades that will be developed later in the High Efficiency Ferry Pilot Project Blueprint process.

### Introduction to Charging Infrastructure Components

Electrical systems required for charging a vessel's propulsion batteries—whether through fast-charging or slower overnight charging—are fundamentally different from the lower-power shore-power systems traditionally used to support hoteling loads such as lighting, HVAC, and onboard auxiliaries. Thus, battery-charging infrastructure for a High Efficiency Ferry (HE Ferry) requires substantially higher voltage and current capacity, along with dedicated equipment, protection systems, and utility upgrades that exceed the capabilities of standard shore-power installations. While several AMHS terminals currently have limited shore-power connections in place, these systems are not designed for battery charging and would require significant enhancement or replacement to meet the demands of an electrified ferry. Key infrastructure components of battery-charging infrastructure are shown below in Figure 1.

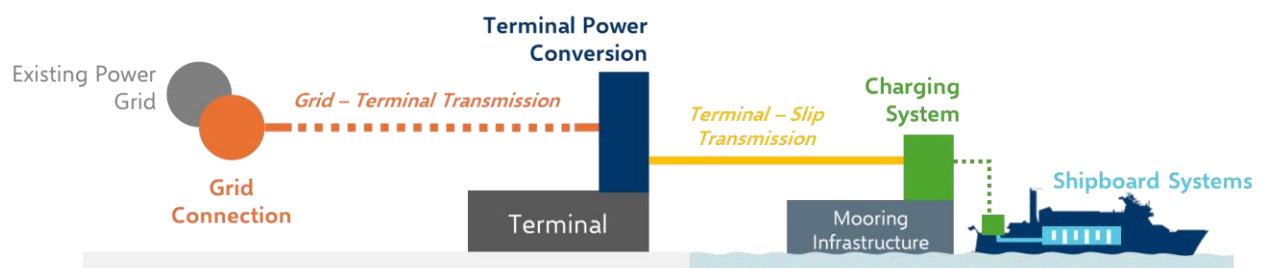


Figure 1- Example Components of a Battery-Charging System

## Site Evaluation Process

As an initial step in preparing for the site visit to ferry terminals in Southeast Alaska, a comprehensive desk-level Literature Review and Gap Analysis was conducted to evaluate the layouts and existing infrastructure present at each terminal site, including in-water, uplands, and electrical equipment. The review synthesized information from a range of recent and historical documents, including available terminal drawings, long-range transportation plans, utility capital improvement programs, climate action plans, and technical assessments of local energy systems. The Literature Review and Gap Analysis also gathered baseline data about existing facilities, energy generation sources, and community energy profiles, with particular attention to the needs and feasibility of integrating high-efficiency electric ferries into the Alaska Marine Highway System. Please see Appendix A for a list of references that were reviewed during this process.

Following the Literature Review and Gap Analysis, site visits were conducted to each terminal location in early October of 2025. Representatives from KPFF, RESPEC, and SEC attended the site visits where terminal and community infrastructures were observed and visually inspected. Meetings with stakeholders were held concurrently with the site visits where the team asked additional questions on conditions and verified desktop review findings, particularly those related to community energy needs and expansion plans.

## Summary of Findings

Both the literature review and the site visits revealed that communities across Southeast Alaska rely primarily on hydroelectric and diesel-fired generator plants, and several projects to increase hydroelectric generation and improve energy resilience have been evaluated or are currently under development.<sup>1</sup> Communities are also actively modernizing their infrastructure, with upgrades such as heat pumps and have goals to install shoreside power for cruise vessels in some communities. However, these advancements are occurring alongside significant constraints in local power supply, especially peak times during winter months. Drought conditions during this time of year limit the capabilities of hydroelectric resources which are often the primary power sources for communities. The capacity of energy providers was found

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<sup>1</sup> Examples include expansions or upgrades at existing facilities such as Tyee and Chester Lake along with potential new hydroelectric projects that have been or are being evaluated for feasibility (Burro Creek, West Creek, etc.).

to be limited, and many communities rely on shared resources or are exploring intertie partnerships to expand service.

Information in the desktop review also indicated that the ferry terminals and associated in-water and shoreside infrastructure are in good or fair condition, which was verified to be the case during site visits. Shoreside infrastructure at Alaska Marine Highway System terminals is generally well-documented, so few changes were observed.

Overall, of all the AMHS terminals that were analyzed, some challenges were observed, but most could be addressed through the design process or through additional capital investment in equipment upgrades. Additionally, it was found that all uplands electrical equipment would need to be upgraded to support ferry charging. In each case, a new disconnect and meter will be required on shore, along with ground fault relays.

A summary of key opportunities and constraints by site is included below, with detailed findings and conditions by terminal discussed in the following sections.

<b>TERMINAL</b>	<b>OPPORTUNITIES</b>	<b>CONSTRAINTS</b>
<b>KETCHIKAN</b>	Adaptable Layout & Space for Equipment	Amount of Infrastructure & Associated Capital Costs
<b>SAXMAN</b>	<ul style="list-style-type: none"> <li>Nearby High Voltage Electrical Equipment</li> <li>Completely New Construction</li> </ul>	Terminal Project Development Timeline
<b>METLAKATLA</b>	Adaptable Layout & Space for Equipment	Low Voltage of Existing Electrical Equipment
<b>HAINES</b>	<ul style="list-style-type: none"> <li>Nearby High Voltage Electrical Equipment</li> <li>Available Uplands Space</li> <li>Potential for New Slip</li> </ul>	<ul style="list-style-type: none"> <li>Sewer and Water Improvements Needed for Homeporting</li> <li>Limited Space for Electrical Equipment on In-Water Infrastructure</li> <li>Frequent Wind &amp; Wave Action</li> </ul>
<b>SKAGWAY</b>	Adaptable Layout & Space for Equipment	<ul style="list-style-type: none"> <li>Float Replacement Needed</li> <li>Frequent Wind &amp; Wave Action</li> </ul>

## Ketchikan Conditions

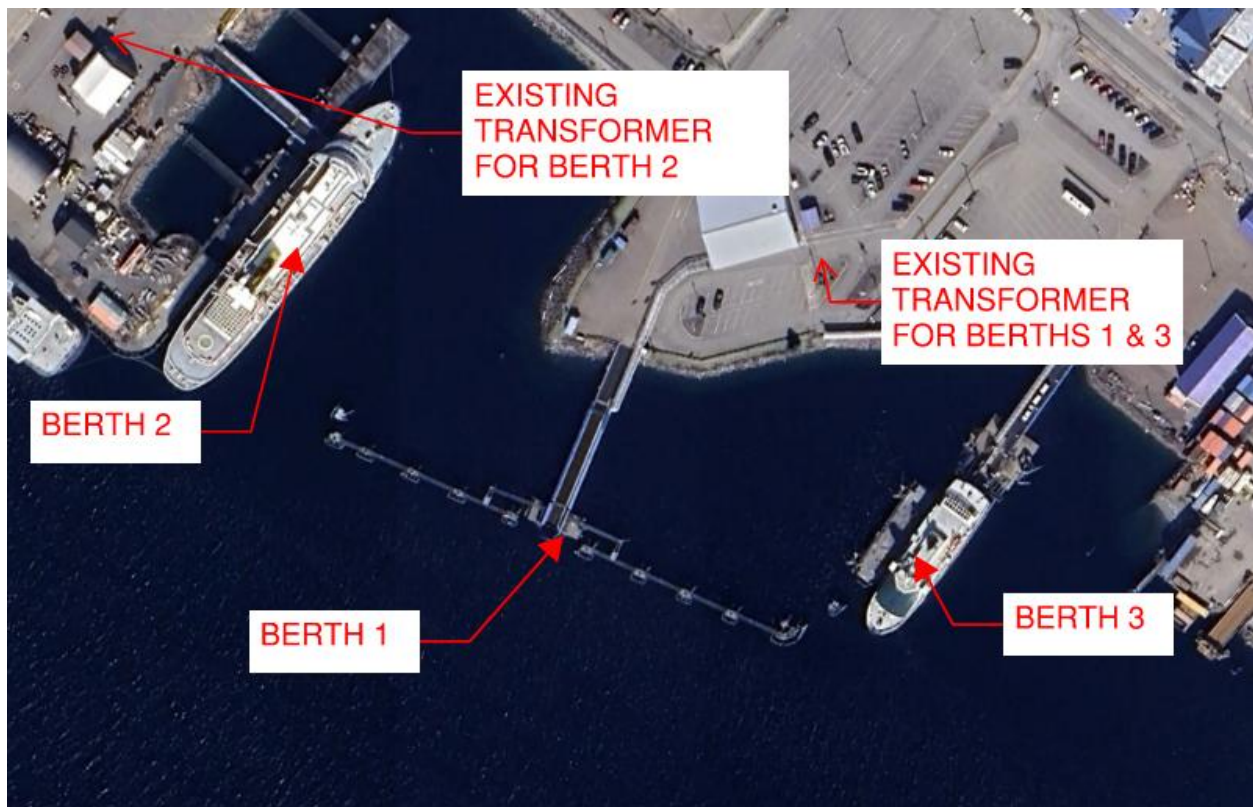


Figure 2- Ketchikan Terminal Berth Locations

### *Existing Ferry Landing Infrastructure & Observed Conditions*

The Ketchikan Terminal serves both the Alaska Marine Highway System (AMHS) and the Inter-Island Ferry Authority (IFA). The facility includes three berths and a paved uplands area for parking and vehicle staging with overhead lighting for safety and a passenger building that supports ticketing and includes restrooms. The paving and passenger building are in good condition and show minimal signs of wear and tear. The facility has existing electrical and shoreside power equipment that are discussed in the following section, beginning on page 10.

The Ketchikan Ferry Terminal has the core utilities needed to support vessel homeporting, with water and sewer services already available within the terminal area. The terminal already supports long layovers of vessels during maintenance periods, and sewer and water utilities can be extended or upgraded as required at any of the three berths to support the homeporting of additional vessels. The existing terminal layout provides sufficient space to integrate additional service connections.

## Berth 1

Berth 1 serves as the main terminal berth for the facility and includes a transfer bridge, steel support float, and steel catwalks that provide access to the steel mooring dolphins for a side berthing condition.<sup>2</sup> Overall, the berth is in good condition with minimal signs of wear. The transfer bridge and float were constructed in 1988 and have undergone several maintenance projects throughout the years. Assuming a 50- to 75-year design life, the two structures have about 12 to 37 years of service life remaining.

The transfer bridge includes electrical conduit running along its bottom and sides, with ample additional space for the addition of new conduit. The float at this berth also has enough space to support the addition of charging infrastructure with some more limited space for infrastructure also available on the mooring docking structures. The charging infrastructure anticipated to be located at the float includes a few electrical boxes and charging cables, which do not weigh a significant amount and can most likely be accommodated. However, there are some significantly larger charging arms on the market, such as the system being explored by Washington State Ferries and the arm in operation for Casco Bay, shown in Figure 4. Systems of this type would likely exceed the float's load capacity in its current configuration.



*Figure 3- Berth 1 Float, Ram and Apron, Observed October 2025*

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<sup>2</sup> If stern berthing of a new, smaller vessel were pursued at this berth, additional dolphins would need to be installed.



Figure 4- Charging Arm for Casco Bay Ferry, larger than the systems anticipated to support the HE Ferry<sup>3</sup>

## Berth 2

Berth 2 also supports side berthing and is often used as a layup berth for off-system AMHS vessels.<sup>4</sup> During the site visit, this berth was being used for layup of AMHS's *Matanuska* which was making use of the existing shore power connections (see following section). Berth 2 also includes a transfer bridge, steel support float, with two mooring floats and access bridges. The transfer bridge and float were constructed in 1986 and have undergone several maintenance projects throughout the years. Assuming a 50- to 75-year design life, the two structures have about 10 to 35 years of service life remaining.

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<sup>3</sup> Photo from Doug Stewart for WorkBoat ([Washington State Ferries selects charging systems provider | WorkBoat](#)).

<sup>4</sup> Similar to at Berth 1, if stern berthing of a new, smaller vessel were pursued at this berth, additional dolphins would need to be installed, though in this case, dolphin installation may conflict with the navigational channel.

Similar to Berth 1, Berth 2 has lots of space on the ramp to support new electrical conduits. However, the floating dock at Berth 2 is a significantly older timber construction that would require further structural investigation and likely structural improvements to support the addition of charging infrastructure.



*Figure 5- Berth 2 Fender Float & Ramp, Observed October 2025*



*Figure 6- Berth 2 Ramp, Float and Apron, Observed October 2025*



*Figure 7- Berth 2 Existing Shore Power Boxes, Observed October 2025*

### **Berth 3**

The final berth at the facility, Berth 3, serves both AMHS and IFA, and unlike the other two berths, Berth 3 supports stern-loading only. The berth was built in 2001 and was designed to support IAF vessels about 200 feet long. The berth's mooring float is in good condition with lots of available space for the charging infrastructure to be installed. The berth consists of a transfer span resting on a concrete float. The transfer bridge and float were constructed in 2001. Assuming a 50- to 75-year design life, the two structures have about 25 to 50 years of service life remaining.

The berth has a large fender float at the side of the berth to hold the starboard side of the vessel. The float is concrete with a large wood and steel fender frame assembly mounted on it. While it is not anticipated that the fender float would be utilized for the shore power system, it may require maintenance on its timber deck prior to any possible utilization. Similar to the other two berths, the ramp at Berth 3 has lots of space to run additional electrical conduit underneath it. The charging infrastructure anticipated to be located at the float is the same as what would be anticipated at Berth 1 and can most likely be accommodated. However, similar to at Berth 1, a larger charging arm, if selected, would likely exceed the float's load capacity in its current configuration.



*Figure 8- Berth 3 Float and Ramp, Observed October 2025*



*Figure 9- Berth 3 Float, Ramp and Fendering Float, Observed October 2025*

### *Existing & Nearby Electrical Infrastructure & Observed Conditions*

Berth 2 and Berth 3 have some existing shore power for charging AMHS vessels at low power levels. The Berth 2 equipment would need to be replaced, as this installation does not meet existing code and would need to be upgraded with modern relays and a heated cabinet to help combat moisture. Additionally, the cables leading to the dock have insulation that is starting to

deteriorate and need to be replaced. The dockside infrastructure is heavily corroded and, though still in use, has reached the end of its usable life.

Berth 3's infrastructure is in fair condition, but it is likely that it would need to be updated to serve the power requirements of the new vessel.

Ketchikan Public Utility (KPU) has both 12.47kV and 34.5kV distribution lines running adjacent to the site along Tongass Hwy. If existing transformers are to be replaced, the higher 34.5kV voltage would potentially support a fast charge, though KPU capacity is limited, and they are likely to prefer a BESS regardless of charging voltage for any fast charging.

### *Opportunities & Constraints for Future Charging Infrastructure*

The site conditions at the Ketchikan Ferry Terminal provide opportunity and flexibility for installation of future charging infrastructure.

#### **Adaptable Layout and Space for Equipment**

All berths could be developed to support charging infrastructure, with Berths 1 and 3 being best suited for installation with minimal waterfront structure upgrades. The mooring floats at these berths present potential to add electrical equipment and connection points for vessel charging. This adaptability supports the development of shoreside charging infrastructure and positions the terminal to meet future high-efficiency ferry operational requirements. Additionally, the ramps at all berths present opportunities for running electrical infrastructure.

The uplands area adjacent to the terminal presents significant opportunities for the installation of new electrical infrastructure, with minimal to no impacts on parking capacity, due to the ample amount of open space available. Transformers, substation equipment, and other utility upgrades required for future ferry charging systems could easily be accommodated, and the open layout of the area would allow for straightforward construction and integration of electrical gear.

However, installation of battery charging infrastructure at all three berths at this facility could cause challenges.

#### **Amount of Infrastructure and Associated Capital Costs**

The amount of infrastructure that could be required at this facility could constrain timelines or pose challenges due to high costs. To maintain flexibility, charging at all three berths may be desired, which would be more expensive and infrastructure intensive than electrification of just one berth, such as would occur at other facilities. Electrifying one berth only, while cheaper, would limit the operational flexibility of the facility, with only one berth being able to support HE Ferry charging.

A more detailed operational study and additional coordination with AMHS and AKDOT&PF will be required to determine the optimal use of each berth at the Ketchikan Ferry Terminal and to assess whether installing charging infrastructure at a single berth or at multiple berths is warranted. This evaluation should be coordinated with the other users of the Ketchikan facility, such as IFA, and with AMHS long-range planning efforts. Key factors for consideration include the final vessel characteristics of the HE Ferry,<sup>5</sup> projected vessel assignments, route planning, and future terminal utilization, to ensure that any investment in electrical charging infrastructure aligns with long-term system needs and operating patterns.

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<sup>5</sup> Including size and berth compatibility based on loading type

## Saxman Conditions



Figure 10- Project Location for the Proposed South Tongass Ferry Terminal

### *Existing Ferry Landing Infrastructure & Observed Conditions*

The South Tongass Ferry Terminal location has not yet been developed and currently does not support AMHS operations. Some in-water infrastructure that serves smaller vessels is present at the facility, including floating structures, which would need to be removed to support a new AMHS facility. The uplands area includes gravel parking which is adjacent to a nearby commercial building.

The South Tongass Ferry Terminal development project, shown in Figure 11, is currently underway, with the aim of completion in 2030.

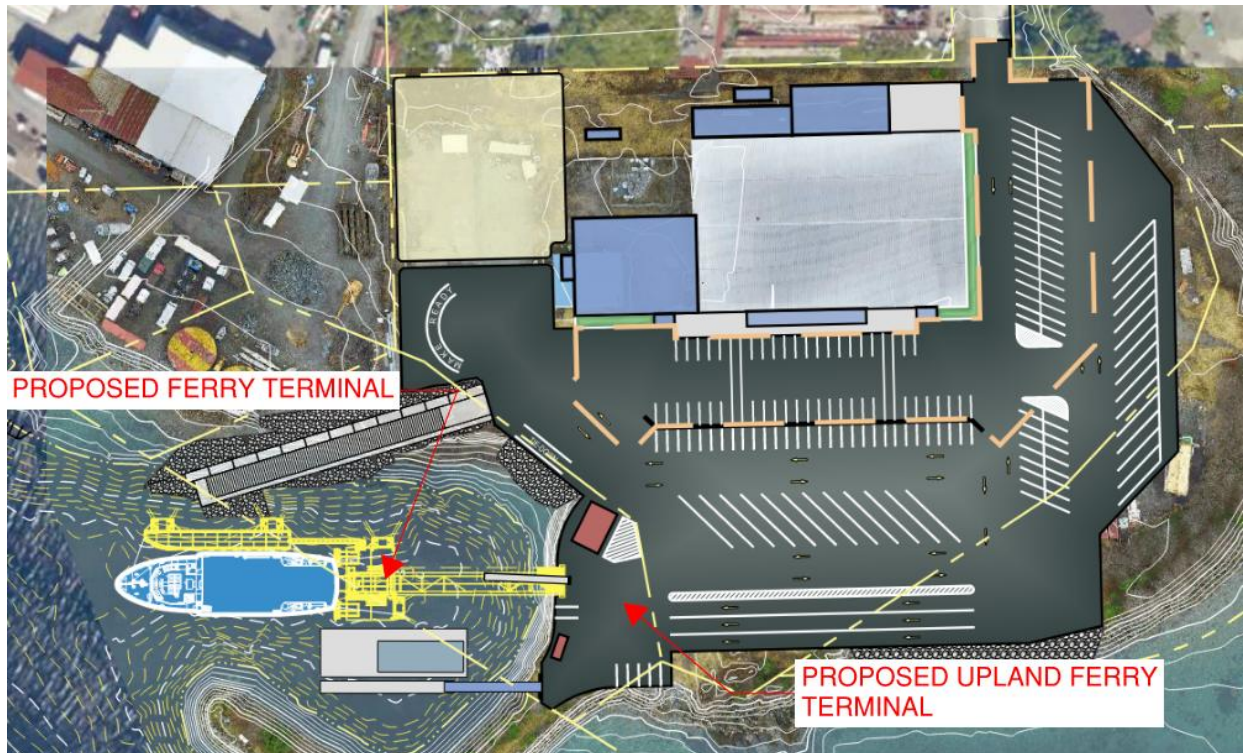


Figure 11- Proposed Concept Drawing of South Tongass Terminal

### *Existing Nearby Electrical Infrastructure & Observed Conditions*

As this installation would be entirely new, the electrical infrastructure could easily be developed to support the needs of a new ferry. The utility distribution line here is 34.5kV, which is ideal to support charging and may not require the addition of a Battery Energy Storage System (BESS).

### *Opportunities & Constraints for Future Charging Infrastructure*

As no facility is currently present, this site has ample opportunity to be designed to optimally support vessel charging. The location is also near an electrical feeder with easy routing to the water. However, as the project won't likely be complete until 2030, charging in Saxman would not be feasible until this time, even if the new HE Ferry vessel was available at an earlier date.

## Metlakatla Conditions



Figure 12- Annette Bay Ferry Terminal Existing Conditions

### *Existing Ferry Landing Infrastructure & Observed Conditions*

The Annette Bay Ferry Terminal at Metlakatla was constructed in 2013, making it one of the newer ferry facilities in Southeast Alaska. The terminal, shown in Figure 12, features a side-berth loading configuration with paved uplands for parking and vehicle staging with overhead lighting for safety, and a passenger shelter and restrooms. The facility does not have a staffed terminal building but includes an open-air shelter to provide passengers with some protection from the elements. A diesel generator is also present at the facility and is located outside near the existing electrical transformer.

The steel floats at the terminal provide robust mooring and support for vessel operations. These floats offer substantial deck area and are in good condition, with only minor wear and tear noted in recent assessments. The ramp has ample space to run additional electrical conduit underneath it. As in Ketchikan, the charging infrastructure anticipated to be located at the float can most likely be accommodated, but a larger charging arm, if selected, would likely exceed the float's load capacity in its current configuration.

The terminal is a remote facility with limited existing utility services, and substantial upgrades would be required to support vessel homeporting, which currently occurs in Ketchikan for the route that uses this facility. Dedicated water and sewer connections for long-duration vessel berthing are not currently available at the terminal and would need to be newly installed or

extended from distant community systems. Given the site's isolation, providing the full range of homeporting utilities at this location would require significant new infrastructure and coordinated investment.

Observations during the assessment indicate that the site is in good condition overall, displaying only the expected wear and minor deterioration typical for a facility of its age. No significant structural concerns were identified, and all major components appear to be functioning as intended for a 13-year-old terminal. The transfer bridge and float were constructed in 2013. Assuming a 50- to 75-year design life the two structures have about 37 to 62 years of service life remaining.



*Figure 13- Ramp and Floats at the Annette Bay Terminal, Observed October 2025*

### *Existing & Nearby Electrical Infrastructure & Observed Conditions*

The Annette Bay ferry terminal has an existing 12.47kV service, currently providing low-voltage power to dockside lights and apron hydraulics.

The Metlakatla Indian Community is currently pursuing funding for a 34.5kV substation in town to complete an intertie with Ketchikan. The transformer will be installed and the line to Walden Point will be upgraded to complete this intertie via new subsea cable that will connect near the terminal, as noted in Figure 12. When this is complete, the 34.5kV line will have adequate capacity to provide fast charges as well as overnight charges. While the normal source will be Metlakatla, it has been proposed that switches be installed at Walden Point to permit routing power from KPU to the terminal while restricting the Metlakatla feed in the event there is a fault on the line into Metlakatla. The scheduled completion of the intertie is unknown as funding is not yet available and may take years to acquire.

Until this intertie is complete, a BESS powered from the 12.47kV line will be required to provide fast charging at this site.

### *Opportunities & Constraints for Future Charging Infrastructure*

The flexible steel float construction and lack of major uplands site constraints are key benefits for this terminal.

#### **Adaptable Layout & Space for Equipment**

The steel floats configuration allows for efficient vessel alignment and transfer operations, and the structural integrity of the steel floats supports additional modifications, such as those that may be recommended to support charging, if needed.

The uplands area adjacent to the terminal presents significant opportunities for the installation of new electrical infrastructure, with minimal to no impacts on parking capacity, due to the ample amount of open space available. Transformers, substation equipment, and other utility upgrades required for future ferry charging systems could easily be accommodated, and the open layout of the area would allow for straightforward construction and integration of electrical gear.

Down the ramp and onto the steel floats, there is further potential to add electrical equipment and connection points for vessel charging. The steel construction of the floats enables flexible attachment of electrical components, making it feasible to mount charging stations, power distribution panels, and other gear wherever needed. This adaptability supports the development of shoreside charging infrastructure and positions the terminal to meet future high-efficiency ferry operational requirements.

Challenges at this facility relate mostly to electrical infrastructure conditions.

#### **Low Voltage of Existing Electrical Equipment**

Connecting to the existing 12.47kV could support fast midday ferry charging but would require a BESS. Moving to the 34.5kV equipment would be more flexible, and, though the Ketchikan intertie project and associate line upgrades represent a beneficial opportunity to move to the higher voltage equipment, the project has uncertain timeline. This uncertainty could impact charging system design planning or delay charging infrastructure development.

## Haines Conditions

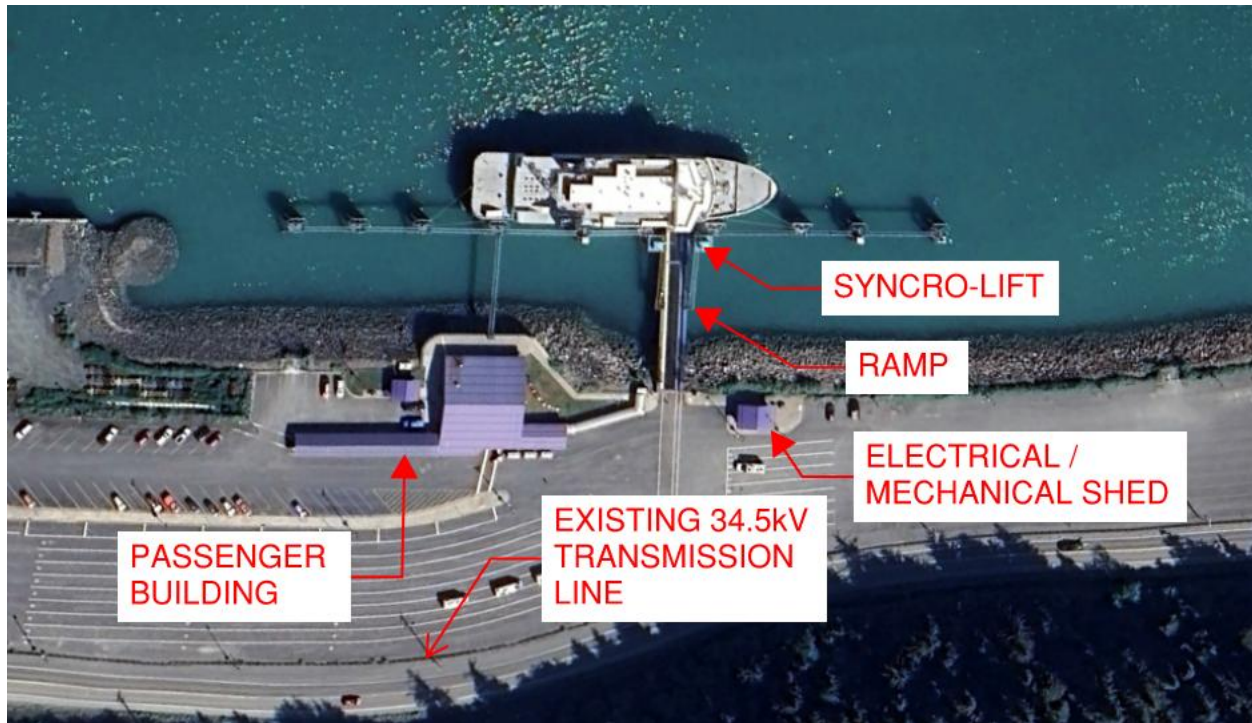


Figure 14- Haines Ferry Terminal

### *Existing Ferry Landing Infrastructure & Observed Conditions*

The Haines Ferry Terminal, shown in Figure 14, was originally constructed in 1962 and has since undergone several major upgrades, including a rebuild in 2008, with additional mooring improvements completed in 2015. The transfer bridge and syncro lift were constructed in 1985. Assuming a 50- to 75-year design life the two structures have about 9 to 34 years of service life remaining, as the Synchro-lift control system was also upgraded in the 2008 projects. The uplands area of the facility includes a large parking lot along with a passenger building and utility shed, all of which appeared to be in good condition. Significant uplands space is available for the installation of potential new infrastructure.

The Syncro-Lift system at this facility, shown in Figure 15 **Error! Reference source not found.**, uses large winches to raise and lower the vehicle and passenger ramps, facilitating vessel access. Unlike other regional terminals, Haines does not utilize a float to support vessel mooring. An alternate approach was selected at the terminal due to its exposure to high wind and wave conditions (often over 5' waves), which can result in significant movement of vessels and floating structures during attempted berth and mooring. This approach and the current mooring system have less space to install equipment on the in-water infrastructure than the float systems at other analyzed terminals.



*Figure 15- Haines Marine Terminal Syncro Lift, Observed October 2025*

Recent observations and Alaska DOT inspections, as referenced in the Literature Review & Gap Analysis report, indicate that the site is in good condition, which is in alignment with what was observed during the October 2025 site visits. The marine structures and superstructure are functioning as intended, with only minor wear observed. Ramp surfaces, as seen in Figure 17, showed some minor rusting but were also generally in good condition. The large available uplands space presents ample space, and the paved surfaces were in good condition.



*Figure 16- Haines Terminal Ramp and Lifts, Observed October 2025*



*Figure 17- Haines Marine Terminal Loading Ramp, Observed October 2025*

Additionally, at the site visit, discussions with the terminal staff indicated that it is possible that a new High Efficiency ferry would utilize a to-be-constructed berth to the east on the same property. This new slip would also likely need to utilize a Syncro-Lift system due to the terminal's environmental conditions. If a new mooring dolphin is constructed, the existing berth would be long enough to moor both the HE Commuter Ferry and the Day Boat at the same time, allowing simultaneous tie-up even though only one vessel could load or unload passengers at a given time.

It should be noted that the terminal is a side-loading facility only, similar to the configuration at Skagway, which limits compatibility with certain AMHS vessel types. New AMHS terminal designs incorporate hybrid loading—supporting both side loading and stern loading—to accommodate a broader range of vessels and improve operational flexibility. Stern-loading arrangements are generally more efficient, reducing vehicle maneuvering requirements and improving overall docking times. Incorporating stern-loading capability at Haines would provide greater adaptability for future fleet operations and support more efficient vessel turnaround.

Regarding potential homeporting of the new vessel at this location, coordination with stakeholders indicated that the terminal has only a small capacity of potable water and limited existing sewer service. New water service would need to be added, and substantial wastewater upgrades would be required to support vessel homeporting at the terminal.

### *Existing & Nearby Electrical Infrastructure & Observed Conditions*

The Haines ferry terminal has a single berth. An existing 34.5kV transmission line runs along the road directly adjacent, and there is plenty of room uplands for a new transformer and associated infrastructure. Because we anticipate this installation will be entirely new construction, any power requirements can easily be met, and the utility has confirmed their 34.5kV transmission line will support new required loads.

### *Opportunities & Constraints for Future Charging Infrastructure*

The terminal has opportunities to support an HE Ferry, most of which relate to uplands conditions.

#### **Nearby High-Voltage Electrical Equipment**

The existing 34.5kV transmission line represents an opportunity for electrical charging infrastructure, particularly to support fast charging during the middle of the day.

#### **Available Uplands Space**

Transformers, substation equipment, and other utility upgrades required for future ferry charging systems could easily be accommodated in the large area uplands of the terminal. The open layout of the area would allow for straightforward construction and integration of electrical gear, while still allowing for ample passenger and vehicle space.

#### **Potential New Slip**

Construction of a new slip would allow for optimal design to support HE Ferry charging equipment installation, ensuring ample space on in-water infrastructure for charging connection infrastructure.

However, the Haines Ferry Terminal has multiple constraints that, while not insurmountable, will require careful consideration and will need to be addressed in charging system design.

#### **Sewer and Water Improvements Needed for Homeporting**

The Terminal has limited existing utilities on site, which provides a foundation for potential homeporting operations, but additional infrastructure would be required to fully support long-duration vessel berthing. A new dedicated waterline and accompanying sewer infrastructure would need to be installed to accommodate the requirements of a homeported vessel. These upgrades would be essential to provide reliable potable water, wastewater handling, and shoreside services comparable to those available at other AMHS terminals.

### **Limited Space for Electrical Equipment on In-Water Infrastructure**

Space for mounting electrical infrastructure is limited at this site. The Syncro Lift platforms, which are used to raise and lower the ramps, do not offer sufficient area for installing charging equipment or related gear. Furthermore, their mechanical function and geometry preclude them from serving as practical mounting locations for electrical systems.

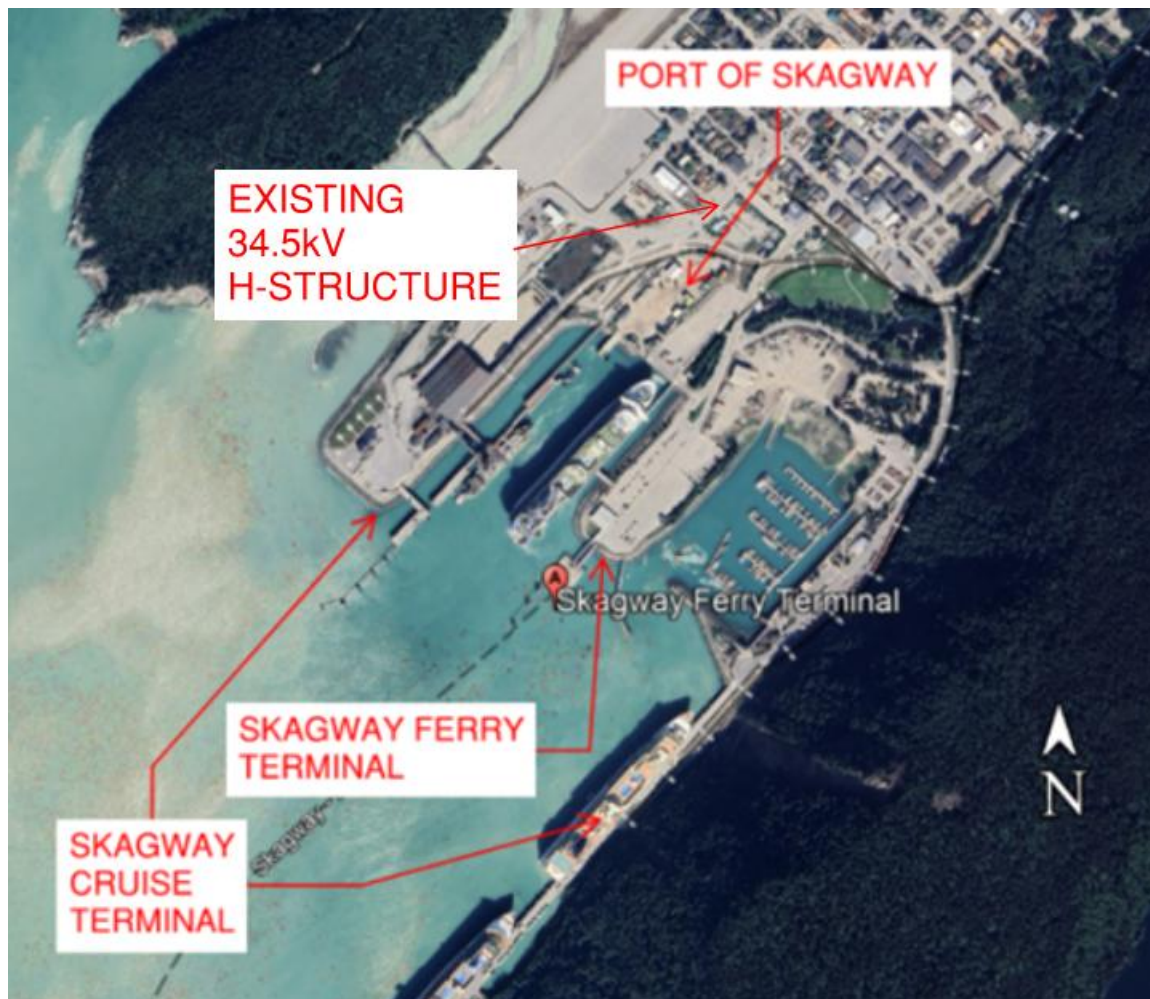
When adding charging infrastructure to support ferries, electrical conduits are typically run along the outside face of the connecting ramps or on adjacent catwalks. This approach would be challenging at the Haines Marine Terminal as limited space is currently available for installing large conduits or equipment on the inside face of the ramp, without impacting the raising and lowering functions needed for operations. Though limited ramp space presents a geometric challenge for routing power to the vessel, charging infrastructure will still be possible to install on the existing ramp. Careful planning and design will be required to ensure that electrical systems can be safely and efficiently integrated without interfering with ramp operations.

Given these constraints, the most feasible approach for vessel charging at Haines will likely involve the use of flexible electrical cables, similar to current shore power connections. These cables would be handled manually by staff, rather than relying on cranes or automated charging arms, to accommodate the dynamic conditions at the dock. While the dock dolphins and Syncro Lift dolphins offer some space for mounting connection points, the available area is more restricted than at sites with floats, and installation will need to be tailored to the site to maintain successful Syncro Lift operations.

### **Frequent Wind and Wave Action**

Additionally, any charging design solution will need to be tailored to the environmental conditions at the Haines Ferry Terminal, including frequent wind and wave activity. Placement of any future vessel charging connections will need to account for the associated vessel movement to ensure reliable and safe operation during berthing and charging.

## Skagway Conditions



### *Existing Ferry Landing Infrastructure & Observed Conditions*

The Skagway Ferry Terminal is owned and operated by both the State of Alaska and Municipality of Skagway. The State of Alaska leases the uplands from the Municipality of Skagway, which includes a terminal building with passenger facilities and a paved staging and parking areas. Two transfer bridges connect the uplands to the in-water infrastructures, one for walk-on passengers and one for vehicles. In-water infrastructure at the facility includes three mooring dolphins and a concrete mooring float.

Wind and wave action are also common at this facility, which commonly sees waves in the 4 to 5' range, resulting in high rates of wear and tear and an increased need for robust infrastructure. The site's 100-year storm significant wave height is just over 6 feet per recent studies performed for the nearby cruise dock.

The float and transfer span were constructed in 1980. More recently, the float sank in 2014 and was re-floated and emergency repairs were performed at that time. The float is now at the end of its useful life. The surface of the mooring float, as shown in Figure 18, was observed to be in poor condition with portholes, cracks, and other damage, with the float substructure also showing advanced corrosion, deterioration, and cracking. Despite these challenges, the primary structural elements of the float remain intact and allow safe operations though they do exhibit extensive corrosion, cracking, and chipping. Based on stakeholder coordination, the mooring float is anticipated to be replaced in approximately 2030, so any charging or electrical infrastructure that is installed prior to that date would have to be removed and re-installed at that time.



*Figure 18- Skagway Concrete Float & Apron in Background, Observed October 2025*

The existing terminal is a side-loading facility, which limits compatibility with certain AMHS vessel types and constrains operational flexibility. Consistent with newer AMHS terminal designs, future improvements at Skagway would benefit from incorporating hybrid loading capability that supports both side loading and stern loading. Providing a stern-loading option would better accommodate a wider range of vessels, reduce maneuvering requirements, and improve docking efficiency. Adding stern-loading capability at Skagway would therefore enhance operational performance and better align the terminal with modern AMHS design standards. It is our understanding that AMHS is considering this type of berth for the replacement facility.



Figure 19- Apron on the Skagway Float, Observed October 2025

### *Existing & Nearby Electrical Infrastructure & Observed Conditions*

The Skagway ferry terminal is not currently electrified, and any such installation would be new. The parking lot currently has 2400V power running to an existing transformer. At the site visit, the utility expressed a preference for any significant loads to be run off the 34.5kV H-structure across the street, and this would likely require a portion of new underground electrical and a new transformer service. Because there has been an interest in a quick, mid-day charge, we strongly feel the higher voltage is the preferred solution for any ferry charging infrastructure. Once the Metlakatla line is installed, the distance to the 34.5kV connection at the Skagway facility will be the longest of the evaluated locations. However, the distance is only slightly further than the Ketchikan connection and would represent only a minimal increase in infrastructure.

As with Haines, this electrical infrastructure would be entirely new and could easily be designed to the power requirements of the new vessel.

### *Opportunities & Constraints for Future Charging Infrastructure*

The overall configuration and design of the terminal present opportunity for charging infrastructure equipment installation.

#### **Adaptable Layout and Space for Equipment**

The Skagway Terminal has uplands space available for the installation of electrical and charging infrastructure and the transfer spans also have plenty of space for conduit

installation. Additionally, the layout of the facility's mooring float and dolphins support sufficient space and buoyancy capacity for the needed electrical and charging equipment.

Though the layout of the Skagway Terminal presents opportunities for relatively easy charging infrastructure design and installation, the condition of the terminal presents a key constraint.

### **Float Replacement Needed**

The major constraint at this facility is the condition of the existing mooring float which would require replacement prior to installation of a charging arm to support the charging an HE Ferry. However, it is important to note the configuration of the current facility would be supportive of vessel charging infrastructure installation, so in-kind replacement of the current float could be explored.

### **Frequent Wind and Wave Action**

Any charging design solution will need to be tailored to the environmental conditions at the Skagway Ferry Terminal which includes frequent wind and wave activity. Placement of any future vessel charging connections will need to account for the associated vessel movement to ensure reliable and safe operation during berthing and charging.

## Conclusions

Of all the AMHS terminals that were analyzed, no in-water infrastructure issues were present that were not solvable. While some geometrical challenges were observed, most could be addressed through the design process. The main in-water infrastructure challenge is present at the Skagway Terminal, which would require a full float replacement prior to the installation of charging infrastructure.

All uplands electrical equipment would need to be upgraded to support ferry charging. In each case, a new disconnect and meter will be required on shore, along with ground fault relays. Existing applications for larger ships often consist of an ungrounded system. It is possible to implement either a grounded or ungrounded system, at charging voltages ranging from 450V to 600V as determined by the vessel designer.

Where 34.5kV charging infrastructure is available, there is likely to be adequate capacity to fast charge a ferry. Where only the lesser 12.47kV and 2.4kV voltages are available, a BESS may be required for fast-charging support. Even if not required, a BESS may be pursued to support energy resilience.

## Next Steps

Based on these findings, the HE Ferry Blueprint Team will next be developing charging equipment layouts and ROM costs needed to support the vessel energy needs, as identified by Alaska DOT&PF's vessel design.

## Appendix A- Reference List

To support this analysis, a variety of documents were reviewed including:

- I. Alaska Low Emission/Electric Ferry Research Analysis
- II. Alaska Marine Highway System (AMHS) 2045 Long-Range Plan
- III. Alaska Statewide Long-Range Transportation Plan: Let’s Keep Moving 2036 Policy Plan
- IV. AP&T Hydroelectric Profile (including Goat Lake Hydroelectric Project)
- V. Metlakatla Indian Community: Annette Islands Reserve Priority Climate Action Plan
- VI. Proposed 2024-2028 Ketchikan Public Utilities Capital Improvement Program
- VII. Southeast Alaska Power Agency (SEAPA) Load Growth Study
- VIII. Pacific Northwest to Alaska Green Corridor Feasibility Study Scoping Proposal
- IX. Annette Island Power System Assessment

Additionally, record drawings from the Alaska Department of Transportation and Public Facilities were reviewed for each existing terminal. These drawings were from a variety of recent infrastructure projects, and a full list of the reviewed drawings is included below. In addition, current plans for the proposed South Tongass Terminal in Saxman were provided by SEC and were reviewed.

Year	Project /Drawing Name	Project Description
<b>Ketchikan</b>		
<b>1969</b>	KTN Ferry Terminal Grading, Drainage, Paving & Slope Protection	Widened existing uplands parking and staging area, paved top surface, installed guardrail and added armor rock to seaside slopes.
<b>1976</b>	KTN Ferry Terminal Reconstruction	Repaired timber dolphin, dock and catwalk elements; replaced timber lift towers with concrete capped/steel piling.
<b>1978</b>	KTN Ferry Terminal Facility	Replaced timber dolphins with concrete capped/steel piling, timber dock with concrete and steel piling.
<b>1980</b>	KTN Vessel Maintenance Facility	Beginning of ASD facility, including cells for South Pier of Berth II.
<b>1986</b>	KTN Vessel Maintenance Facility South Berth	Dredged basin, built all structural elements of the existing facility, installed cap and fenders on 2 corner sheet pile cells of existing wharf.
<b>1991</b>	KTN Ferry Terminal Building	New terminal building.
<b>1991</b>	KTN Staging Area Expansion	Dredged areas adjacent to current Berths II & III and filled uplands next to terminal building. Adds 28 parking spaces and a larger staging area. Also removes the berth for airport shuttle and M/V Chilkat.
<b>1994</b>	KTN Ferry Terminal Mooring Realignment	Removed existing concrete dock, all dolphins (but W5). Held dolphin W5 and installed new dolphins along a rotated fender face that is parallel to the north pierhead line to allow both port and side mooring. New bridge approach and dolphin catwalks.

<b>Year</b>	<b>Project /Drawing Name</b>	<b>Project Description</b>
<b>1994</b>	KTN Ferry Terminal Mooring	Built access gangway between the South mooring float and South Pier.
<b>2016</b>	KTN Ferry Terminal Improvements	Replaced wrap-around end dolphin W5 with two dolphins, W5 and W6 at Berth 1, modified the catwalk leading to that dolphin, built new dolphin S1 at Berth 3, installed new sewer and waterlines with heat trace at Berth 3 transfer bridge, built new covered walkway between Berth 3 and the terminal building.
<b>Metlakatla</b>		
<b>2013</b>	Annette Bay Ferry Terminal	Construction of new marine & uplands facilities at the end of Walden Point Road.
<b>2015</b>	Annette Bay FT Improvements	Installation of a 4-pile mooring dolphin to the east of the existing marine structures, boarding ladder mounted on steel bridge float, envelope improvements to the existing storage room.
<b>Skagway</b>		
<b>1963</b>	Skagway Ferry Terminal	Original construction of terminal facility consists of uplands fill, timber transfer & mooring/fendering structures.
<b>1980</b>	Skagway FT Facility	Removed original timber structures and replaced with steel transfer and mooring/fendering structures. Extended uplands fill for future staging and terminal building.
<b>1981</b>	Skagway FT Pedestrian Transfer Bridge	Constructed the steel pedestrian bridge.
<b>1993</b>	Skagway FT Slope Stabilization	Added riprap armory rock to the seaward slopes beneath the terminal building.
<b>1995</b>	Skagway FT Reconstruction	Repaired and corrosion proofed existing transfer and mooring structures that were damaged from a slope failure across the Inlet.
<b>1999</b>	Skagway FT Improvements	Installed new fender panels and hawse rails on dolphin S3.
<b>2014</b>	AMHS Skagway Dock Emergency Repairs	The work consists of salvaging the sunken concrete float off the ocean bottom, structural analysis of the float's condition, raising and placement of the vehicle & pedestrian bridges, salvaging/repairing the timber vehicle ramp, repairing the intermediate ramp hydraulic system, replacing utility (fuel/water) services to the dock face.
<b>Haines</b>		
<b>1962</b>	Southeast Alaska Ferry Terminal	Placement of fill, guardrail, septic tank, oil tank, lighting, and hypochlorinator.
<b>1992</b>	Haines Ferry Terminal Upland Improvements	Expand uplands parking & staging areas.
<b>2007</b>	Haines Mooring Improvements	Replaced a Duncan Type timber dolphin (E3) and a concrete timber pile cluster (E4) with new steel mooring/breasting dolphins. A new dolphin, W2, was also installed west of the transfer bridge. Additional work included replacing a timber catwalk between E3 and E4 with a steel catwalk, installing a new

Year	Project /Drawing Name	Project Description
		gangway between W2 and the sheet pile dock, removing an existing timber fender module on the dock, and shoring for an existing concrete retaining wall above partially fail sheet pile cell #4.
<b>2008</b>	Haines - Ferry Dock Hoist Upgrade	Replaced the existing relay-based control panel for the transfer bridge lift system with a PLC-based control panel.
<b>2015</b>	Haines FT Improvements	Removed the cellular sheet pile bulkhead, installed a retaining wall seaward of the terminal building, constructed three new mooring dolphins, four catwalks, two pedestrian walkways, new generator & storage buildings, reconfigured the uplands parking and staging areas, placed excavated fill from bulkhead along tidelands to construct new staging area west of the terminal building.