

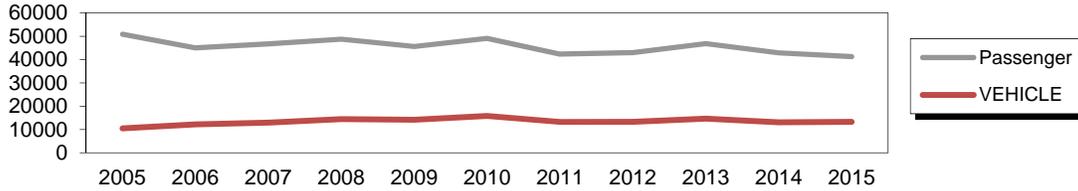
# Skagway Ferry Terminal

Mile 0 Klondike Highway

**Owner:** State of Alaska

**Terminal Manager:** Lara Labesky – 907-983-2944

**Terminal Description:** The Skagway facility consists of a floating side berth, terminal building, staging and parking areas, three mooring dolphins, concrete mooring float, and separate vehicle and passenger transfer bridges. The Skagway facility is the northernmost terminal on the Southeast Alaska Marine Highway Route. The past 10 years of total passenger and vehicle traffic at Skagway is shown below.



Above water and underwater inspections were completed on August 26, 2015 & August 2, 2011 respectively. The most recent fracture critical inspection occurred on September 23, 2014.

Vessels	
Name	Berthing, Alignment
Mal/ Columbia / FVF	Starboard
Kennicott	Port

Tidal Data (MLLW 0.0 feet)	
EHW	25.7
MHHW	16.7
MHW	15.7
ELW	-6

Terminal Building	
Year Built:	1982
Square Footage:	5344 s.f.
Heating System:	Boiler
Fuel Storage:	UST
Fire Protection:	Alarm
Condition:	Good

Generator & Building	
Building / Generator:	2002
Square Footage:	224 s.f.
Heating System:	Electric
Fuel Storage:	-
Fire Protection:	Halon
Condition:	Good

Uplands	
Short-Term Parking:	40 cars; 1 HCP
Long-Term Parking:	
Staging Area:	2400 lineal feet, 8 lanes
Paint Striping:	Yes
Driving Surface:	Asphalt

Vehicle Transfer Bridge - #0805	
Type:	17' x 140' Orthotropic deck, twin box girder
Year Built:	1980?
Shoreward support:	Concrete abutment
Seaward support:	Concrete Support Float
Coating:	Wasser Paint
Lighting:	Parking-lot light poles and Float light poles
Condition:	Fair
Load Posting Sign:	N/A
Original Design Load:	Original Design Drawings not on file

Utilities		
	at terminal	at ramp
Electrical:	Yes, city & backup power	
Water:	Yes	Yes
Sewer:	Yes (City)	No
Telephone:	Yes	Yes
Cable TV:	No	No
Fuel:	Yes	Yes
Wireless Bridge:	Yes	-

<b>Bridge Support Float</b>	
Type:	120' x 160' Concrete Mooring Float
Year Built:	1980
Ballasted:	No, but has flooding compartments
Ramp lift:	Hydraulic/Block & Cable
Apron lift:	Hydraulic/Block & Cable
Anodes:	-
Condition:	Fair

<b>Pedestrian Bridge - #1626</b>	
Type:	8' x 138' Through Truss
Year Built:	1995
Shoreward support:	Concrete abutment
Seaward support:	Concrete Support Float
Coating:	Wasser Paint
Lighting:	Roof mounted fixtures
Condition:	Fair

<b>Dolphins</b>							
Dolphins	Dolphin Piles	Fender Support	Fender Face	Anodes	Built	Cond.	Notes
S3	6B, 1V	Hanging	UHMW	No	74-'98	Fair	Red navlight
S2	2B, 1V	4V	Ekki Timber	No	1980	Fair	
S1	2B, 2V	4V	Ekki Timber	No	1996	Fair	

**LEGEND**

V = Vertical Steel Pipe Piling

B = Battered Steel Pipe Piling

<b>Catwalks / Gangways</b>								
#	From Struct.	To Struct.	Length / Style / Main Members	Built	Safety Chains?	Cond.	Lighting	Notes
C1	S3	S2	60' / Catwalk / 10"x10" Tube Girders	1982	No	Good	Jelly Jars	
C2	S2	S1	108' / Catwalk / 10"x10" Tube Girders	1982	No	Good	Jelly Jars	
G1	S1	Dock	50' / Gangway / Thru Truss	1965	No			

<b>Terminal Projects</b>			
Year	Project #	Project Name	Description
1963	S-0999(4)	Skagway Ferry Terminal	Original construction of terminal facility, consists of uplands fill and timber transfer & mooring/fendering structures.
1980	F-097-2(2)	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.
1981	R10263	Skagway FT Pedestrian Transfer Bridge	Constructed the steel pedestrian bridge.
1982	N/A	Skagway Ferry Terminal Building	Constructed the current ferry terminal building.
1992	75092	Barge Tendon Rehabilitation	Tendon repair/overlay and tendon anchor head repair.
1993	75277 / F-097-1 (2)	Skagway FT Slope Stabilization	Added riprap armory rock to the seaward slopes beneath the terminal building.
1995	75468 / ER-0069 (1)	Skagway FT Reconstruction	Repaired and corrosion proofed existing transfer and mooring structures that were damaged from a slope failure across the Inlet.
1999	67543 / NH-097-1 (4)	Skagway FT Improvements	Installed new fender panels and hawse rails on dolphin S3.

<b>Terminal Projects (continued)</b>			
<b>Year</b>	<b>Project #</b>	<b>Project Name</b>	<b>Description</b>
2007	N/A	N/A	Maintenance hired a Contractor to construct shoreward bearing improvements to the Pedestrian Bridge.
2008	73003(5)	Skagway FT Building Interior Renovations & Door Replacement	The work consists of replacement of all exterior doors, frames, and hardware; construction of new ticket counters and staff work stations; and new finishes and toilet partitions at existing restrooms; and replaces all carpet in the facility.
2014	70196	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.

### **Observations**

1. The concrete float supports a hydraulically adjusted transfer ramp and apron structure used for side loading vehicles and passengers onto the ferry at the car deck level. The concrete float supports both a vehicle transfer bridge and a pedestrian bridge. The City owns the vehicle transfer bridge and the State owns the pedestrian bridge. The float and transfer bridge are a joint use facility between the City and the State. The City utilizes the southeast side of the float for tourism vessel moorage under a mutual-use agreement.
  
2. The pedestrian transfer bridge is in fair condition, except for the shoreward bearing. The bridge sits on a steel bent frame that transfers bridge loads to the abutment through an eccentric connection on the bent cap. The seaward bearing, a skid with Orkot on the bottom, transfers high friction loads to the shoreward bearing. The bridge has fallen off its shoreward bearings several times over the years.  

The bridge is in fair condition but needs to be repainted. The shoreward end of the bridge is supported on a swivel beam. The collar around the retaining pin is cracked in several locations and more than half the weld between the collar and beam has failed. Access holes were cut in both girders, outside webs, 2 ea girder, to provide access for interior corrosion proofing on the 1995 repair project. The holes were sealed with a matched plate & weld. Therefore, there is no access to the girder interiors. The transition plate on the west side of the bridge at the abutment end is bent concave upward.

The apron is supported from the seaward end of the bridge by a twin pin-hanger connection. This connection was retrofitted in 1991 by adding a restraint cable. The apron and transition pins have required frequent repairs, and the rubber fender is currently crushed and in need of replacement.

Hillman brand rollers support both ends of the transfer bridge; these were refurbished during the 1994 slide damage repairs. On the float end, the rollers rub against the guide channels causing both the channels and the side plates to wear. The rollers at the abutment end are enveloped in sand and grit, which is blown into the abutment area by street sanding vehicles. The rollers and abutment should be cleaned thoroughly.
  
3. Roughly ten years after the float was built, in 1991, a repair was made to the deck surface that involved removing contaminated surface concrete, down to the prestressing tendons in some cases, sealing the deck with Silane sealer, and installing a 1-1/2" concrete overlay along the south (seaward) end of the barge. Almost 17 years later the overlay repair has -now almost fully delaminated from the superstructure below, and there is spider-web cracking and spalling at the construction joint next to the original concrete deck.  

Between 2009 & 2011, new damage consisted of minor spalling & widespread delamination in the concrete deck above post-tensioning strands in the vehicle lane between the timber cribbing & the vehicle transfer bridge (i.e. the main vehicular traffic area). There is a 42" long exposed section of post tensioning strand in the wheel path within 5-feet of the timber cribbing & intermediate ramp.

### Observations (continued)

The float is held in position by a chain anchor system. The float moves due to wind, wave, and mooring loads, especially at low tide levels. The float may have rotated clockwise, in plan view, and the bridges and catwalks no longer track in their guides. The 2011 Underwater Inspection noted that the majority of anchor chains showed significant section loss in an area between 5-20 feet below the bottom of the float. The divers could not locate chain #8, and figure it must have parted & fallen to the seafloor.

The shore lines are galvanized wire rope fastened to bollards at the float corners and bollards or padeyes on shore. Galvanizing of the lower portion of rope is exhausted. The FVF damaged the edge of the seaward fender panel mounted on the dock at low tide. The dock fenders stick out beyond the dolphin fenderline during low tidal stages. The terminal manager reports that they pump all cells dry each winter.

4. A wooden crib ramp structure provides access from the float deck to the hydraulically adjusted ramp. The apron must be actively raised or lowered during transfer of low-clearance vehicles to prevent damage to vehicle undercarriages. This structure is in fair condition, but wear is evident at the toe of the incline and several 4x12 timbers need to be replaced.  
The bottom flange and a portion of the lower web of the stringers have been removed near the seaward end of the apron. The cut is uneven, indicating this was performed in the field. This is not noted on the as-builts of the apron replacement project in 1988.
5. Snow removal operators damaged bull rails on south and west sides of the float. Two bull rails were pushed over the side on the south side and a single bull rail was damaged on the west side. Breach should be blocked with jersey barriers until repairs are made.
6. An electrical distribution panel and embedded copper conduit are severely corroded. Conduit buried in the concrete deck has corroded, causing spalling of concrete. Conductors are exposed in one location.
7. The gangway from the float to the dolphins is guided by a single angle. The gangway periodically migrates to the left and must be lifted and repositioned with a forklift.
8. The fender system northeast of the transfer ramp on the float has sustained damage from the KENNICOTT sponson wing. The sponson of the FAIRWEATHER can override the fenders on the float. Spruce timber units on the north fender panel have disconnected from the lower wale. Sitka spruce timbers on the north panel were replaced with Ekki in 1999.
9. Seawater to structure potentials of S1 and S2 were -0.63, indicating steel is freely corroding. Install anodes and bonding straps on all three dolphins. The hawser rail of S2 collides with toe plate and top cord of catwalk C2.
10. The mooring basin depth is limited by the elevation of the top of the barge anchor pin piling located at approximately -25.0 MLLW. Operations reported that the basin is more like a -19.0 MLLW and they are scheduling vessels to avoid the terminal at lower tides.
11. The concrete float sustained extensive damage, as the result of a broken waterline connection within the float, and sank on April 24<sup>th</sup>, 2014. Skagway was without service until construction crews were mobilized in and able to successfully pump out & raise the float, bridge and repair the timber ramp and hydraulic system. Service resumed on May 11<sup>th</sup>.

<b>Inspection Summary</b>		
Structure	Priority	Recommendations
<i>Category I - Safety Repairs</i>		
Concrete Float	1	Monitor ongoing deterioration of concrete top slab. Provide temporary spot repairs if needed until permanent repairs can be identified. Replace sub-surface mounted electrical utilities between terminal building and barge mounted distribution panel. Replace damaged/missing bullrails. Install guide for roller bearing of the dolphin access gangway on the barge. Monitor the wire rope shore line for broken strands. Inspect anchor system to determine needed adjustment to chains. Provide chafing gear for two lines on left side of bridge. Wire rope bears on armor rock of the beach.
Vehicular Transfer Bridge	2	The shoreward swivel beam should be replaced using a thicker collar and the top of the retaining pin should be tied into the backwall. Install Orkot skids to provide bearing surface and lift the seaward bottom flange above the float deck. Replace transition plates or bend leading edge downward.

<b>Inspection Summary (continued)</b>		
Structure	Priority	Recommendations
<i>Category I - Safety Repairs</i>		
Pedestrian Transfer Bridge	3	Fasten down/replace broken anchor bolt connections between bent frame and abutment and improve protective coating on all steel framework.
Ramp/Apron	4	Load-rate the seaward end of the apron, where the stringers have been cut.
Dolphins	5	Cut hawser rail of S2 back to prevent damage to catwalk top cord when fender panel is compressed. Failure of top cord could cause collapse of catwalk.
Dock Fender System	6	Program to replace the fender system northeast of the ramp on the float to adequately provide fendering for the Kennicott sponson wing and geometrically capable of fendering the FVF.
Mooring Basin	7	Program a project to dredge the basin near shore to -30' MLLW.
<i>Category II - Rehabilitation Work</i>		
Intermediate Ra	8	Replace several 4x12 timbers from the cribbing near the toe of the ramp.
Dolphins	9	Seawater to structure potentials of S1 and S2 were -0.63, indicating steel is freely corroding. Install anodes and bonding straps on all three dolphins.
Terminal Building & Uplands	10	The stain coating of the terminal building requires touch up at trim and building should be repainted within 2 years. All six exterior steel doors require replacement. Bottom panels are severely corroded. Install over-fill alarms on above ground fuel tanks to comply with ADEC regulations.
Transfer Bridge	11	Place riprap at the toe of the concrete bridge abutment backwall.
Ramp	12	The ramp's hydraulic system should be upgraded to a modern system. At the very least, program a project to replace the controls, relocate the shed for better observation of the operator.
<i>Category III - Upgrades Needed</i>		
Concrete Float	13	Investigate and determine permanent repairs for concrete top slab and potentially the future replacement of the float if deemed required. Replace all chains and anchors. Design work for this work is presently ongoing under Project #69624.
Transfer Bridge	14	Repaint entire bridge structure. Consider replacement of the existing fracture-critical orthotropic solid-deck bridge with a new multi-girder open-deck bridge.

**Project #69624 – Skagway Ferry Terminal Modifications:**

Berger-ABAM has completed preliminary design, alternatives and project cost estimates have been developed. The project will consist of major restoration & refurbishment of the existing concrete float and anchor system and other miscellaneous items. Construction funding established for FY16.