



*VICINITY MAP*



*T E N A K E E   I N L E T*



*GENERAL LAYOUT  
TENAKEE*

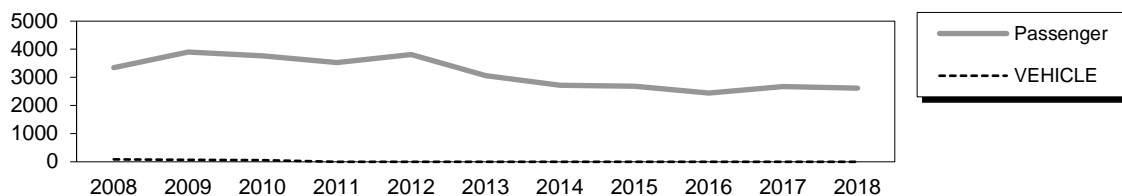
# Tenakee Ferry Terminal

**Owner:** State of Alaska

**Contact:** Simon Bradley, AMHS Terminal Ops Manager (Ketchikan) – 907-228-7290

**Terminal Description:** The Tenakee Springs city dock was constructed in 1978 to provide passenger and light freight service to Tenakee Springs. The dock facility is a 40'x 52' main dock section with a 12'x 240' approach span to shore and consists of concrete panels supported by steel pipe piles. Three, steel pile mooring dolphins with timber fenders are used by AMHS for port side mooring. By City ordinance, *Transfer of vehicles at Tenakee Springs is limited to motorcycles, all terrain vehicles and other small motorized vehicles under 10'-0" in length and under the maximum weight limit of 1000 pounds.* The City Dock also supports a fuel and freight operations, a small city storage building and a jib crane that is located on the southeast corner of the dock. The AMHS ferry terminal is accessed from the City Dock by a pile supported steel platform structure and steel gangway. This platform structure was widened by ADOT in 2011.

The passenger transfer facility was built in 1984 to service LeConte class vessels. An open steel grate approach extends to the east, perpendicular to the City Dock. At the end of the approach is a gangway down to a floating platform supported by a custom steel pontoon. A counter weighted, pull-down apron connected to the platform provides access to the ferry side deck. An 8'x 20' waiting shelter was constructed at the juncture of the City Dock and the ferry terminal approach. The past 10 years of total passenger and vehicle traffic at Tenakee is shown below.



The most recent above water survey was completed on June 15, 2017. The most recent fracture critical inspection occurred on August 20, 2018. The most recent underwater inspection occurred on August 8,

| Vessels |                     |
|---------|---------------------|
| Name    | Berthing, Alignment |
| LeConte | Port                |

| Tidal Data (MLLW 0.0 feet) |      |
|----------------------------|------|
| EHW                        | 21.6 |
| MHHW                       | 14.7 |
| MHW                        | 13.7 |
| ELW                        | -5.0 |

| Terminal Building                                |
|--|
| This facility does not have a terminal building. |

| Generator & Building                             |
|--|
| This facility does not have a generator on-site. |

| Utilities @ Dock |     |
|------------------|-----|
| Electrical:      | Yes |
| Fuel:            | Yes |

| Uplands             |     |
|---------------------|-----|
| Short-Term Parking: | N/A |
| Long-Term Parking:  | N/A |
| Staging Area:       | N/A |

| City Dock & Approach - #1451 |  |
|------------------------------|--|
| Type:                        | 40'x 52' concrete panel dock with 12' x 240' approach span                       |
| Year Built:                  | 1985   |
| Support:                     | Vertical & Battered Steel Piles  |
| Steel Coating:               | Galvanizing  |
| Fender System:               | Timber Pin Piles bolted to steel wale with rubber (donut) energy absorbing units |
| Anodes:                      | No   |
| Lighting:                    | Two lights mounted on fuel shed.   |
| Condition:                   | Poor   |
| Notes:                       |  |
| Load Posting Sign:           | Single Axle 4 Tons   |

2016.

| <b>Platform Pontoon</b> |                      |
|-------------------------|----------------------|
| Type:                   | 715 s.f. steel barge |
| Year Built:             | 1984                 |
| Ballasted:              | Yes                  |
| Ramp lift:              | counterweight        |
| Anodes:                 | Yes                  |
| Condition:              | Fair                 |

| <b>Dolphins</b> |                      |                       |                    |               |              |              |              |
|-----------------|----------------------|-----------------------|--------------------|---------------|--------------|--------------|--------------|
| <b>Dolphins</b> | <b>Dolphin Piles</b> | <b>Fender Support</b> | <b>Fender Face</b> | <b>Anodes</b> | <b>Built</b> | <b>Cond.</b> | <b>Notes</b> |
| W1              | 2B, 1V               | 4H                    | Sitka Spruce       | No            | 1977         | Fair         |              |
| E1              | 2B, 1V               | 4H                    | Sitka Spruce       | No            | 1977         | Fair         |              |
| E2              | 2B, 1V               | 4H                    | Sitka Spruce       | No            | 1977         | Fair         |              |
| EG              | 4V                   | -                     | -                  | No            | 1984         | Fair         |              |
| ER              | 7V                   | -                     | -                  | No            | 1984         | Fair         |              |

#### LEGEND

V = Vertical steel pipe piling      B = Battered steel pipe piling      H = Vertical steel h-piling  
ER = East gangway support float restraint piles      EG = East gangway support piles

| <b>Catwalks / Gangways</b> |                    |                  |                                      |              |                       |              |                 |              |
|----------------------------|--------------------|------------------|--------------------------------------|--------------|-----------------------|--------------|-----------------|--------------|
| <b>#</b>                   | <b>From Struc.</b> | <b>To Struc.</b> | <b>Length / Style / Main Members</b> | <b>Built</b> | <b>Safety Chains?</b> | <b>Cond.</b> | <b>Lighting</b> | <b>Notes</b> |
| C1                         | Dock               | EG               | 50' / Catwalk / W 14x30 Stringers    | 1984         | No                    | Good         | None            |              |
| G1                         | EG                 | Float            | 65' / Gangway / MC 6x12 Stringers    | 1984         | No                    | Good         | None            |              |
| G2                         | Float              | -                | 15' / Gangway / Pony Truss           | 1984         | No                    | Good         | None            |              |

| <b>Terminal Projects</b> |                    |   |  |
|--------------------------|--------------------|---|--|
| <b>Year</b>              | <b>Project #</b>   | <b>Project Name</b>                                 | <b>Description</b>   |
| 1977                     | 6-77126            | Tenakee Dock  | Constructed approach and main dock, fender system and mooring structures.  |
| 1984                     | K-83207            | Tenakee Ferry Passenger Facility                    | Constructed steel catwalk, gangways, and barge with steel platform to provide access between vessel and fixed dock for transferring passengers.  |
| 1994                     | N/A                | Tenakee Dock Structural Reinforcement (City Funded) | Installed new steel beams between the pile caps along both lines of exterior support piles of the approach and dock. However, these beams are not effective in strengthening vertical load capacity of dock. |
| 2011                     | 69444 / DC01321-00 | Tenakee Springs FT Improvements                     | New 6'x52' steel approach expansion at upper pedestrian access platform, replaced the gangway support wheel, and replaced all float pile guides with removeable style.                                       |

## Observations

1. The platform gangway support float is an L-shaped custom steel float installed in 1985. The paint system is epoxy coating and the float is cathodically protected with pendant anodes. The pontoon supports a steel galvanized platform welded to the top of the pontoon. The exposed coatings have failed and all surfaces exhibit large blisters and delamination. The steel is bare over much of the exposed steel surfaces. There is significant surface corrosion at almost all of the platform base plates, anode cable studs, and pile collars. The steel float needs to be inspected, re-coated or ideally replaced. Corrosion measurements indicate that anodes are not adequate. The pile guide brackets on the float have no galvanized coating remaining and are freely corroding. The 2011 project replaced all pile guides with new UHMW-faced units. Debris and materials are often deposited or stored on the float by non-AMHS users of the facility.
2. The pull-down ramp is decked with fiberglass grating secured with stainless steel fasteners. Several of the fasteners are damaged and they need to be replaced. The handrail has broken, on both sides, at the seaward end where the 2" pipe necks down to a 1" section.
3. The three offshore mooring structures are in very poor condition. These structures are beyond cost effective rehabilitation and should be completely replaced. The lower bolted connections on the Steel H fender piles have many corroded and missing bolts. As such, the fenders are structurally loose and have excessive movement. Some of these bolts were replaced by the contractor as part of the 2011 project. Anodes were installed in 1993 and need to be replaced. AMHS Maintenance has reported that anode consumption is higher in Tenakee than at other AMHS facilities. The steel H-piles for the fender system have 50% coating remaining within 5-feet of the low-water mark, with up to 1/8-in. pitting. The eccentrically bolted connection attaching the fender system to the piling is a high-stress region, and several bolts are missing or loose-fitting, due to poor installation. Twenty-percent (20%) of the timber fender boards have 100% section loss within the bottom 8-feet, due to rot in the saltwater environment. This affects the LeConte class vessels when mooring at low-tide.

The fender timbers within the tidal zone are heavily deteriorated with >40% section loss on all dolphins. Dolphin E1 has the worst deteriorated fender timbers with a section loss of ~60%.

4. Several of the precast concrete ("Dy-Core" style) panels along the dock and approach have filled with water, subsequently frozen, and then cracked. The outside edges of the panels are in poor condition with substantial spalling. The east edge cell of the concrete dock panel nearest to shore has largely broken off beneath the timber bullrail leaving the bullrail hanging on the shoreward end.

The top surface of the deck has numerous surface spalls and wide areas of delamination. There are longitudinal cracks beneath the bullrails, several holes in the underside of the panels, and moderate efflorescence between the panel joints. There is a sizeable 2"x 5" hole in the top surface of a concrete dock panel near the fuel/maintenance shop. A separate, but larger, hole is located at about the mid-point of the dock, on the underside of the panel. The size is estimated to be 4"x 24".

The 2014 Fracture Critical inspection found small spalls on the underside of the deck panels with widespread delamination over more than 25% of the area of the dock. There are exposed and corroding prestressing strands with up to 30% section loss at the edges of the steel bent caps. Overall, the deck is rated as a 3 out of 10, correlating to a 'serious' FHWA condition rating; the bent caps are rated a 6, or 'satisfactory'.

Steel backing plates beneath the crane on the bottom side of the dock do not bear on the pile cap. A timber fender pile on the face of the dock is broken 7-feet above the channel bottom.

5. The most shoreward bent has an odd pile/cap connection between the bent cap and support pile. Two W-sections are welded flange to flange to extend the bearing surface of the cap. The connection induces bending in the piles.

There is a broken electrical conduit, with exposed wiring, on the RT side of approach trestle span #1. A J-box has pulled away from the RT edge of span #5.

6. In 1994, the municipality awarded a contract to reinforce the approach structure. The project included installation of new steel beams underneath the precast concrete panels. These beams were welded to pile caps between bents on both LT & RT edges. Unfortunately, no leveling grout was placed between the top flanges and the bottom of the dock panels. Therefore the beams carry no vertical load.
7. The City and AMHS installed anodes to the dock and pontoon in 1992, but most are exhausted. The steel bents are bonded with SS cables that run length of dock. The 2006 Underwater Inspection found that all steel support piles have complete coating loss within the high-water splash zone.



### Observations (continued)

8. The timber support structure (beneath the City's storage building on the dock) was not closely inspected. A cursory inspection found that a 12"x12" pier cap exhibited open decay holes along the grain of the wood in the bottom face at the highest moment region, mid-span. Two of the support piles are missing cross-bracing.
9. The City dock is also used for fuel barge and freight deliveries via Alaska Marine Lines (AML) and other commercial carriers. The AML barge is extremely large and berths against the dock and ferry terminal mooring dolphins. The existing dock fender piles and mooring dolphins are largely inadequate for moorage of this type of vessel. Freight is transferred mostly by hand from inside containers that are lifted by AML from the barge to the dock surface. Freight is temporarily stored on the dock and then the City utilizes a small forklift to move items to shore. The dock was load rated in 2014 and is posted for a 4-ton max. axle weight.
10. The 2011 project (funded by the Denali Commission) installed a 6' x 52' addition to the existing steel approach, allowing increased room for ATV turning movements at the top of the gangway. The transition apron at the base of the access gangway still needs repairs.
11. Cathodic potential (CP) readings for the dock support piles average -0.59V. The cutoff for adequate protection is -0.8V, so the steel piles are freely corroding. Depth to mudline elevations, taken with leadline readings at locations along the fender line in 2015, range from -18' to -20' MLLW.

| Inspection Summary                       |          |   |
|--|----------|---|
| Structure                                | Priority | Recommendations   |
| <i>Category I - Safety Repairs</i>       |          |   |
| Dock & Approach span                     | 1        | A load restriction sign has been posted at both ends of the dock. Failure of the City dock will result in closure of AMHS ferry service since access to the existing ferry terminal is on the City Dock. A deck panel refurbishment design was completed by Denali Commission/USACE, but there is no construction funding. The State's project (described below) will replace the aging dock with a new facility. |
| Storage Building                         | 2        | Inspect/replace the timber center support beam beneath the storage building if required.  |
| <i>Category II - Rehabilitation Work</i> |          |   |
| Gangway Transition Apron                 | 3        | Remove and replace the small pipe skid at the end of the transition apron. Bolt 1/4" thick UHMW skids to the grating on the platform.   |
| Anodes                                   | 4        | Program a project to install/replace anodes on all submerged steel structures.  |
| Platform Pontoon                         | 5        | Re-coat the platform pontoon and replace the gangway roller skids.  |
| Dolphins                                 | 6        | Replace the timber fender boards and mounting hardware on the three mooring structures. The new State project will replace the existing mooring structures.   |
| Pull-down ramp                           | 7        | Replace damaged grating fasteners, and weld repair the pipe handrails.  |
| Timber Bullrails                         | 8        | Timber bullrails should be re-mounted, possibly to a steel bracket welded to the stringers below the concrete deck.   |
| Gangway                                  | 9        | Replace the pins in the hanger connections for the gangway.   |
| <i>Category III - Upgrades Needed</i>    |          |   |
| Marine                                   | 10       | Replace the aging dock with a new facility (see project description below).   |

#### Project #68145 – Tenakee Ferry Terminal Modifications:

This project will construct improvements at the existing ferry terminal to provide improved vessel mooring facilities, pedestrian and vehicle access, public safety and security. Work includes the installation of new and/or renovation of existing shoreside facilities and marine structures to accommodate cargo and baggage handling, vessel mooring and passenger and vehicle access gangways. Preliminary design is underway with advertisement planned in Fall 2018. Construction funding established for FY18.