

***Safe, Secure, Efficient and Environmentally Responsible Maritime Operations***

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December 10, 2008

Mr. John Stone  
Port Director  
City of Juneau  
155 S. Seward St.  
Juneau, AK 99801

Dear Mr. Stone,

The Marine Exchange of Alaska submits the following “Navigation Study” conducted of the various dock and pier alternatives under consideration for expanding the moorage facilities available for cruise ships calling on the Port of Juneau. This report refers to docks and piers with “docks” referring to structures constructed along the shore, i.e. Steamship Dock, AJ Dock, and Franklin Dock and pier referring to moorage that extends out from the shore, i.e. perpendicular from the shore.

This report sought input from the various governmental and maritime stakeholders to identify what, if any, positive and negative navigational impacts the various dock and pier options would have on maritime traffic in the Port of Juneau and whether impacts that are identified can be accommodated safely.

With respect to navigational impacts, we explored the navigational issues from the following two perspectives;

1. Macro Impacts: What, if any negative navigational impacts the various moorage options would present to other vessels and float planes operating in the Port area.
2. Micro Impacts: What challenges the various mooring options would present to the master and pilots docking and undocking cruise ships at specific piers and docks.

The information compiled in this study provides the Juneau community navigational safety issues that should be considered along with other factors when deciding which of the various moorage options should be permitted to proceed. While navigational impacts are one of several factors to consider in making these decisions, they can also in some cases provide clear “go” or “no go” options.

We evaluated the potential navigational impacts that the following five cruise ship moorage options under consideration can have on maritime operations:

1. Willoughby Street Dock – Gold Creek : Dock parallel to shore
2. Willoughby Street Dock – Gold Creek : Pier perpendicular to shore
3. Merchant’s Wharf T-Dock
4. Parallel Floating Dock off the Port’s Steamship Dock
5. Extension of the Port’s existing Steamship Dock

The maritime stakeholders that could potentially be impacted by the construction of these docks and piers comprised of ship pilots, cruise ship operators, float plane operators, tugs, facility operators, the Coast Guard and the Army Corps of Engineers, all of whom were briefed on the study and offered an opportunity to comment. A contact list is attached as enclosure (1).

The process for completing this Navigation Study comprised of;

1. Reviewing the basic engineering plans of the various dock and pier alternatives
2. Reviewing and evaluating weather and current data impacting vessels
3. Assessment of the present and anticipated size of vessels calling on the Port of Juneau today and in the future.
4. Evaluating present operation of cruise ships, passenger vessels and tug boats through review of photos and historical vessel transit data obtained from the Marine Exchange of Alaska’s AIS (Automatic Identification System) vessel tracking network.
5. Development of a Survey Form disseminated to port users to guide respondents in providing the information sought to best identify impacts. (See enclosure 2)
6. Conduct of interviews with various port users to obtain their input on the potential navigation impacts.
7. Review, assessment, compilation and presentation of the survey responses.

The information obtained in the conduct of this report are attached and in some cases provided in graphical format.

**Findings and Recommendations:** We found a considerable degree of subjectivity and a wide range of opinions expressed by vessel operators (pilots and cruise ship owners) as to the navigational impacts the options being considered may have. Also, opinions varied as to the degree the wind and current factors in on the moorage options as well as the spatial area (sea room) needed to safely moor a vessel. The practical experience and opinions of vessel operators was evaluated and compared to the data provided by the replay of AIS data on prior vessel

transits. In some cases, as recommended later in this report, computerized vessel simulator modeling should be done for some moorage options to further identify the challenges and the preferred maneuvers to ensure the safe mooring of vessels under various conditions.

1. General Factors:

- a. Unassisted Mooring: The newer advanced cruise ships operating in Alaska waters are designed to moor without the assistance of tugs in most conditions through the use of twin propellers for main propulsion (in some cases azipods) and bow and stern thrusters. When these systems are operational and weather conditions are favorable (in most cases 25 knots or less) the vessels do not require tug assistance. Accordingly the tugs that are available in Juneau are limited in size and capability. Additionally, the use of tugs increases port call costs, which the cruise operators want to avoid.
- b. Anchorage Area: The anchoring of large cruise ships in the Port of Juneau interferes with the arrival and departure of cruise ships, transits of other vessels (float planes, tugs, fishing boats & small passenger vessels) presenting a hazard to navigation. In addition, anchoring a cruise ship results in more congestion in the Harbor by presenting an approximately 1,000 foot obstruction in the Port that is further complicated by the operation of shore launches sailing to and from shore to transport passengers and crew. The anchoring of cruise ships would be dramatically reduced if not eliminated by increasing the mooring capacity of the Port. The Coast Guard noted the benefit of having an open anchorage area to provide a “safety net” that allows a vessel to anchor a safe distance away from the community should a fire, quarantine or other situation develop. See graphics and photos in enclosure (3).
- c. Vessel Sizes: The maximum anticipated size of the cruise ships calling on the Port is projected to be substantially the same size as the vessels presently calling on the Port, some of which are Post Panamax (having over 106’ beam and thus too large to transit the Panama Canal). The newer 68,000 displacement ton Norwegian Cruise Line Voyager class of vessels that are operating on the West Coast could potentially sail to Alaska ports in the future, in which case these would be the largest vessels likely to call on Juneau in the near future. These vessels have a Length of 1,021 feet, Beam of 126 feet, Draft of 29 feet and have a capacity of 3,114 passengers and 1,185 crew. The proposed moorage facilities are designed to accommodate vessels of this size. In comparison, the Grand Princess class of cruise ships that presently call on Juneau have a length of 951 feet, beam of 118 feet and draft of 26 feet. See photos in enclosure (4).
- d. Weather and Tidal Current: The Port of Juneau is considered a relatively easy Port to moor due to the open waterway and the mild weather encountered during summer months. Review of weather statistics reveals that during the 2008 tourist season 14 days (9%) had high winds recorded over 20 kts, and 21 days with wind gusts over 25 kts. The winds generally are from the southeast or northwest in alignment with the channel. Tidal Current was also considered in this study and according to NOAA current tables, is less than 1 knot in the Port area and thus should not have a significant impact on docking and undocking at the various dock and pier alternatives under consideration. Several pilots have indicated current is sometimes a

complicating factor in mooring as current moves along the shoreline and is affected by pier and dock structures, thus is variable. See wind and current data provided in enclosure (5).

- e. Maritime Operations in the Port: In addition to cruise ships docking, undocking and anchoring in the Port, maritime activity also includes the operation of float planes, recreational vessels, fishing vessels, tugs with and without tows, garbage vessels, small passenger vessels and Coast Guard and NOAA vessels. Representatives from all of these operators were contacted for information related to this study. With exception of the float planes which are addressed in several sections of this report, the remaining vessels are generally moving at slower speeds, can easily maneuver around cruise ships that are arriving, departing, anchoring or moored. The DIPAC cost recovery fishery in the Port has historically worked around other maritime operations without incident. The reduced need to anchor cruise ships in the Port when additional docks are available will provide more open water for the float planes and vessels to operate.

## 2. Vessel Dock and Pier Options and Impacts:

- a. Willoughby Street Dock-Gold Creek: There are two to three options to this mooring concept that surfaced in the course of interviewing stakeholders. One alternative (Concept 1) essentially aligns the dock parallel to the shore which places the beam of the vessel nearly perpendicular to the prevailing southerly winds complicated mooring maneuvers. Some pilots opined that skewing the dock angle off the shore by 15-45 degrees would reduce the wind's forces on the vessel reducing the challenges of mooring in stiff breezes. See enclosure (6). This alternative would not present any significant navigational challenges to other vessels operating in the area. The Coast Guard raised some concerns on how the dock could potentially impact the Coast Guard, NOAA and Navy vessels that moor at the Coast Guard dock immediately east of the Willoughby Street Dock option, however, it appears there is sufficient distance between the two.

The other significant alternative to this alternative (Concept 1a) would be a pier that extends generally perpendicular from the shore which would alleviate the concerns caused by wind forces on vessels presented by Concept 1. See enclosure (7). Concept 1a projects into the Harbor and therefore presents more navigational challenges for anchored vessels as well as the arrival and departures of larger vessels at the adjacent Coast Guard dock, however this should not be prohibitive.

This study noted consensus that Concept 1 of this moorage option would not present any significant navigational challenges to other vessels operating in the area. The Coast Guard raised some concerns on how the dock could potentially impact the Coast Guard, NOAA and Navy vessels that moor at the Coast Guard dock immediately east of the Willoughby Street Dock option, however, it appears there is sufficient distance between the two. The other option considered (Concept 1a) projects into the Harbor and therefore presents more navigational challenges for anchored vessels as well as the arrival and departures of larger vessels at the adjacent Coast Guard dock.

There was a wide divergence in opinions as to whether or not the option that is parallel to the shore (Concept 1) would make it too difficult to dock and undock vessels during higher winds which in many cases would be almost directly on the vessels' beam. High winds could complicate maneuvering and possibly require tug assistance, thereby adding port call costs. It should be noted the generally northwest-southeast lay of the dock would be similar to the AJ Dock's exposure to winds. Past history has shown vessels have been able to moor unassisted at the AJ Dock during stiffer winds. Also, some raised concerns that the water currents in the vicinity of the Juneau Douglas Bridge may interfere with docking the vessels at a new berth (Concept 1 or 1a). There presently is no real time tidal current information for that area. The presence of additional docks or piers will likely affect the present currents making it difficult to accurately predict the impacts currents will have on the mooring vessels in the future.

Willoughby Dock Navigational Recommendations: The Concept 1 mooring option appears to present no significant impact on the safe navigation of vessels and float planes. As is the case for all of the other moorings in the Port, Concept 1 is parallel to the shore and thus provides limited obstruction to navigable waters. Repositioning the dock so that it is a two berth pier that projects into the harbor by approximately 1000 feet, would restrict the availability of navigable waters and impact the anchoring of vessels.

With respect to the concerns over the impact of the tidal currents that are stronger in the vicinity of the waters passing under the Juneau-Douglas Bridge that can complicate mooring operations, should this dock alternative be pursued, the installation of a tidal current sensor and reporting capability should be considered to provide pilots and vessel captains accurate information on the forces they need to account for.

As to the mooring of vessels at this dock, vessel computer simulator evaluation can reveal go – no go criteria as well as preferred approaches. Computer simulator evaluation can also determine if the positioning of Concept 1 at a different angle from the shore would result in meaningful reduction in wind forces on vessels' beams simplifying mooring. It is evident in the majority of the relatively moderate weather conditions encountered in Juneau that vessels can be safely navigated and moored to this proposed facility. Approaches to this dock would, however, be complicated if there was a vessel already at anchor. This could be addressed by sequencing of vessels' arrivals.

- b. Merchant's Wharf T-Pier: This alternative provides a 1000'+ pier extending out from the Merchant's Wharf area into port waters to provide berthing for two cruise ships. See enclosure (8). The proposed pier's projection into Port waters is substantially different than all other existing berths which lie parallel to the natural shoreline. The Merchant's Wharf T-Pier presents substantive adverse impacts on current float plane operations, anchoring of cruise ships, the approach of cruise ships to the existing or

modified Port of Juneau cruise ship dock, referred to as the “Steamship Dock”, and to smaller cruise ships mooring at the Goldbelt Seadrome pier.

Merchant’s Wharf T Pier Navigational Recommendations: As noted above, this option presents the most significant navigational impacts on other maritime operations. While the impacts on float plane operations are evident, the interference this pier would present to the Steamship Dock mooring operations is less obvious and should be evaluated via a computer simulator should this option be considered to move forward.

- c. Floating Dock Parallel to Port’s Cruise Ship Docks: This floating dock alternative presented navigational concerns to several maritime stakeholders due to the dock extending approximately 200’ off of the existing dock and off the intermediate vessel float where fishing vessels and small passenger vessels moor. See enclosure (9). There were also concerns raised by the operator of float planes that the dock would encroach on their aircrafts’ landings, take offs and approaches to the passenger and fueling dock at Merchant’s Wharf. Pilots, cruise ship operators and the Franklin Dock operator expressed concerns that the dock would substantially complicate the mooring and departure of cruise ships to the Franklin Dock and some opined it would also impact arrivals to the Jacobsen Dock or AJ Dock. The concerns are not fully supported by the AIS data generated from prior approaches and departures by cruise ships which have been well clear (100 yards +) of the area where the new dock and moored vessels would occupy. Based on AIS reports reviewed it is evident some vessel approaches to the Franklin Dock are done via a shallow approach and will be complicated should this option move forward as approaches will need to be made steeper, which are routinely done. The review of prior vessel maneuvers indicate it is unlikely there will be any noticeable impact on vessels’ approaches to the Jacobsen Dock.

Another factor considered with this dock option was the navigational impacts on fishing vessels mooring at Taku Fisheries and the intermediate vessel float where small cruise vessels and fishing boats moor. If this option is implemented, there appears to be adequate sea room remaining for vessels to maneuver to and from these piers. Taku Fisheries’ owner stated he is comfortable with the space provided between the proposed new floating dock and his facility is adequate for maneuvering.

Floating Dock Recommendations: It is evident this dock would have an impact on some vessels’ approaches to the Franklin Street pier and that certain shallow angle approaches may be prevented due to moored vessels projecting approximately 200’ further offshore than they presently are. However, this could be reduced by the sequencing of vessel arrivals so that vessels mooring at the Franklin St. pier arrive before vessels moor at the Port’s Steamship Dock. Past maneuvers by various vessels shows safe approaches to the Franklin pier that would provide ample sea room of over 100 yards can be safely done. (See enclosure 10).

In light of the above concerns and issues, computer simulator evaluation of this dock and how it impacts on the mooring of vessels at the Franklin Dock is

recommended. This computer simulator can also assist pilots evaluate maneuvers that could ensure safe approaches and departures should this dock option be pursued.

- d. Extension of the Port's existing Steamship Dock: This floating dock option presents most of the same navigational concerns as the previous dock option. The one significant difference is this dock option would not interfere with the float plane operations at the Merchant's Wharf area. The same evaluation as recommended for the above option applies to this alternative. (See enclosure 11).

**Benchmarking**: In considering the various mooring options and impacts on the navigation of vessels in the Port of Juneau we benchmarked the spatial restrictions to other ports that cruise ships call on, specifically Los Angeles and Port Lauderdale. Based on the fact the waters in these other ports are more restrictive than in Juneau, it is evident expansion of moorage facilities will not overly restrict maritime operations in the Port. (See enclosure 12)

**Simulator Evaluation**: As noted earlier in this report, computerized vessel simulation can provide more information on the challenges the various docks and piers will have on vessels mooring and departing various piers and docks under consideration. Simulator evaluations can also help decide what measures should be taken to best ensure uneventful mooring, such as the sequencing the arrival of vessels, steepness of approaches, etc. As the cost of conducting computer simulations is fairly high, it is recommended that simulations should only be conducted for the moorage options that are likely to be pursued. The Marine Exchange is in the process of developing the simulator evaluation criteria for each dock and pier option considered in this report to provide to the Pacific Maritime Institute for development of a cost estimate.

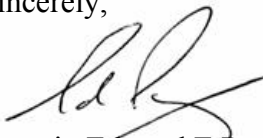
**Summary**: This navigation study finds four of the five moorage options being considered have no substantial navigational impacts to vessel operations that would prevent them moving forward. However, each alternative presents varying degrees of navigational impacts. The rating of the dock and pier options under consideration based on the impacts on navigation is provided below listed from the facility with the least impact to that of the highest impact.

1. Gold Creek – Willoughby Concept 1 (Parallel to Shore):
  - Limited impact to float plane operations
  - Limited impact on anchoring vessels in the Port
  - Limited impact on mooring vessels at the adjacent Coast Guard dock.
2. Port's Steamship Dock Extension:
  - Moderate impact on the mooring and undocking of cruise ships at the adjacent Franklin Dock
  - Limited impact on float plane operations

- Limited impact on Taku fisheries and the Intermediate Vessel Float (IVF).
3. Floating Dock Parallel to Port's Cruise Ship Dock:
- Substantial impact on float plane operations in their approaches and departures to the Merchant's Wharf sea plane facility.
  - Moderate impact on the mooring and undocking of cruise ships at the adjacent Franklin Dock.
  - Limited impact on the Taku fisheries and the Intermediate Vessel Float (IVF).
4. Gold Creek – Willoughby Concept 1a (Perpendicular to Shore:
- Moderate impact on float plane operations and on anchoring of vessels in the Port. (Note: anticipate less anchoring as more dock space will be available).
  - Moderate impact on mooring of vessels at adjacent Coast Guard dock.
5. Merchant's Wharf T-Pier:
- Substantial impact on float plane operations preventing future operations.
  - Substantial impact on mooring of cruise ships at Port's Steamship Dock
  - Moderate impact on anchoring of vessels in the Port. (Note: anticipate less anchoring as more dock space will be available).
  - Moderate impact on mooring of vessels at adjacent Coast Guard dock.
  - Moderate impact on mooring of small passenger vessels at Goldbelt's Seadrome pier.

The above findings were summarized in a public presentation on 5 December 2008 at the Centennial Hall where approximately 35 people from the community attended. A copy of that presentation is provided as enclosure (13).

Sincerely,



Captain Edward E Page  
U.S. Coast Guard (Retired)  
Executive Director  
Marine Exchange of Alaska

Enclosures: