RECONNAISSANCE REPORT

Operational Feasibility Study: Task 2

FRIENDS OF FROG FERRY

MARITIME CONSULTING PARTNERS

I. INTRODUCTION

The first phase of the Operational and Financial Feasibility Study is to collect relevant data and make observations pertaining to the ferry route, potential stops and necessary support services. The initial planning phase, prior to the reconnaissance is purely data based, relying on previous reports, published data and internet sources. This data is invaluable but needs to be verified under real-world conditions. The project team accomplished this by performing a reconnaissance of the route over the course of two days; one day on the river via boat and the one day by land. This Reconnaissance Report is a summary of the data collected by the project team through research performed in the planning phase that was subsequently verified, modified or updated as a result of real-world observations.

A. PURPOSE

The primary purpose of the Reconnaissance Report is to collect the observations made by the project team, organize them and summarize the team's findings and recommendations. A secondary purpose is to identify any critical barriers to implementation or changes in the direction of the study.

The Reconnaissance Report provides a guide to the team as it moves into the next phases of the feasibility study, ensuring all assumptions made are based on the same vision of the ferry system that is based on its technical feasibility.

II. METHODOLOGY

The methodology utilized for the reconnaissance consists of three basic phases; planning, conducting reconnaissance and merging data. Each phase is critical to the success and thoroughness of the reconnaissance, adding value to the feasibility study.

A. PLANNING

Prior to the actual reconnaissance, considerable planning was conducted to ensure that the most effective use of the team's time and efforts. This included extensive data investigation and review and development of a reconnaissance plan. The reconnaissance plan outlined the way by which the activities would be conducted, what general information would be collected, observed and verified and the key evaluation characteristics for terminal sites and docks.

B. CONDUCT OF RECONNAISSANCE

Conduct of the reconnaissance was established in the plan and shared with the project team. This plan communicated how the river runs would be conducted, specifying speeds and stops, in both directions (southbound and northbound). It also stipulated the data that would be gathered while underway and at each stop. Below is an excerpt from the reconnaissance plan:

The recon will be conducted over two days. One day will be on the water and will include a round-trip run up the Willamette and back, from Vancouver to Oregon City. For this run we will want to try to maintain 24 kts over the ground average speed during the run to Oregon City, not including approaches/departures and maneuvering at sites or slow bells for traffic or wake zones. On the return trip we will match RPM's to the upriver trip to give us a sense of the current impact.

For the second run we'll head back to Oregon City (speed won't matter) and stop at each site to gather info; pictures, soundings, confirm boundaries, inspect facilities, etc. I expect each stop will range from 10 – 15 minutes. We will not need to make any stops on the return unless we missed anything or want to investigate alternatives.

The second day will be land side. We'll drive to each site, checking transportation links, access and upland facilities / layout.

Like all plans, it is just a plan and changes can be made as circumstances allow or dictate. In the course of the actual reconnaissance, the project team elected to alter the approach and make one run on the river as opposed to two. This was made possible by utilizing two vessels simultaneously and shifting more of the dock observations to the second day by land. While the primary vessel focused on route timing and assessment, the second vessel was able to loiter longer at each terminal sight to collect water depth and dock data.

C. MERGING DATA

Members of the project team collected specific data throughout the course of the reconnaissance. This included photos, videos, research during planning, observations and notes. This data has been collated and merged into this report. This report and the data contained within is considered preliminary and unvetted. Over the course of the feasibility study the project team will use this report to identify gaps in available data, verify information and determine reasonable assumptions where possible.

III. OBSERVATIONS

A. ROUTE ASSESSMENT

A route assessment verifies distances between stops against those calculated on a nautical chart and the time needed to transit those distances at specific speeds. It also allows for simulated maneuvering and docking times as well as fluctuations in river current.

A route assessment also affords the project team a detailed look at the river conditions along the route. These include river heights and currents, traffic density and make-up, and hazards to the safe navigation of the river.

1. ROUTE DESCRIPTION

The general ferry route, as currently envisioned, is best described as a varying combination of route segments or legs that will be phased in over time through different stages and for different uses. Some legs will be a regular part of the commuter route, on a regular schedule, while others may only be utilized on an 'on demand' basis. This approach also lends itself to a flexible system that can grow and adjust with demand and changing ridership demographics and conditions. The table below identifies the route legs currently being considered as a part of the full route.

SOUTHBOUND

LEG	FROM	TO	DIST (nm)
S1	Vancouver	Cathedral Park	8.85
S2	Cathedral Park	Convention Center	5.6
S3	Convention Center	Salmon Street	0.75
S4	Salmon Street	OMSI	0.5
S5	OMSI	OHSU	0.55
S6	OHSU	Milwaukee	3.75
S7	Milwaukee	Lake Oswego	1.65
S8	Lake Oswego	Oregon City	4.85
Total Distance			**26.5**

NORTHBOUND

LEG	FROM	TO	DIST (nm)
N1	Oregon City	Lake Oswego	4.85
N2	Lake Oswego	Milwaukee	1.65
N3	Milwaukee	OHSU	3.75
N4	OHSU	OMSI	0.55
N5	OMSI	Salmon Street	0.5
N6	Salmon Street	Convention Center	0.75
N7	Convention Center	Cathedral Park	5.6
N8	Cathedral Park	Vancouver	8.85
Total Distance			**26.5**

2. GENERAL

Some general areas of observation that affect the whole route include the following:

a. Weather Conditions

The US Coast Pilot[1] describes general weather conditions in the Vancouver/Portland area as being influenced heavily by the surrounding mountain ranges as follows:

> *The coast range provides limited shielding from the maritime influence of the Pacific Ocean. The Cascade Range provides a steep high slope for the lifting moisture-laden westerly winds, which produces heavy rainfall in the western Cascade piedmont region. They also form the barrier for the Columbia River basin region and dry continental air masses. Airflow is usually northwest in Portland in spring and summer and southeast in fall and winter, interrupted occasionally by outbreaks of dry continental air east through Cascade passes and across ridge tops. When such an outbreak occurs, extreme high or low temperatures are usually experienced in the Portland area.*

Seasonal conditions are described as:

> *Portland has a very definite winter rainfall climate. About 88 percent of the annual total occurs in October through May, nine percent in June and September, while only 3 percent comes in July and August.*

For precipitation, the region experiences mostly rain, with only 17 days per year on average having snow and that snowfall being only a few inches at most.

Seasonal weather is clearly defined in the region, for the most part.

> *Winter is mild, cloudy and wet with southeast surface winds predominating. Summer is marked by mild temperature, with prevailing northwest winds and very little precipitation. Fall and spring are transitional in nature, with frequent periods of ground fog.*
>
> *In summer the hot, dry, continental air brings the highest temperatures. Extreme temperatures below zero are very infrequent.*

As for extreme weather, the region is relatively inactive:

> *Destructive storms are infrequent in the Portland area. Surface winds seldom exceed gale force. Thunderstorms are infrequent, occurring, on average, only seven days each year. Tornadoes with the funnel cloud reaching the ground are rare and there are rare occurrences of heavy*

[1] U.S Coast Pilot 10, Chapter 5

rain even though winter rains may persist for days at a time.

Weather conditions during the reconnaissance were consistent with prevailing patterns for July. The day was mostly sunny with good visibility on the water. Air temperatures were in the low to mid 80's Fahrenheit while the water was a cool 61 – 62 degrees on the Columbia River and 62 – 64 degrees on the Willamette River. Winds started out fairly light in the morning, but increased to 10 – 15 kts in certain areas on the river, mostly out of the northwest. Waves were typical for the wind conditions, ranging from flat calm to 1 ft in some parts of the Columbia.

b. River Conditions (Depths and Current)

The Columbia River and Willamette River use mean lower low water (mllw) during the lowest river stages for **Columbia River Datum** (CRD) from Harrington Point to Bonneville Dam on the Columbia and up to the Willamette Falls Locks on the Willamette for river depths. This datum applies to the entire route contemplated for the ferry system and explored during the reconnaissance.

According to data from the USGS Water Resources website, river levels fluctuate throughout the year on both rivers. High water tends to be in Spring and early Summer. River levels during this period often reach 15 feet above datum on the Columbia and 16 feet or higher on the Willamette. Extreme low waters on both rivers generally occur in the Fall (September to November) with mean low levels of 2 feet on both rivers and negative levels of -0.5 to -1.0 feet occurring for short periods, sporadically.

The significance of river heights is implicated in two primary aspects of the ferry system; the vertical clearance of bridges and the design and construction of docks. While river heights are somewhat predictable on an annual basis, the severity and daily fluctuations are not as reliable. Some years see moderate high levels while others bring extreme levels.

Water depth along the route, even at times of low water, is not a restrictive factor for the size of vessels intended for the system. At a conceptual maximum draft of 3 – 6 feet, the entire route can be easily run with plenty of water under the keel.

The limiting vertical clearance on the route (Steel Vertical Lift Bridge) is 26 feet at Columbia River Datum. This means that in the best scenario there is 26 feet of vertical clearance under this bridge. On the day of the reconnaissance, the Willamette river was at 7.5 feet, giving us 18.5 feet of vertical clearance (this was verified by the clearance gauge painted on the vertical bridge supports). When the river is at its highest of 16 feet, there is only 10 feet of vertical clearance. In these situations, a bridge lift will be required.

Due to the nearly 20-foot vertical range in river heights throughout a given year, docks and gangways must be designed to accommodate this variation. This makes floating docks more feasible than hard piers but requires that they be designed and built to withstand the forces of a larger vessel alongside. Floating docks must also accommodate relatively long access ramps in order to maintain a reasonable slope at low water conditions. (See Americans with Disabilities Act of 1990, ADA).

Various elevation baselines are used on the local rivers including Columbia River Datum (CRD), NGVD 29, City of Portland and local Gauge at a specific station. Conversions vary based on location, type and use. Some survey data reflects actual contour elevation and nautical charts typically reflect depth from a low water condition, thus the reader is cautioned against using data

in this report for navigation or design. One of the more common datums used on the local rivers is CRD, which is a sloping datum that varies by river mile, with 0 typically being low water during low flow.

The river current over the course of the day varied by location and time. Both the Columbia and Willamette are influenced by the tide, and the Willamette is also influenced by Columbia River discharge. During high flow in the Columbia, flow in the Willamette is backwatered and depending on Columbia elevations, flow can approach 0 ft/sec at times. As snowpack and rainfall are collected from a distant and large basin, flows in each river are highly independent. Flows in the Columbia are also set by water allocation, power demands, treaties, and fishery management, as some of the constraints. The most general rule is the rivers and current will be lowest in September-October. All other times currents can vary significantly over the route.

Peak flows can reach 4 to 6 knots, at extremes. The significance of current velocity on a ferry system is apparent in two primary areas. First, current affects the schedule by slowing the vessels when transiting upriver and provides a push going downriver. But this effect is not always equal on all vessels. This will create less reliable arrival times at all stops throughout the day. The best way to mitigate this effect is to design the vessel with additional speed, not normally required, but available to the operator when needed.

The second effect of excessive current is on the maneuvering ability of the vessel when arriving or departing a dock. Current, particularly when running perpendicular to the dock face can increase the amount of time required to maneuver in and out of the dock. The best way to mitigate this effect is to avoid utilizing docks that are positioned perpendicular to the flow of current and to ensure the vessel is designed with considerable maneuverability at slow speeds.

c. Vessel Traffic

Vessel Traffic on the Columbia and Willamette rivers varies greatly. Both rivers experience everything from non-motorized recreational craft to large ocean-going commercial vessels. Both rivers are popular amongst recreational users; stand-up paddleboards, kayaks, sailing vessels, wakeboarders, cruisers and fishermen. The use of the rivers varies for recreational use depending on the season and the location. Commercial vessel traffic is more consistent throughout the year and more prevalent on the Columbia, but large ships are present on the Willamette as far up as the Broadway Bascule Bridge.

Operators of small passenger vessels such as those being contemplated for this ferry service are expected to follow the International and Inland Rules of the Road for navigation. They should also be aware of local conditions, practices and customs in order to act prudently and practice safe navigation. On the lower Columbia and Willamette rivers this includes navigating outside the federally maintained channel when water levels safely allow it in order to mitigate close quarters situations with deep draft vessels that cannot react as quickly or safely navigate outside the channel themselves. It also includes taking extra precautions when navigating in restricted visibility, in particular when transiting designated Critical Maneuvering Areas (CMAs) or making way for deep draft vessels in narrow channels (in accordance with Rule 9, Narrow Channels).

The Harbor Safety Plan, published by the Lower Columbia Region Harbor Safety Committee, provides further guidance on local navigation practices and customs. The latest revision can be found at www.lcrhsc.org

d. Speed/Wake

Speed limits and wake restrictions exist in designated areas on the rivers as per local regulations. These regulations can be accessed via an interactive map at the following website:
https://geo.maps.arcgis.com/apps/webappviewer/index.html?id=841da68081294bb2a6b50f93b1a12f05

Regardless of local regulations, Rule 6 of the Inland Navigational Rules, require that all vessels maintain a safe speed for the conditions. Similarly, Rule 2 of the Inland Navigational Rules, requires that all vessels be responsible for their own wake and the damage it could cause at all times. This applies to commercial and recreational vessels.

This report will look at the impacts of speed and wake restrictions on the route by each leg.

e. River Debris

At times throughout the year considerable debris can be found in the rivers. According to the US Coast Pilot:

> *Since logging is one of the main industries of the region, free floating logs and submerged deadheads or sinkers are a constant source of danger in the Columbia and Willamette Rivers. The danger is increased during spring freshets.*

Freshets, the flood of a river from heavy rain or melted snow, typically occur on the Columbia River in May but on the Willamette they begin earlier in the year. This results in a 'backwater' scenario when the Columbia reaches a peak rate of flow whereby considerable amounts of debris get 'trapped' in the lower Willamette where the currents meet.

This debris can be anywhere in size from a small stick (or large clumps of small sticks) to full-sized tree trunks. Either of these, and anything in between, can be hazardous to the safe navigation of the waterway. Small sticks can clog waterjets, jam rudders or damage props. Larger debris can damage any underwater appurtenances or cause severe hull damage.

3. BY ROUTE LEG

The following details are specific to each leg of the southbound route.

- **Transit Times** compare actual (including maneuvering/docking) times and averaged speeds versus those calculated during planning, which do not include slow-downs. All maneuvering/docking times consistently ranged between 30 – 60 seconds for arrivals and departures. All sites being considered have fairly straightforward, direct approaches without any lengthy slowdowns or maneuvering required. Reasons for any variations in transit times are noted.
- **Speed/Wake Zones** may be specifically regulated for an area or simply occur by necessity.
- **Vessel Traffic** summarizes typical traffic encountered on each leg. This will vary by season. A subjective **Traffic Risk Rating** (TRR) has been assigned to each leg, taking into account the traffic volume (at its peak), types of traffic and navigational restrictions. The TRR is assigned as a number from 1 – 5, with 5 representing the highest risk.
- **Current** also varies by leg, at different times of the year.

Items of concern or that present an unmitigated risk are in **red**.

a. S1: Vancouver Terminal 1 to Cathedral Park

Transit	Distance	Speed	Time
Calculated	8.85 nm	24.0	22 mins
Actual	8.85 nm	24.5	21 mins
Variations	Average speed was slightly higher than calculated due to weaker currents on the lower Willamette.		
Speed/Wake Zones	No restricted zones as per local regulations aside from within 200 ft of Cathedral Point. Typically, wouldn't expect speed reductions under normal circumstances other than for traffic.		
Vessel Traffic	Typically encounter ocean-going vessels underway or at anchor on the Columbia, some recreational traffic around Hayden Island, tug and barge traffic throughout the leg, large vessels transiting to terminals or shipyard on the Willamette and small craft fishing near Multnomah Channel and Cathedral Park. **TRR: 3.5**		
Hazards to Navigation	Debris can be found in both rivers. Severe shoaling at Kelley Point on Hayden Island (well-marked) and shoaling and obstructions near the mouth of Multnomah Channel (well outside the main channel).		
Current	The current in the Columbia around Vancouver varies between 0.5 and 2.0 kts, flowing west providing a slight push on this leg. At Kelley Pt the opposing current of the Willamette (gradual) begins to take effect.		

b. S2: Cathedral Park to Convention Center

Transit	Distance	Speed	Time
Calculated	5.6 nm	24.0	14 mins
Actual	5.6 nm	20.0	17 mins
Variations	Transit took longer than calculated due to a longer slowdown being required from just north of Steel Bridge to the dock.		
Speed/Wake Zones	No restricted zones as per local regulations aside from within 200 ft off Duckworth Dock, but the small boat pier on the west bank just north of Steel Bridge prudently requires a low wake.		
Vessel Traffic	Some commercial traffic transiting from/to Swan Island or terminals up the Willamette as far as the Steel Bridge. This includes ocean going vessels and tugs with barges in tow. Moving further up the river more and smaller recreational traffic is encountered, including non-motorized craft (paddleboards, kayaks). **TRR: 3.0**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. The only other hazard is the Steel Bridge which has a vertical clearance of 26 feet above datum (CRD).		
Current	The current in the Willamette varies depending on discharge rates and water level but is generally fairly moderate on this leg. The current flows northerly to the Columbia.		

c. S3: Convention Center to Salmon Street

Transit	Distance	Speed	Time
Calculated	0.75 nm	20.0	2 mins
Actual	0.75 nm	12.0	4 mins
Variations	Transit took longer than calculated due to longer slowdown departing Duckworth Dock and small boat traffic en route.		
Speed/Wake Zones	No restricted zones as per local regulations aside from within 200 ft of Duckworth Dock.		
Vessel Traffic	Commercial traffic above Steel Bridge is limited to passenger vessels and small tugs and construction barges. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft. There are also swimmers near several downtown beaches. **TRR: 3.5**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. The Burnside Bascule Bridge has a horizontal clearance of 205 feet between spans and the Morrison Bridge 209 feet between spans, requiring a prudent vessel operator to slow down in cases of traffic or low visibility.		
Current	The current in the Willamette varies depending on discharge rates and water level but is generally fairly moderate on this leg.		

d. S4: Salmon Street to OMSI

Transit	Distance	Speed	Time
Calculated	0.5 nm	18.0	2 mins
Actual	0.5 nm	6.0	5 mins
Variations	Transit took longer than calculated due to small boat traffic and an extended slow down past the swim dock and Riverplace Marina.		
Speed/Wake Zones	Local regulations require a slow-no wake zone within 200 feet of Riverplace Marina.		
Vessel Traffic	Commercial traffic above Steel Bridge is limited to passenger vessels and small tugs and construction barges. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft. **TRR: 4.0**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. Shoaling occurs on the west bank of the Willamette upriver from Riverplace Marina.		
Current	The current in the Willamette varies depending on discharge rates and water level but is generally fairly moderate on this leg.		

e. S5: OMSI to OHSU

Transit	Distance	Speed	Time
Calculated	0.55 nm	18.0	2 mins
Actual	0.55 nm	11.0	3 mins
Variations	Transit took longer than calculated due to a longer maneuvering time required in departing the OMSI dock.		
Speed/Wake Zones	There are no regulated wake or speed zones on this leg.		
Vessel Traffic	Commercial traffic above Steel Bridge is limited to passenger vessels and small tugs and construction barges. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft. There is a jet ski rental business on the east bank. **TRR: 4.0**		
Hazards to Navigation	Debris can be found in most parts of the Willamette.		
Current	The current in the Willamette varies depending on discharge rates and water level but is generally fairly moderate on this leg.		

f. S6: OHSU to Milwaukee

Transit	Distance	Speed	Time
Calculated	3.75 nm	24.0	10 mins
Actual	3.75 nm	12.0	19 mins
Variations	Transit took significantly longer than calculated due to several slowdowns, vessel traffic and a longer maneuvering time required in arriving at the Milwaukee dock.		
Speed/Wake Zones	There are several regulated wake or speed zones on this leg: • 5 mph speed limit within 100 feet of the Landing Boat Club (west bank near Toe Island) • 5 mph speed limit within 100 feet of Willamette Park & Sailing Club (west bank at Stevens Pt) • 5 mph speed limit within 100 feet of Oregon Yacht Club (east bank across from Stevens Pt) • No wake within 200 feet of the Macadam Bay Club Marina (west bank) • No wake within 200 feet of Sellwood Riverfront Park (east bank) • No wake within 200 feet of Waverly Marina (east bank) • No wake within 200 feet of Milwaukee Riverfront Park		
Vessel Traffic	Commercial traffic above OHSU is limited to sporadic passenger vessels and small tugs and construction barges. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft. **TRR: 3.5**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. More shoaling occurs on both banks of the river as you go further up. Most are well marked however there have been numerous groundings in the area known locally as the "Milwaukee Rock Garden".		
Current	The current in the Willamette varies depending on discharge rates and water level but is still fairly moderate on this leg.		

g. S7: Milwaukee to Lake Oswego

Transit	Distance	Speed	Time
Calculated	1.65 nm	22.0	5 mins
Actual	1.65 nm	16.5	6 mins
Variations	Transit took slightly longer than calculated due to some vessel traffic and a narrowing channel with blind spots around bends.		
Speed/Wake Zones	There are no regulated wake or speed zones on this leg other than no wake within 200 feet of Foothills Park (Lake Oswego). Note: while not specifically regulated, as the river narrows there are numerous private small boat docks along both banks that could be damaged by excessive wake energy.		
Vessel Traffic	Commercial traffic above Milwaukee is very limited. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft and fishermen either at anchor or underway or drifting. **TRR: 3.5**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. More shoaling occurs on both banks of the river as you go further up. Most are well marked, including a large submerged rock adjacent to George Rogers Park. (Marked by a white beacon, shown on chart 18528).		
Current	The current in the Willamette varies depending on discharge rates and water level and begins to increase noticeably on this leg.		

h. S8: Lake Oswego to Oregon City

Transit	Distance	Speed	Time
Calculated	4.85 nm	24.0	12 mins
Actual	4.85 nm	10.0	30 mins
Variations	Transit took considerably longer than calculated due to numerous slowdowns and a narrowing channel with blind spots around bends.		
Speed/Wake Zones	Note: while not specifically regulated, as the river narrows there are numerous private small boat docks along both banks that could be damaged by excessive wake energy.		
Vessel Traffic	Commercial traffic above Milwaukee is very limited. Continuing further up the river more and smaller recreational traffic is encountered, including non-motorized craft and fishermen either at anchor or underway or drifting. **TRR: 4.0**		
Hazards to Navigation	Debris can be found in most parts of the Willamette. More shoaling occurs on both banks of the river as you go further up. Most are well marked.		
Current	The current in the Willamette varies depending on discharge rates and water level and continues to increase noticeably on this leg.		

B. DOCKS / TERMINAL SITES

For each of the nine sites contemplated as a part of the ferry system, whether as a regular commuter stop or an on demand stop, an assessment was made of what currently exists, what changes or upgrades are needed, or what alternatives could be utilized.

For each site, the team evaluated both the terminal/uplands and the dock. Wherever a terminal or dock does not currently exist, the team attempted to identify what would be the most effective solution considering the information at hand.

1. VANCOUVER TERMINAL 1

a. Terminal 1

Terminal 1 Aerial during renovations

Terminal 1 rendering of planned redevelopment

General Description

The Port of Vancouver's Terminal 1 is currently undergoing a major renovation project as a part of the Port's waterfront development. https://www.discoverterminal1.com Vancouver is considered a key terminus stop on the ferry route in phase 2. The development plans of the waterfront present a good foundation for a public ferry terminal. This analysis is based on those plans.

Access/Egress

Under the current redevelopment plan, access/egress for the general vicinity of the dock will be good for pedestrians coming from multiple directions (parking structures, transit stops, bike paths, kiss and ride). The renovated amphitheater and surrounding area provide ample waiting space although without any protection from the weather.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS

Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain. Columbia River Renaissance Trail to the east.
Bicycle / Scooter Share	None yet. Potential in near future.
Local Transit	C-TRAN stops within 0.5 miles
Car / Ride Share	Uber and Lyft
Kiss and Ride	Esther Street and Waterfront Way roundabout

Parking (Auto and Bike)

The current redevelopment plan includes some parking. Additional parking development is being considered by private entities.

Facilities

There do not appear to be any facilities specific to a ferry service in the redevelopment plan. That being said, the only need for a ferry system of this scope is an electronic ticket kiosk, signage and a covered waiting area.

Ownership

Terminal 1 is currently all property owned and operated by the Port of Vancouver USA.

Capital Improvements

The only necessary capital improvements to the current redevelopment plans include:

- covered waiting area
- electronic kiosk
- lighting
- signage (wayfinding)
- secure bicycle parking

b. Terminal 1 Floating Dock

Dock Description

Currently, an existing floating dock directly to the west of Terminal 1 is being considered for use by the ferry. However, there are some barriers to its use. In particular, it is designated as a public dock and would require some alterations to be safely utilized for the ferry service. The Port has indicated that it would work to resolve these issues.

As an alternative or perhaps preferred option, the inclusion of a ferry-specific dock in the waterfront development plan should be considered. For the time being however, this analysis addresses the existing dock.

Water Depths

The Terminal 1 dock is located in 30+ feet of water at CRD.

Exposure

The current floating dock lies in a west to east orientation, parallel to the north shore of the river. Its face is flush with the Terminal 1 hard pier and unprotected to the East, South and West. The greatest wind and wind wave exposure is from the east and west where the fetch is considerable.

Dimensions and Construction

The floating dock consists of a modular concrete/foam system with structural timber whalers. The dock is of high-quality construction, with internal piles alternating on either side. The general dimensions are as follows:

- linear dock face available for moorage – 180 feet
- clear width of pedestrian surface – 14 feet
- freeboard to deck – 1.75 feet

Access Ramps

The existing dock has one welded aluminum access ramp from the top of Terminal 1 hard pier (the amphitheater). The ramp has aluminum bulkheads with handrails on each side and is uncovered.

ADA

The Americans with Disabilities Act provides guidelines for passenger vessels (including gangways) to best accommodate individuals with disabilities. The ADA also mandates certain access requirements specific to docks and access ramps. The project team looked at each dock in relation to the major requirements (not fully inclusive of all requirements and guidelines) but until detailed design drawings can be attained compliance cannot be fully ascertained.

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Doubtful, need design to confirm

Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Compliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Compliant
Clear Width	The clear width of ramps shall be 36 inches minimum.	Non-compliant @ X inches clear
Landings	Level landings are required at doors and where ramps change direction.	Compliant
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Compliant

General Passenger Safety

Due to the dock's construction and overall width it provides a stable platform for ferry passengers to transit. There are no apparent tripping hazards. As it is a public dock, there are no railings on the outboard edges. There is no lighting or safety equipment (i.e. life-ring, swim ladder).

Dock Hardware

The dock has 6x6 timber bull-rails. This is sufficient for a commercial passenger vessel of the intended size.

Fendering

The current floating dock has no fendering.

Use Agreements

Aquatic Lands Enhancement Account (ALEA) grant?

Capital Improvements

Recommended capital improvements to the existing dock include:

- covered access ramp
- lighting
- safety equipment
- install sufficient fendering

As an alternative, it is recommended that the addition of a purpose-built ferry dock be considered in the redevelopment plan.

2. CATHEDRAL PARK

a. Cathedral Park Boat Launch

General Description

The Cathedral Park Boat Launch is a part of the City of Portland's Parks and Recreation department. The boat launch is located at the northwest end of the park, with a large parking lot for vehicles and boat trailers and two docks (west and east) situated on either side of the boat ramp.

Cathedral Park Boat Launch Property Lines

Access/Egress

Access/egress for the west dock is through the parking lot. Access/egress for the east dock is adjacent to the parking lot, following a paved sidewalk from the north and the Cathedral Park path to the east. Access/egress should be designed as to avoid pedestrian traffic crossing the active boat ramp.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets, some with sidewalks. Terrain is hilly and active train tracks lay to the north. A shared roadway bicycle route extends down N. Burlington Avenue linking cyclists to the park via the Cathedral Park Trail.
Bicycle / Scooter Share	Cathedral Park is currently outside the boundary of the bike share program in Portland (BikeTown).
Local Transit	5 TriMet bus routes
Car / Ride Share	Uber and Lyft
Kiss and Ride	Either parking lot provides good opportunities

Parking (Auto and Bike)

There are currently two parking lots within Cathedral Park, a small lot (approximately 20 spaces) within a short walk to the boat launch, and a large lot (78 long pull-through spaces designed to accommodate vehicles with boat trailers) directly adjacent to the boat ramp. Some of these pull-through spaces could be reconfigured to accommodate standard vehicles, with each current space accommodating two vehicles. There is ample space for secure bike parking.

Facilities

There are public restrooms immediately adjacent to the boat launch parking lot. There is space for an electronic kiosk, covered waiting area, signage and bike parking.

Ownership

Cathedral Park is a part of the City of Portland Parks and Recreation Department.

Capital Improvements

The Cathedral Park terminal site will require the following capital improvements:

- electronic ticket kiosk
- signage (wayfinding)
- covered waiting area
- secure bicycle parking
- lighting
- designated parking/restriping

b. Floating Docks (Existing)

Dock Description

Currently, two floating docks are located on either side of the boat ramp. Both are floating docks, made of segments to provide for flexibility as they adjust to the level of the river. The docks are secured to a single row of pilings on the outboard side (away from the ramp). The west dock has a section (approximately 60 feet) at the end that is angled outward at about a 45-degree angle.

These docks are currently used by small recreational craft launching and staging at Cathedral Park.

Water Depths

The docks are built to access water depths between the 6 -foot and 30-foot curves at CRD.

Exposure

The current floating docks lie perpendicular to the flow of the river (except for the angled portion of the west dock). They are exposed primarily to wind and weather from the southwest to southeast with the southeast having the most wind fetch.

Dimensions and Construction

The general dimensions are as follows:

<u>West Dock</u>

- linear dock face available for moorage – varies based on water level
- clear width of pedestrian surface – 6 feet
- freeboard to deck – 1.25 feet

<u>East Dock</u>

- linear dock face available for moorage – varies based on water level
- clear width of pedestrian surface – 6 feet
- freeboard to deck – 1.25 feet

Access Ramps

There are no access ramps for either dock.

ADA

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Possible, need design to confirm
Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Noncompliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Compliant
Clear Width	The clear width of ramps shall be 36 inches minimum.	Not applicable
Landings	Level landings are required at doors and where ramps change direction.	Not applicable
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Not applicable

General Passenger Safety

Due to the docks' intended use as temporary mooring and staging for recreational fishermen, they are designed to flex with the slope of the riverbank as the height of the river varies. This necessitates several 'joints' between dock sections that are bridged by steel plates, which could pose tripping hazards. The docks are not very wide or stable and therefore not suitable for ferry passengers to transit as designed and constructed. There is not lighting or safety equipment. As they are public docks, there are no railings on the outboard edges.

Dock Hardware

The docks are equipped with bull-rails of 4x4 treated timber. This is insufficient for a commercial passenger vessel of the intended size.

Fendering

The current floating docks have no fendering.

Use Agreements

Oregon State Marine Board (OSMB) Grant

Capital Improvements

Recommended capital improvements to the existing dock include replacement with a wider, more substantial floating dock with a designated section for the ferry to land at the end of the east dock in deeper water. It is recommended that this section be turned perpendicular to the main dock, parallel to the flow of the river. The ferry landing should be equipped with the following:

- lighting
- safety equipment
- cast cleats or bollards
- fendering

Alternatively, a new dock designed and designated exclusively for ferry use could be built to the northwest of the existing docks.

3. CONVENTION CENTER

a. Convention Center

General Description

The Convention Center, operated by Metro, is a central hub for events. It is not so much a terminal site as it is a destination for activities. The Duckworth Dock is a .5-mile walk from the Convention Center, Moda Center and the rest of the Rose Quarter. As such, the actual terminal site is better identified as the Vera Katz Eastbank Esplanade as an 'open' terminal in concept.

It is not the intent of the system to utilize the Convention Center as a regular commuter stop or as a part of the regular ferry schedule, but rather as on-demand service specific to scheduled events. Therefore, the demands on the terminal differ from those of a standard transit terminal.

Access/Egress

Access/egress for the dock (Duckworth Dock) is along the Eastbank Esplanade which runs north and south along the east bank of the river. A short walk to the north leads you to a pedestrian overpass that will take you over the train tracks to access the Rose Quarter. A longer walk or bike ride to the south along the esplanade will take you to Tilikum Crossing and OMSI.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Eastbank Esplanade is a non-motorized, multi-use path that runs in a north-south direction along the east bank for 1.5 miles.
Bicycle / Scooter Share	Several BikeTown hubs can be located to the north.
Local Transit	Four lines of the light rail (MAX) and six TriMet bus lines
Car / Ride Share	Uber and Lyft. Three Zipcar stations within 1 mile.
Kiss and Ride	Nothing within close proximity

Parking (Auto and Bike)

There are several reserved parking areas in the vicinity of the Oregon Convention Center. There are no identified secure bicycle parking facilities.

Facilities

While there is no designated terminal site close to the dock, the intent to use the Oregon Convention Center stop for on demand use negates the need for standard terminal facilities.

Ownership

Portland Bureau of Transportation

Capital Improvements

The only capital improvement needed for the Convention Center site is wayfinding for the ferry landing and various local attractions (some currently exists along the esplanade).

b. Duckworth Dock

Dock Description

The Kevin J. Duckworth Memorial Dock, better known as the "Duckworth Dock", is a floating dock off the Eastbank Esplanade just north of the Burnside Bridge. Named after beloved Portland Trail Blazer Kevin J. Duckworth, the facility was developed with a grant from the Oregon Marine Board in cooperation with the City of Portland Bureau of Transportation (PBOT) and is operated by PBOT.

The dock is currently used by small recreational craft on a first-come-first-served basis. The first 100 feet of dock face on the outboard and upstream side has been set aside for commercial use only (designated by sign and yellow paint). As per city code, commercial vessels must obtain a permit through the Portland Parks and Recreation Reservation Center for use of the dock[2].

Water Depths

The outboard face of the Duckworth Duck is in 30 feet of water at CRD.

Exposure

The dock lies parallel to the flow of the river, along the east bank. It is exposed primarily to wind and weather from the south to northwest with the south exposure having the most wind fetch.

Dimensions and Construction

The floating dock consists of a modular concrete/foam system with structural timber walers. A single line of internal piles on the inboard side provide stability. The general dimensions are as follows:

- linear dock face available for moorage – 100 feet on the outboard side designated for commercial use
- clear width of pedestrian surface – 8 feet
- freeboard to deck – 1.25 feet

Access Ramps

The single access ramp runs from the Eastbank Esplanade and is perpendicular to the dock and the river. The aluminum access ramp has structural bulwarks with railings on either side.

[2] City of Portland Charter, Code and Policies 19.16.500

ADA

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Compliant
Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Compliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Compliant
Clear Width	The clear width of ramps shall be 36 inches minimum.	Compliant
Landings	Level landings are required at doors and where ramps change direction.	Compliant
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Compliant

General Passenger Safety

Due to the dock's construction and overall width, it provides a stable platform for ferry passengers to transit. There are no apparent tripping hazards. As it is a public dock, there are no railings on the outboard edges. There is low level lighting but no apparent safety equipment (i.e. life-ring, swim ladder).

Dock Hardware

The docks are equipped with cast cleats spaced at approximately 10 feet. The existing cleats are insufficient for a commercial passenger vessel of the intended size.

Fendering

The current floating dock has no fendering.

Use Agreements

Built with an OSMB grant.

Capital Improvements

Recommended capital improvements to the existing dock include:

- safety equipment
- replace some existing cleats with appropriately sized cast cleats or bollards
- install sufficient fendering

4. SALMON STREET

a. Salmon Street

General Description

Salmon Street or Salmon Street Springs (referring to the water feature within the park), is located at the eastern terminus of SW Salmon Street in downtown Portland. It is located in Tom McCall Waterfront Park along the Willamette River's western bank. Waterfront Park and Salmon Street Springs provide an open space with public access that could function as an 'open' terminal.

Access/Egress

Access/egress for the general vicinity is good for pedestrians coming from multiple directions and modes (parking structures, transit stops, bike paths). Cyclists can access Salmon Street via the Waterfront Trail, a multi-use trail that extends a little over a mile along the river between Hawthorne Bridge to the south and Steel Bridge to the north or via designated bike lanes along Naito Parkway (immediately parallel to Waterfront Park) and numerous cross streets into the downtown core.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain. The Waterfront Park Trail runs north and south along the west bank and connects with a vast network of bike lanes.
Bicycle / Scooter Share	BikeTown hub located at SW Salmon Street and Waterfront Park.
Local Transit	Five lines of the light rail (MAX) and numerous TriMet bus routes. Five C-TRAN routes traverse the downtown corridor.
Car / Ride Share	Uber and Lyft. Zipcar stations (2) within 5 blocks.
Kiss and Ride	No designated spots nearby.

Parking (Auto and Bike)

There are currently numerous parking facilities close by. There is no apparent secure bike parking.

Facilities

There does not appear to be any facilities specific to a ferry service in the immediate area. There is space in Waterfront Park for a covered waiting area, electronic kiosk and secure bicycle parking.

Ownership

The Tom McCall Waterfront Park is owned and operated by City of Portland Parks and Recreation.

Capital Improvements

The Salmon Street terminal site will require the following capital improvements:

- electronic ticket kiosk
- signage (wayfinding)
- covered waiting area
- secure bicycle parking

b. Salmon Street Dock

Dock Description

The Salmon Street Dock is a privately owned and operated dock accessed via a gangway from

Waterfront Park at the Salmon Street Springs Fountain. The dock is a floating dock that runs parallel to the seawall. The dock was designed and built as a landing platform to accommodate the 150-foot Portland Spirit, a dinner cruise vessel.

Water Depths

The Salmon Street dock is in 30+ feet of water at CRD.

Exposure

The dock lies parallel to the flow of the river, along the west bank. It is exposed primarily to wind and weather from the south to northeast with the south exposure having the most wind fetch.

Dimensions and Construction

The dock at Salmon Street is a monolithic concrete dock with cosmetic walers and was not intended to support moorage of a commercial vessel. The dock is used as a landing platform for the access ramp. The dock is secured by two external pilings. The general dimensions are as follows:

- linear dock face available for moorage – XX feet
- clear width of pedestrian surface – X feet
- freeboard to deck – XX feet

Access Ramps

The single access ramp runs from the Waterfront Park and is parallel to the dock and the river.

ADA

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Possible, need design to confirm
Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Compliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Unconfirmed
Clear Width	The clear width of ramps shall be 36 inches minimum.	Unconfirmed
Landings	Level landings are required at doors and where ramps change direction.	Compliant
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Compliant

General Passenger Safety

As this is a private dock, the project team was unable to gain full access and perform an evaluation of passenger safety features.

Dock Hardware

As the dock is not used as a mooring platform, there is no existing hardware that would be suitable for securing a commercial passenger vessel of the size intended.

Fendering

There is no fendering on the dock. A log camel is used to distribute the loads bearing directly on it and protect the concrete from impact.

Use Agreements

The dock was privately built and is owned and operated by Portland Spirit under a use agreement with the City of Portland.

Capital Improvements

Recommended capital improvements to the existing dock are unknown at this time due to the lack of information available regarding the privately-owned dock.

As an alternative, it is recommended that the addition of a purpose-built ferry dock be considered directly to the south of the existing dock.

5. OMSI

a. OMSI

General Description

OMSI (Oregon Museum of Science and Industry) is envisioned as an on-demand destination for the ferry and not a part of the regular ferry schedule. The facility lies on the east bank of the river along the Eastbank Esplanade.

Access/Egress

Access/egress for the general vicinity of the dock is good for pedestrians and cyclists coming to/from OMSI or nearby destinations such as the Opera Center, via the Esplanade or city streets.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain. The Eastbank Esplanade runs north to the Steel Bridge.
Bicycle / Scooter Share	BikeTown hub at the Opera Center
Local Transit	One line of the light rail (MAX) and a Portland Streetcar stop.
Car / Ride Share	Uber and Lyft
Kiss and Ride	At the OMSI parking lot

Parking (Auto and Bike)

There is ample parking at the OMSI lot but no secure bike parking

Facilities

While there is no designated terminal site close to the dock, the intent to use the OMSI stop for on demand use negates the need for standard terminal facilities.

Ownership

The uplands and dock are owned by the OMSI organization.

Capital Improvements

The only capital improvements needed for the OMSI site is signage.

b. OMSI Dock

Dock Description

The OMSI dock was designed and built as a multi-use facility and accommodates a submarine exhibit (USS Blueback), a commercial jetboat excursion operator as well as public access.

Water Depths

The OMSI dock is in between the 6-foot and 30-foot contours at CRD.

Exposure

The public access portion of the dock lies at an angle to the flow of the river, along the east bank. It is exposed primarily to wind and weather from the south to northwest with the south exposure having the most wind fetch.

Dimensions and Construction

The floating dock consists of a modular concrete/foam system but without structural walers. A single line of external piles on the inboard side provide stability. The general dimensions are as follows:

- linear dock face available for moorage – 65 feet on the outboard side of the angled section
- clear width of pedestrian surface – 8 feet
- freeboard to deck – 1.25 feet

Access Ramps

The single access ramp runs from the Eastbank Esplanade at an angle to the river bank and is extensive in both size and construction. With three switchbacks and landing platforms between each section, the ramp is wide and very accessible for multi-direction travel. The access ramp has structural bulwarks with railings on either side.

ADA

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Compliant
Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Compliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Compliant
Clear Width	The clear width of ramps shall be 36 inches minimum.	Compliant
Landings	Level landings are required at doors and where ramps change direction.	Compliant
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Compliant

General Passenger Safety

Due to the dock's construction and overall width it provides a stable platform for ferry passengers to transit. There are no apparent tripping hazards. As it is a public dock, there are no railings on the outboard edges. There is low-level lighting but no apparent safety equipment (i.e. life-ring, swim ladder).

Dock Hardware

The dock has 4x4 timber bull-rails. This is insufficient for a commercial passenger vessel of the intended size.

Fendering

The current floating dock has no fendering, but a log camel has been secured along the outboard face to distribute the load and protect the concrete face.

Use Agreements

Private facility, use agreements are unknown.

Capital Improvements

Recommended capital improvements to the existing dock include:

- safety equipment
- replace bull-rails with appropriately sized cast cleats or bollards
- install sufficient fendering

6. OHSU/ZIDELL

a. Zidell Property

General Description

The Zidell property is an extensive facility that stretches along the west bank of the Willamette River from Tilikum Crossing to just south of the Ross Island Bridge. The site includes the former facilities of the Zidell shipyard.

Access/Egress

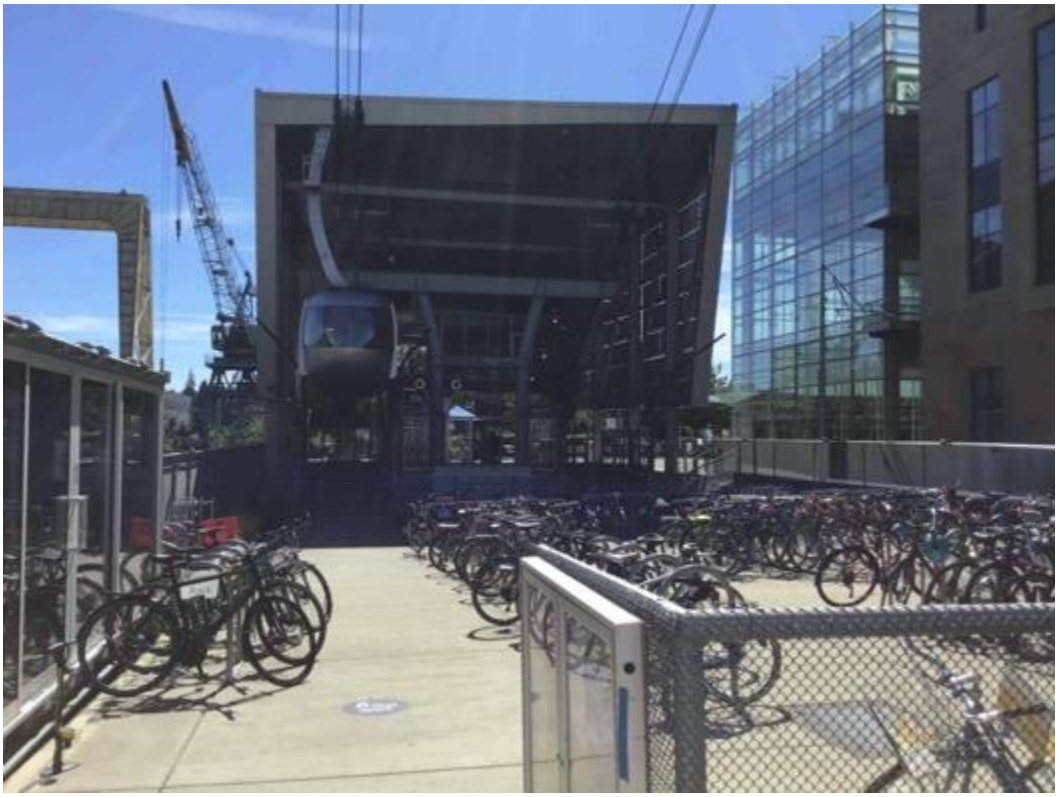
Access/egress for the general vicinity of the Zidell property is excellent for pedestrians coming from multiple directions (parking structures, transit stops, bike paths, kiss and ride). Cyclists also have excellent access via numerous multi-use paths and designated bike lanes on city streets.

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain surrounding the property. Most of the Zidell property is undeveloped.
Bicycle / Scooter Share	BikeTown hub immediately adjacent to the Zidell marine property and the OHSU Aerial Tram.
Local Transit	Two lines of the light rail (MAX), nine TriMet bus routes, one C-TRAN route, Portland Streetcar stop and the OHSU Aerial Tram.
Car / Ride Share	Uber and Lyft. One Zipcar station within 5 blocks.
Kiss and Ride	Numerous potential locations.

Parking (Auto and Bike)

There are numerous parking facilities in the vicinity. Additional parking development may be possible depending on land use. A lot for bike parking is located at the base of the OHSU Aerial Tram.



Facilities

While there are currently no facilities at the site, the Zidell Property presents extensive opportunities. It is recommended that the site be considered as both a ferry terminal and a maintenance hub for overnight moorage of the vessels and maintenance activities.

Ownership

ZRZ Realty.

Capital Improvements

While there currently are no ferry facilities, the Zidell property presents promising opportunities for a main ferry hub, terminal and maintenance facility as a part of the redevelopment plan.

b. No Existing Dock

There is currently no existing dock at the Zidell property to evaluate.

7. MILWAUKEE

a. Milwaukee Bay Park

General Description

Milwaukee Bay Park, in Milwaukee presents a future opportunity for a ferry terminal. The park is located on an 8.5-acre site nestled between the Willamette River to the west, Kellogg Creek to the south and Johnson Creek to the north. The park is also conveniently accessed from Milwaukie's downtown, just off McLoughlin Boulevard.

The park currently includes a boat launch with a dock, public restrooms and a parking lot. While the existing dock is not suitable for ferry service due to its light construction, opportunities exist for the addition of a ferry dock in the immediate vicinity.

Access/Egress

Access/egress for the general vicinity of the park is good for pedestrians coming from multiple directions (transit stops, bike paths, kiss and ride).

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain. Access to downtown Milwaukee includes crossing Highway 99 via crosswalks at a traffic light.
Bicycle / Scooter Share	None yet, Milwaukee is outside BikeTown's zone.
Local Transit	One line of the light rail (MAX) and a TriMet bus stop (4 routes).
Car / Ride Share	Uber and Lyft
Kiss and Ride	Potential at parking lot.

Parking (Auto and Bike)

There are currently no designated parking lots in the immediate vicinity.

Facilities

While there are currently no facilities specific to a ferry service other than public restrooms, there is potential for development with a modest footprint in the vicinity of the park.

Ownership

Milwaukee Bay Park is owned and operated by the City of Milwaukee.

Capital Improvements

The only necessary capital improvements to the current infrastructure include a covered waiting area, electronic kiosk and signage.

b. No Existing Dock

There is currently no suitable dock at the site to evaluate.

8. LAKE OSWEGO

a. Foothills Park

General Description

Foothills Park in Lake Oswego is nine acres on the Willamette River waterfront, just north of Roehr Park and the Oswego Pointe area. It features sweeping views of the river from a covered platform, pathways, a reflecting pond, and a grass amphitheater.

Access/Egress

Access/egress for the general vicinity of the dock is good for pedestrians coming from multiple directions (transit stops, bike paths, kiss and ride).

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Paved paths, mostly flat terrain. A short uphill walk via path to the main part of the City of Lake Oswego.
Bicycle / Scooter Share	None

Local Transit	One TriMet bus route within 0.5-mile, Lake Oswego Transit Center (four TriMet bus routes) within 0.75 mile.
Car / Ride Share	Uber and Lyft
Kiss and Ride	Foothills Park roundabout

Parking (Auto and Bike)

There is limited parking in Foothills Park. The nearest existing parking is a half mile away. There may be potential for development of additional parking on Foothills Road. There is no apparent secure bike parking in the park.

Facilities

While not intended for ferry use, the facilities at Foothills Park include public restrooms and a covered area adjacent to the roundabout.

Ownership

Foothills Park is owned by the City of Lake Oswego.

Capital Improvements

The Salmon Street terminal site will require the following capital improvements:

- electronic ticket kiosk
- signage (wayfinding)
- secure bicycle parking

b. Foothills Park Dock

Dock Description

The Foothills Park Dock is a floating dock on the west bank of the Willamette River. The dock runs parallel to the shore and is accessed by a single ramp. There is a sign on the dock that states it is not designed to support vessels over 40 feet. While length overall is not a typical metric used as dock design criteria, it is most likely intended as a guideline and warrants investigation.

Water Depths

The Foothills Park dock is in 30+ feet of water at CRD.

Exposure

The dock lies parallel to the flow of the river, along the west bank. It is exposed primarily to wind and weather from the north and the south, with both exposures having the moderate fetch.

Dimensions and Construction

The floating dock consists of a modular concrete/foam system with structural timber walers. A single line of internal piles on the inboard side provide stability. The general dimensions are as follows:

- linear dock face available for moorage – 270 feet on the outboard side
- clear width of pedestrian surface – 8 feet
- freeboard to deck – 1.25 feet

Access Ramps

The single access ramp runs from the Foothills Park pedestrian path and is perpendicular to the dock and the river. The access ramp has structural bulwarks with railings on either side.

ADA

Characteristic	Requirement	Condition
Ramp Slope	Ramp runs shall have a running slope not steeper than 1:12	Possible, need design to confirm
Cross Slope	Cross slope of ramp runs shall not be steeper than 1:48 (Ramp and dock)	Compliant
Surfaces	Deck surfaces shall be stable, firm and slip resistant. (Ramp and dock)	Compliant
Clear Width	The clear width of ramps shall be 36 inches minimum.	Compliant
Landings	Level landings are required at doors and where ramps change direction.	Compliant
Handrails	Ramp runs with a rise of greater than 6 inches shall have handrails.	Compliant

General Passenger Safety

Due to the dock's construction and overall width it provides a stable platform for ferry passengers to transit. There are no apparent tripping hazards. As it is a public dock, there are no railings on the outboard edges. There is no lighting and no apparent safety equipment (i.e. life-ring, swim ladder).

Dock Hardware

The dock is equipped with galvanized metal bull-rails. These are insufficient for a commercial passenger vessel of the size intended.

Fendering

The current floating dock has no fendering.

Use Agreements

The Foothills Park dock was funded by a Boating Infrastructure Grant (BIG). Commercial use and public access should be investigated.

Capital Improvements

Recommended capital improvements to the existing dock include:

- covered access ramp
- lighting
- safety equipment
- replace bull rails with cast cleats or bollards
- install sufficient fendering

As an alternative, it is recommended that the addition of a purpose-built ferry dock be considered. To the immediate south of the existing dock are several dolphins left over from a previous barge loading operation. If determined to be structurally sound, these dolphins could be used to support a new floating dock and access gangway similar to the existing dock. All access/egress would remain the same.

9. OREGON CITY

a. Oregon City

General Description

While there currently isn't a ferry terminal or dock in Oregon City, an extensive redevelopment of the 22-acre Blue Heron Paper Mill site is planned. As part of this plan, there is potential for a suitable ferry terminal, either as an on-demand destination or eventually for regularly scheduled transit. The site is in the downtown corridor and directly adjacent to the scenic Willamette Falls.

Partial rendering of Blue Heron Mill redevelopment

Access/Egress

Under the redevelopment plan, access/egress for the general vicinity of the development site will be good for pedestrians coming from multiple directions (parking structures, transit stops, bike paths, kiss and ride).

Transportation Links (First and Last-mile Connections)

LINK	DETAILS
Pedestrians and Cyclists	Urban streets and sidewalks, mostly flat terrain.

Bicycle / Scooter Share	None.
Local Transit	One TriMet route within 0.1 mile and the Oregon City Transit Center (8 TriMet routes) within 0.4 miles.
Car / Ride Share	Uber and Lyft
Kiss and Ride	Potential to incorporate into redevelopment plan.

Parking (Auto and Bike)

The current development plan does not specifically call out parking.

Facilities

The development plan currently identifies a location suitable for a floating dock with direct access to the site along the east bank of the river. Other facilities are not specifically called out in the plan.

Ownership

Unknown, however, the Blue Heron Mill site is owned by the Confederated Tribes of the Grand Ronde.

Capital Improvements

The redevelopment plan should consider shoreside aspects necessary to support a ferry in addition to a dock.

b. No Existing Dock

There is currently no suitable dock at the site to evaluate.

C. PERMANENT MOORAGE / MAINTENANCE FACILITY

The importance of establishing permanent moorage and a facility with the proper capabilities to perform light maintenance (daily planned maintenance activities, most things short of heavy maintenance requiring a drydock) for the ferry system cannot be overstated. It goes beyond just a dock to moor the vessels for the night. Successful ferry systems require suitable infrastructure to support operations and ensure that they can be performed efficiently.

An ideal situation would be to create a home port at or near the main hub or terminus of the route. This proximity eliminates or minimizes the need for deadheading the vessels and reduces operating costs. It also ensures all levels of the organization are centralized, maintaining good communication and common processes.

A home port would incorporate sufficient dock space for the entire fleet (as planned), with the ability to expand, providing a safe and secure environment. All logistics could be supported, such as fueling, potable water, sewage, provisioning and shore power. Light maintenance would be supported from shoreside facilities (parts storage, workshops, tools, etc.) located at the home port. Administrative offices would be onsite to foster a strong corporate culture and maintain consistent communications throughout the organization.

It is rare to identify a site that can accommodate all of these requirements. Typically, waterfront property in close proximity to the route is in high demand or has restrictions. But if the

opportunity to build a home port from a clean slate can be identified it is invaluable to the success of a ferry system.

As a part of the reconnaissance, an initial scan of potential home ports or permanent moorage locations at the very least was conducted. Port of Portland staff provided some potential locations and other sites with existing tenants (typically other marine operations) that might sublet space were investigated in order to get an initial sense of the potential. Without drawing any conclusions based on the limited amount of information, it appears that permanent moorage is available at several sites and at least the potential for some supporting infrastructure.

Of all of the sites investigated, the most promise for establishing a full home port exists at the Zidell property. As a clean slate, this site could be developed into a permanent home port in phases, beginning with temporary floats and facilities until eventually building out into a purpose-built facility capable of supporting all of the system's needs, including vessel haul outs and major overhauls.

IV. SUMMARY

As stated earlier in the report, the purpose of the Reconnaissance Report is to collect the observations made by the project team and summarize the team's findings and recommendations based on the preliminary information gathered. This information is then used to inform the direction of the feasibility study by identifying any critical barriers that must be overcome or necessary changes in the direction of the study.

A. ROUTE ASSESSMENT

Preliminary conclusions from the route assessment suggest that the route contemplated for the ferry is absolutely technically feasible. The primary challenges include the following:

- Periods of high current in the rivers will affect accurate schedule-keeping and safe navigation.
    - Mitigation – vessel design criteria to include requirements for additional speed capability (above design service speed) and maneuverability.
- Vertical clearance restrictions along the route (26 feet at Steel Bridge at CRD), particularly at extreme high-water levels.
    - Mitigation – it won't be possible to design a vessel that will achieve 100% non-lift clearance (of the bridge), the project team must determine an acceptable percentage based on historical data that can be achieved without negatively impacting vessel design.
- Vessel traffic density and complexity on the rivers registered as a moderate to high risk along the entire route.
    - Mitigation – includes elements of vessel design, vessel operators with well-established policies and procedures and comprehensive training programs, and close coordination with other user-groups.
- Speed/wake restrictions on the rivers whether imposed by local regulation or prudent seamanship.
    - Mitigation – ultra low wake (ULW) vessel design (designed and verified through testing), sound operating procedures and public outreach.
- Debris in the river presents a high risk to reliable ferry service and potential safety of passengers.
    - Mitigation – vessel design elements (impact resistance, minimize underwater appurtenances, propulsor selection, night vision cameras), vessel operators with well-established policies and procedures and comprehensive training programs.

B. DOCKS/TERMINAL SITES

Evaluation of the nine potential terminals/stops for the ferry leaves additional research to be conducted but provided the project team with a clear vision for future strategy at each site. For each site, further investigation into property ownership and use agreements is necessary. The following table summarizes the recommended strategy for each site:

SITE	INTENDED USE	TERMINAL FEASIBILITY	DOCK FEASIBILITY	DOCK ALTERNATIVE
Vancouver Terminal #1	Regularly - scheduled Ferry	Feasible under development plan	Feasible assuming use agreement and capital improvements	Design and build ferry-specific dock

Cathedral Park	Regularly - scheduled Ferry	Feasible with some capital improvements	Existing dock is not feasible as configured without major changes	Design and build ferry-specific dock
Convention Center	On Demand Service	Feasible with some capital improvements	Feasible for intended purpose with capital improvements	
Salmon Street	Regularly - scheduled Ferry	Feasible with some capital improvements	Feasible assuming use agreement and capital improvements	Design and build ferry-specific dock
OMSI	On Demand Service	Feasible with some capital improvements	Feasible for intended purpose with capital improvements	
OHSU / Zidell	Regularly - scheduled Ferry	Feasible with major capital improvements	No existing dock. Design and build ferry-specific dock	
Milwaukee	Regularly - scheduled Ferry	Feasible with some capital improvements	Existing dock is not feasible	Design and build ferry-specific dock
Lake Oswego	Regularly - scheduled Ferry	Feasible with some capital improvements	Feasible assuming use agreement and capital improvements	Design and build ferry-specific dock
Oregon City	On Demand Service	Feasible under development plan	No existing dock. Design and build ferry-specific dock	