

DRAFT

# Portland – Peaks Island Ferry

## Peaks Island Landside Operations Study

Task 1 – Existing Conditions Assessment

### Introduction

The Casco Bay Island Transit District (CBITD, aka Casco Bay Lines) operates ferries in Maine’s Casco Bay, including service between the City of Portland’s (“City”) Casco Bay Ferry Terminal on the mainland and its Peaks Island community. Peaks Island residents have raised concerns regarding the capacity of the City’s existing infrastructure on Peaks Island, specifically on Welch Street and adjacent areas, to accommodate demand on the Peaks Island Ferry. In response, the City has undertaken a review of the Casco Bay Lines ferry landing on Peaks Island and adjacent areas affected by ferry operations.

Working in partnership with Casco Bay Lines, this assessment will include a review of data related to Peaks Island ferry operations including: existing and future ridership demand, evaluation of the effects of future demand on City property on Peaks Island utilized to access the ferry, and the development of a menu of potential improvements to accommodate demand and enhance the boarding experience at Peaks Island.

### Project Purpose

The purpose of the Peaks Island Ferry Demand and Operational Analysis is to analyze and evaluate the following:

- Current conditions on Peaks Island on and around the Casco Bay Ferry Pier
- Current passenger demand for the ferry
- Impacts from ferry passenger demand on the surrounding roadway network and parking areas
- Anticipated future changes to ferry operations and passenger demand
- Effects of these changes on the surrounding roadway network and parking areas
- Strategies for managing passenger demand and impacts

### Study Area

The study area comprises the Casco Bay Lines ferry pier on Peaks Island, the Welch Street approach to the pier through the intersection of Welch Street/Island Avenue, and the parking lot off Welch Street adjacent to the ferry pier. The study is also informed by the operations of the Peaks Island Ferry operated by Casco Bay Lines.

### Existing Conditions Data

The following review of historic and current travel data for the Peaks Island Ferry is based on a review of information included in “Casco Bay Lines Schedule and Fleet Analysis,” completed March 25, 2019 for Casco Bay Lines, along with new data that was collected during the summer of 2019.



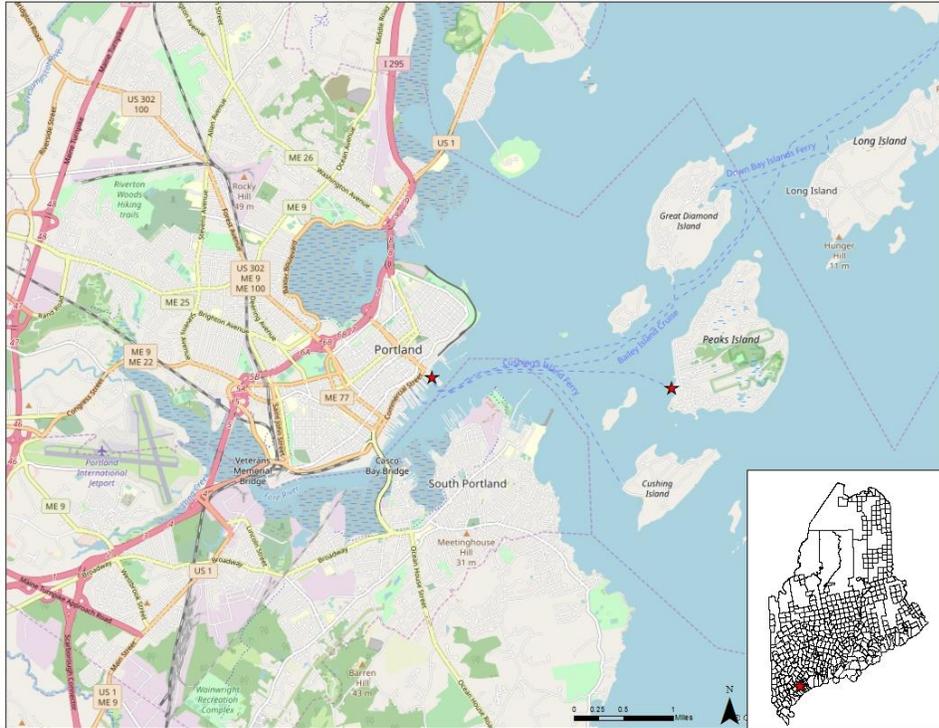


Figure 1 Ferry Location



Figure 2 Study Area: Peaks Island Ferry Pier



# Peaks Island Ferry Operations

The following is a summary of the operations of the Peaks Island Ferry and the service that it provides.

## Ferry Service

Casco Bay Lines provides the following Peaks Island Ferry service:

- The ferry schedule varies slightly by time of year:
  - Summer (highest demand): 16 daily round-trips on Weekdays, Sunday and Holidays, one extra round-trip on Saturday
  - Fall and Spring: 15 daily round-trips Monday to Thursday, 16 daily round-trips on Friday and Saturday, 14 daily round-trips on Sundays and holidays
  - Winter: 14 daily round-trips Monday to Thursday, 15 daily round-trips on Friday and Saturday, 12 daily round-trips on Sundays and holidays
- Car ferry operations
  - On Mondays and Tuesdays, car ferry operates before 6:00 PM
  - On all other days, all the trips are provided by car ferry
- Service hours: 5:45 AM – 11:30 PM for trips from Portland to Peaks Island, 6:15 AM – 11:55 PM for trips from Peaks Island to Portland
- Trip time and schedule
  - Trips take about 17 minutes each way
  - Most round-trips are scheduled on a one-hour frequency from each pier (departures from the Maine State Pier and Peaks Island pier are spaced at half-hour intervals)

## Vessel Characteristics

The Peaks Island Ferry service is provided primarily by the Machigonne II.

- Vessel name: Machigonne II
- Capacity: 399 passengers and 12 vehicles
- Limitation: Limited vehicle deck width

*“The MACHIGONNE II is a single-ended car ferry that was designed and built by Blount Marine Co. in 1987. This vessel only operates between Portland and Peaks Island. The vessel is all steel construction arranged with vehicle space and a passenger cabin on the main deck. The vessel can load/unload vehicles across both the bow and stern. Stairs from the main deck lead to an upper deck on both sides of the center car lanes with enclosed passenger cabins. Exterior stairs lead from the mezzanine deck to an open bridge deck which includes a small wheelhouse and bench seating. The freeboard at the bow and stern are different to accommodate different terminal ramp configurations. The MACHIGONNE typically loads stern-in at the Portland terminal and bow-in at the Peaks Island terminal.*”





Figure 3 M/V MACHIGONNE II

*“The hull is of single chine construction with six watertight bulkheads. The vessel is twin screw with geared diesel engines driving fixed pitch propellers. Two diesel generator sets connect to a non-parallel switchboard for electrical power.”<sup>1</sup>*

## Ferry Passenger Demand

The following high-level review of passenger demand and general travel patterns is based on historic data that was provided by CBL and summarized in the “Casco Bay Lines Schedule and Fleet Analysis,” completed March 25, 2019 for Casco Bay Lines.

Peaks Island Ferry ridership (shown in Figure 4) fluctuates significantly by season. The passenger demand and ferry ridership has major demand peaks during July and August, with demand that is much higher during these two months. This pattern is obvious from Figure 4, with those two summer months experiencing demand that is much higher than off-peak months, which reflects the tourist and recreational nature of much of the peak demand for the Peaks Island Ferry.

In addition, it is the peak summer passenger demand that is growing most significantly. The volume of passenger demand during summer peak periods has experienced major growth from 2009 to 2016. From 2000 to 2009, the Peaks Island Ferry summer passenger demand was roughly consistent, with July and August ridership of roughly 100,000 passengers per month. From 2009 to 2016, however, this demand rose from that level to more than 130,000 passengers per month. Starting in 2014, Casco Bay Lines increased the number of ferry trips to accommodate passenger demand.

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<sup>1</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019



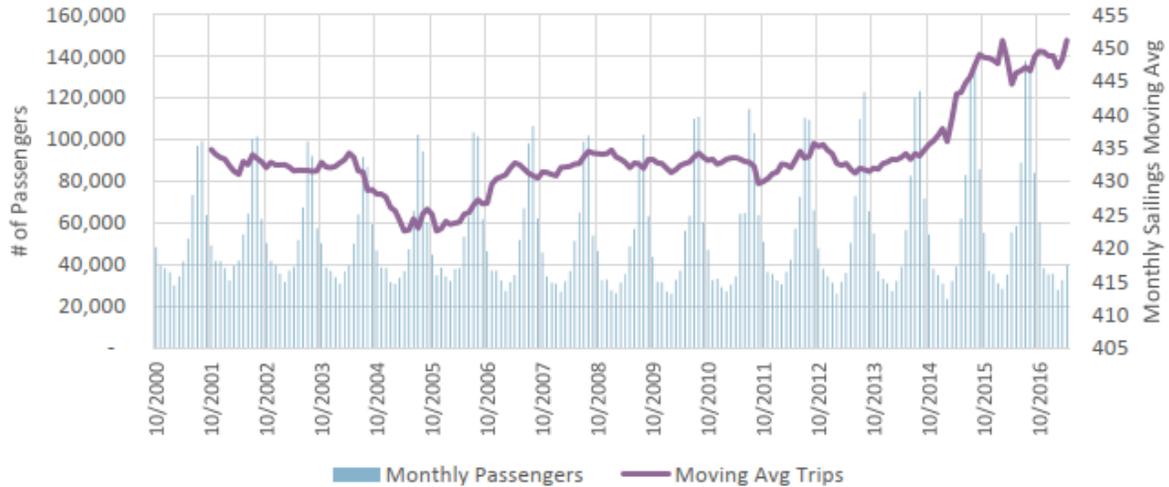


Figure 4 Peaks Island Total Monthly Ridership (October 2000 – April 2017) and Monthly Sailings (12 month moving average)<sup>2</sup>

The Peak Island Ferry rarely experiences passenger capacity constraints during off-peak periods. However, during peak summer days (weekend days during the summer season, between June and September), the Peaks Island Ferry frequently experiences capacity constraints. CBL often adds vessel trips, especially during Sunday afternoon summer demand peaks.

The passengers waiting for the ferry during summer peak season can sometimes reach the 399 capacity of the vessel. Although the Machigonne’s total vessel capacity is 399 passengers, there are only 277 seats available, and sailings can feel crowded to customers before the capacity limit is reached.<sup>3</sup>

### Passenger Demand and Travel Patterns

This historic data provides information on the general travel patterns of Peaks Island Ferry users. The summer hourly passenger demand is generally more balanced between the two ferry travel directions. Off-season (Fall, Winter, and Spring) hourly ridership displays a more obvious directional pattern typical of commuters. Peaks Island residents leave the island in the morning hours and return in the evening hours.

<sup>2</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019

<sup>3</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019



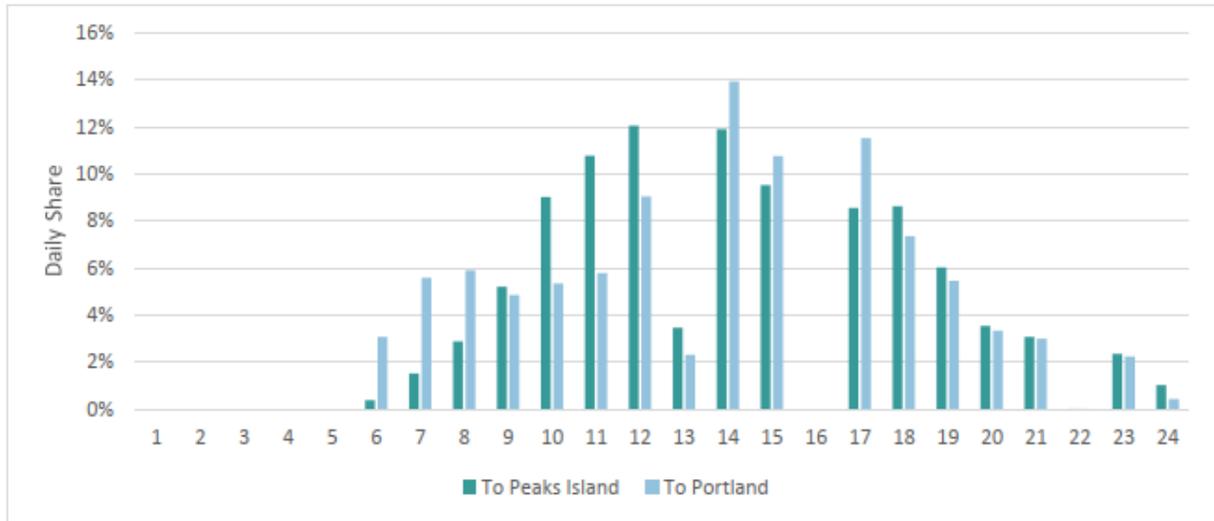


Figure 5 Peaks Island Hourly Ridership Profile – Summer Season<sup>4</sup>

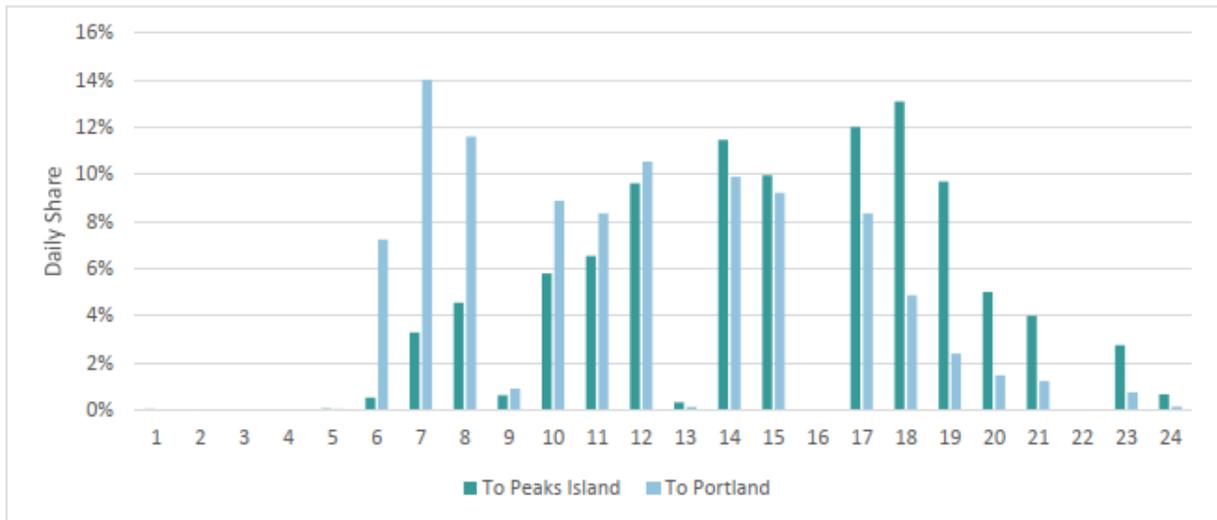


Figure 6 Peaks Island Hourly Ridership Profile – Off-Season<sup>5</sup>

Vehicle travel patterns during summer months are also very directional, and are consistent with commuting behavior, during both weekdays and weekends. This suggests commuting traffic during the week and weekend-long trips on the weekend.

<sup>4</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019

<sup>5</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019



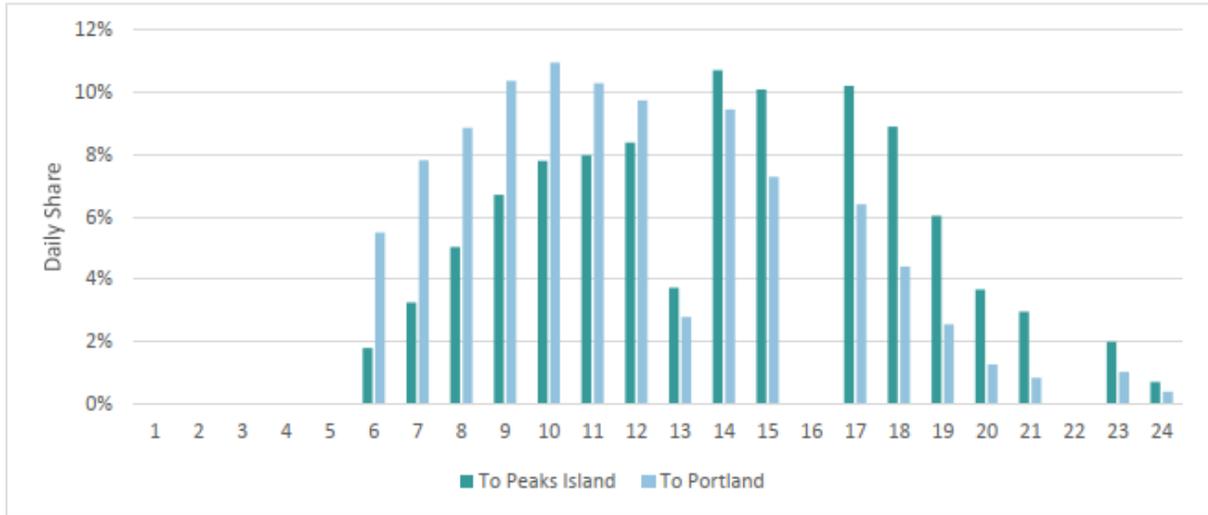


Figure 7 Peaks Island Hourly Vehicle Profile - Summer Season<sup>6</sup>

Off-season (Fall, Winter, and Spring) vehicle demand for the Peaks Island Ferry is less consistent. Historic data suggests commuter travel on weekdays, along with more midday travel on the weekends (74 percent of passengers traveling between 10:00 am and 5:00 pm).<sup>7</sup>

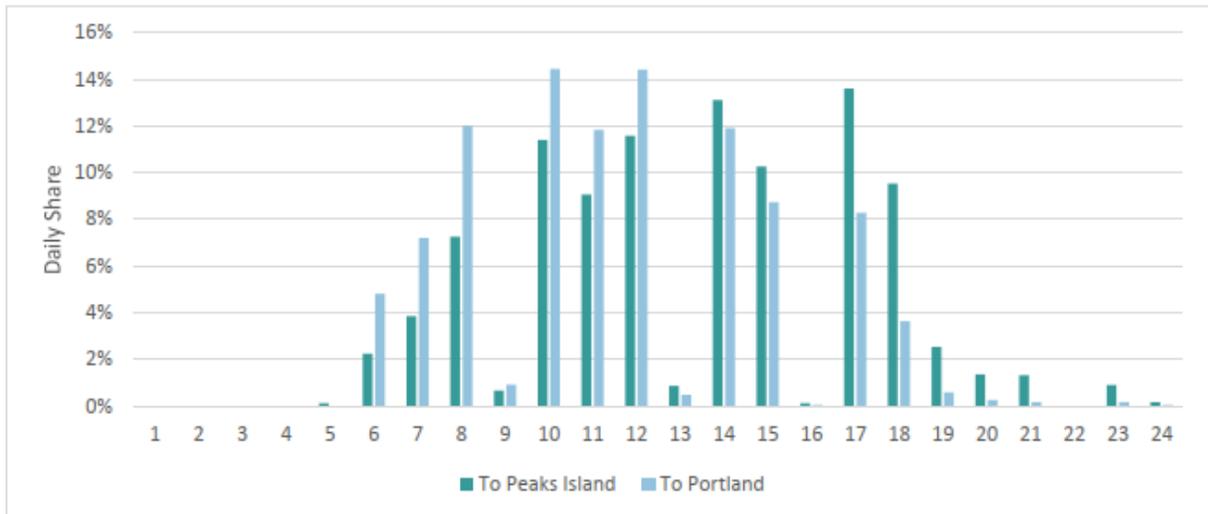


Figure 8 Peaks Island Hourly Vehicle Profile - Off-Season<sup>8</sup>

<sup>6</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019

<sup>7</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019

<sup>8</sup> Casco Bay Lines Schedule and Fleet Analysis, March 25, 2019



# Transportation Demand and Impacts

The following is a detailed assessment of current passenger demand and travel patterns for the Peaks Island Ferry. This assessment is based on data collected during the 2019 summer peak season. Video of passenger and vehicle operations was recorded at the Peaks Island Pier and surrounding areas, including the intersection of Welch Street/Island Avenue and the Welch Street parking lot from Wednesday, August 28 to Monday, September 2, 2019.

- The highest ridership trips are on Saturday and Sundays.
- Peak ridership for outbound trips (Portland to Peak Island) is on Saturday morning, and peak ridership for inbound trips (Peak Island to Portland) is Sunday afternoon. This is consistent with the expected tourist travel pattern.
- High vehicle volume on Wednesday afternoons on Outbound trips due to reduced fares.

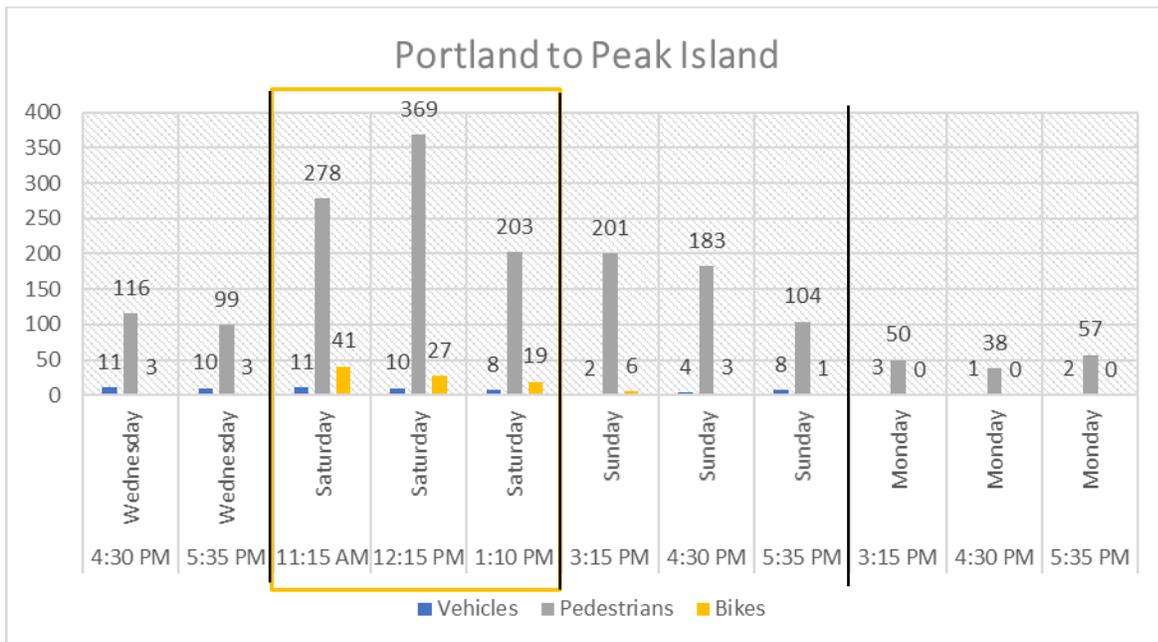


Figure 9 Portland to Peaks Island Ferry Ridership for Vehicles, Pedestrians and Bicycles



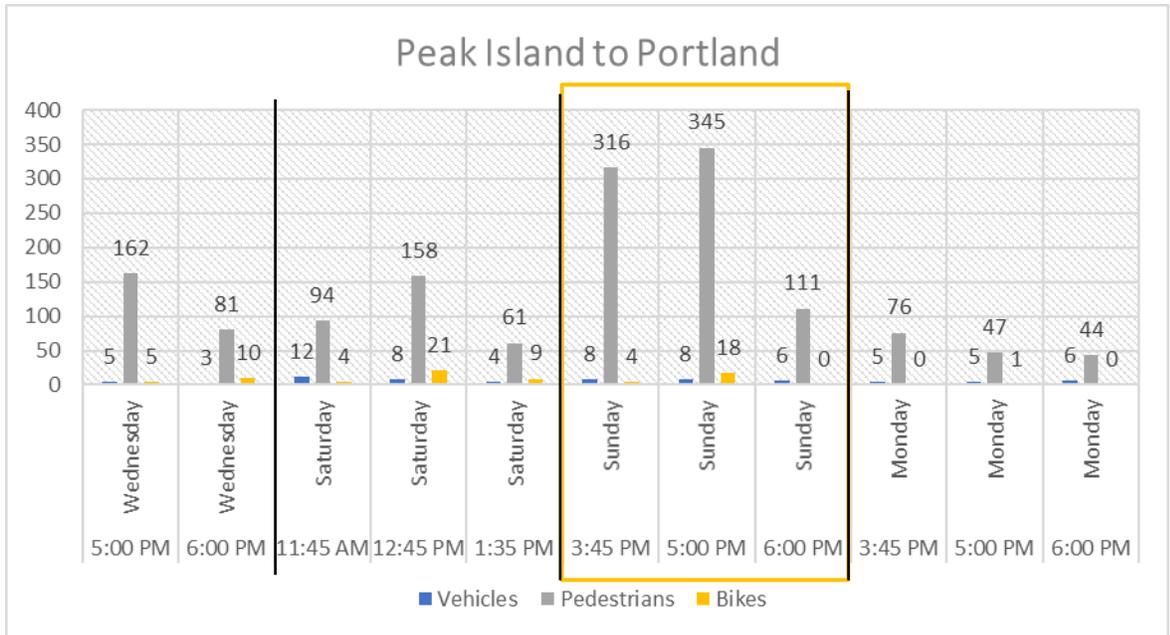


Figure 10 Peaks Island to Portland Ferry Ridership for Vehicles, Pedestrians and Bicycles

## Vehicle Demand and Volumes

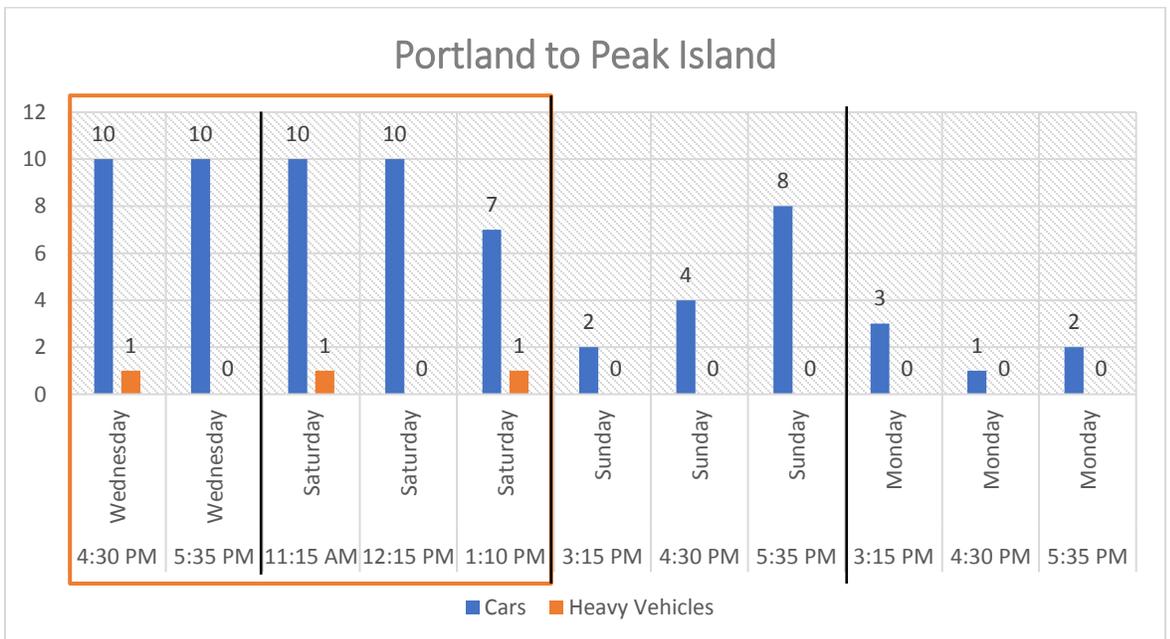


Figure 11 Portland to Peaks Island Ferry Ridership for Vehicles



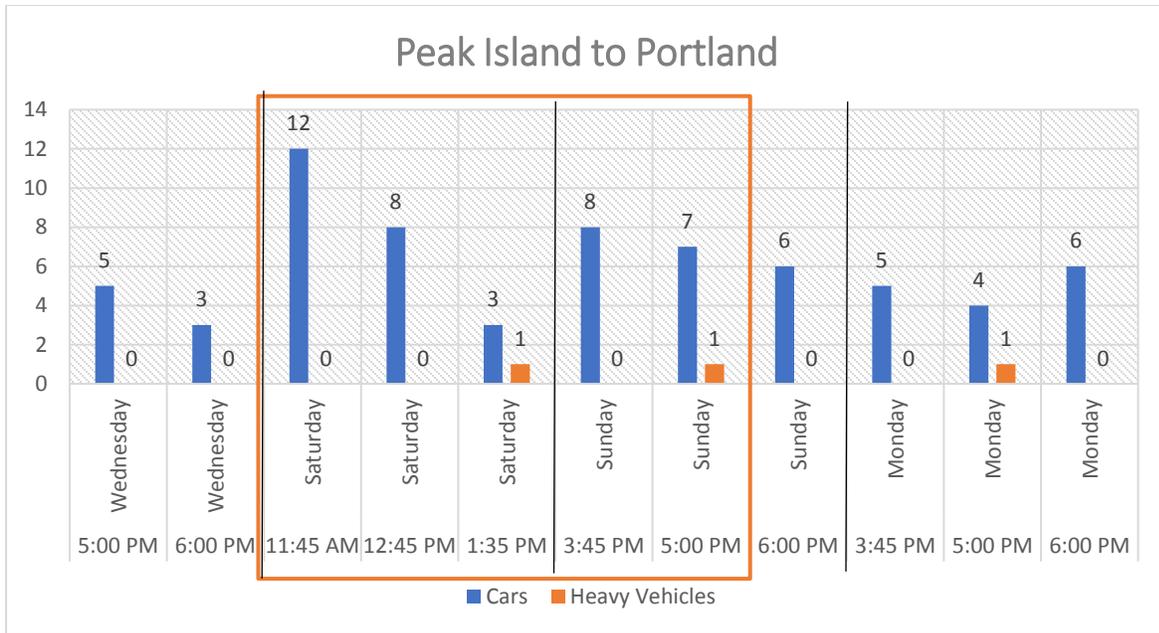


Figure 12 Peaks Island to Portland Ferry Ridership for Vehicles

### Vehicle Queuing

- During peak demand periods, vehicles queue up along Welch Street to Island Avenue, and then extend onto the northern leg of the intersection, on southbound Island Avenue approaching Welch Street.
- The highest vehicle demand was observed on Saturday morning. The vehicle queue for the 11:45 departure from Peaks Island totaled 15 vehicles, including one truck. As a result, the 11:45 vessel carried a full load of 12 vehicles, and three more vehicles from that queue were forced to wait for the next ferry.
- The waiting area on the Welch Street can accommodate about 10 cars; longer queues on weekends typically exceed this storage capacity and extends onto Island Avenue.
- During peak hours, 21 percent – 35 percent of the vehicles passing through the intersection of Island Avenue/Welch Street were headed to the pier area.
- The number of cars driving to the pier area is higher during peak periods than it is during off-peak periods.





Figure 13 Vehicle Queuing Area



Figure 14 Vehicle Queuing during Peak Hours

Table 1 Turning Movement Counts (TMCs) for Intersection of Island Ave/Welch St During Weekend Peak Hours (Saturday, Aug 31st, 11:00 AM – 2:00 PM)

	Island Ave					Welch St					Island Ave					Welch St					Total	Driving Into The Pier	% of Cars Driving Into The Pier
	From North					From East					From South					From West							
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total			
11:00 AM	9	13	4	0	26	0	1	0	0	1	1	12	3	0	16	6	3	3	0	12	55	13	23.64%
11:15 AM	10	23	4	1	38	0	0	0	0	0	0	20	7	0	27	4	0	4	0	8	73	17	23.29%
11:30 AM	10	15	7	2	34	2	0	0	0	2	3	10	0	0	13	6	2	7	0	15	64	10	15.63%
11:45 AM	7	14	4	0	25	3	1	0	0	4	0	16	6	0	22	6	1	7	0	14	65	14	21.54%
Total	36	65	19	3	123	5	2	0	0	7	4	58	16	0	78	22	6	21	0	49	257	54	21.01%
12:00 PM	3	12	1	0	16	1	3	0	0	4	0	9	5	0	14	3	0	1	0	4	38	11	28.95%
12:15 PM	2	14	0	1	17	2	0	1	0	3	0	8	7	0	15	5	1	5	0	11	46	9	19.57%
12:30 PM	16	11	3	0	30	6	1	0	0	7	2	10	5	0	17	2	1	7	0	10	64	22	34.38%
12:45 PM	8	10	4	0	22	1	1	1	0	3	0	11	3	0	14	15	1	17	0	33	72	12	16.67%
Total	29	47	8	1	85	10	5	2	0	17	2	38	20	0	60	25	3	30	0	58	220	54	24.55%
1:00 PM	9	10	3	1	23	1	1	1	0	3	0	18	0	0	18	4	1	5	0	10	54	10	18.52%
1:15 PM	8	20	3	1	32	1	0	0	0	1	2	9	4	0	15	0	0	4	0	4	52	12	23.08%
1:30 PM	3	15	3	0	21	6	1	1	0	8	0	10	3	0	13	1	0	1	0	2	44	7	15.91%
1:45 PM	5	13	1	0	19	4	0	0	0	4	2	18	4	0	24	5	0	13	0	18	65	9	13.85%
Total	25	58	10	2	95	12	2	2	0	16	4	55	11	0	70	10	1	23	0	34	215	38	17.67%
Grand Total	90	170	37	6	303	27	9	4	0	40	10	151	47	0	208	57	10	74	0	141	692	146	21.10%



Table 2 TMCs for Intersection of Island Ave/Welch St During Afternoon Peak Weekday Hours (Wednesday, Aug 28th, 04:00 AM - 7:00 PM)

	Island Ave					Welch St					Island Ave					Welch St					Total	Driving Into The Pier	% of Cars Driving Into The Pier
	From North					From East					From South					From West							
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total			
4:00 PM	12	13	2	0	27	3	0	1	0	4	0	10	1	0	11	0	2	13	0	15	57	13	22.81%
4:15 PM	3	7	3	1	14	1	1	0	0	2	1	8	2	0	11	0	0	6	0	6	33	6	18.18%
4:30 PM	9	8	7	1	25	3	4	0	0	7	2	8	3	0	13	1	0	2	0	3	48	16	33.33%
4:45 PM	12	11	6	0	29	4	1	1	0	6	1	11	3	0	15	10	4	18	0	32	82	16	19.51%
<b>Total</b>	<b>36</b>	<b>39</b>	<b>18</b>	<b>2</b>	<b>95</b>	<b>11</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>19</b>	<b>4</b>	<b>37</b>	<b>9</b>	<b>0</b>	<b>50</b>	<b>11</b>	<b>6</b>	<b>39</b>	<b>0</b>	<b>56</b>	<b>220</b>	<b>51</b>	<b>23.18%</b>
5:00 PM	4	4	1	0	9	0	0	1	0	1	0	10	0	0	10	4	0	2	0	6	26	4	15.38%
5:15 PM	4	5	3	0	12	2	0	0	0	2	0	1	2	0	3	3	0	3	0	6	23	6	26.09%
5:30 PM	1	3	2	1	7	2	0	0	0	2	1	3	0	0	4	0	0	1	0	1	14	1	7.14%
5:45 PM	16	6	1	2	25	4	1	1	0	6	1	6	3	1	11	12	2	17	0	31	73	20	27.40%
<b>Total</b>	<b>25</b>	<b>18</b>	<b>7</b>	<b>3</b>	<b>53</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>11</b>	<b>2</b>	<b>20</b>	<b>5</b>	<b>1</b>	<b>28</b>	<b>19</b>	<b>2</b>	<b>23</b>	<b>0</b>	<b>44</b>	<b>136</b>	<b>31</b>	<b>22.79%</b>
6:00 PM	4	13	3	0	20	3	0	0	0	3	0	10	1	0	11	2	1	6	0	9	43	5	11.63%
6:15 PM	0	13	1	0	14	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	22	0	0.00%
6:30 PM	1	7	0	1	9	2	0	0	0	2	1	3	0	0	4	0	0	1	0	1	16	1	6.25%
6:45 PM	0	8	0	1	9	0	0	0	0	0	2	10	0	0	12	1	0	0	0	1	22	0	0.00%
<b>Total</b>	<b>5</b>	<b>41</b>	<b>4</b>	<b>2</b>	<b>52</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>31</b>	<b>1</b>	<b>0</b>	<b>35</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>11</b>	<b>103</b>	<b>6</b>	<b>5.83%</b>
<b>Grand Total</b>	<b>66</b>	<b>98</b>	<b>29</b>	<b>7</b>	<b>200</b>	<b>24</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>35</b>	<b>9</b>	<b>88</b>	<b>15</b>	<b>1</b>	<b>113</b>	<b>33</b>	<b>9</b>	<b>69</b>	<b>0</b>	<b>111</b>	<b>459</b>	<b>88</b>	<b>19.17%</b>



Table 3 TMCs for Intersection of Island Ave/Welch St During Labor Day Holiday Hours (Monday, Sep 2nd, 03:30 AM – 7:00 PM)

	Island Ave					Welch St					Island Ave					Welch St					Total	Driving Into The Pier	% of Cars Driving Into The Pier
	From North					From East					From South					From West							
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total			
3:30 PM	12	8	3	0	23	4	0	0	0	4	1	10	10	0	21	8	4	10	0	22	70	22	31.43%
3:45 PM	3	8	2	2	15	0	1	0	0	1	0	10	0	0	10	3	0	1	0	4	30	4	13.33%
Total	15	16	5	2	38	4	1	0	0	5	1	20	10	0	31	11	4	11	0	26	100	26	26.00%
4:00 PM	3	9	3	1	16	0	0	0	0	0	0	9	1	0	10	1	0	2	0	3	29	4	13.79%
4:15 PM	2	11	1	0	14	3	0	3	0	6	0	5	1	0	6	1	0	3	0	4	30	3	10.00%
4:30 PM	2	6	3	0	11	2	0	0	0	2	0	4	1	1	6	1	0	1	0	2	21	3	14.29%
4:45 PM	5	6	3	0	14	7	1	0	0	8	1	6	4	0	11	4	1	11	0	16	49	10	20.41%
Total	12	32	10	1	55	12	1	3	0	16	1	24	7	1	33	7	1	17	0	25	129	20	15.50%
5:00 PM	2	8	0	0	10	6	0	0	0	6	1	7	0	0	8	1	0	0	0	1	25	2	8.00%
5:15 PM	1	4	1	0	6	2	0	0	0	2	0	2	2	0	4	0	0	2	0	2	14	3	21.43%
5:30 PM	3	3	1	0	7	1	0	0	0	1	0	5	5	0	10	1	0	0	0	1	19	8	42.11%
5:45 PM	9	6	1	0	16	1	1	1	0	3	0	2	1	0	3	7	2	5	0	14	36	11	30.56%
Total	15	21	3	0	39	10	1	1	0	12	1	16	8	0	25	9	2	7	0	18	94	24	25.53%
6:00 PM	3	4	1	0	8	3	0	0	0	3	0	5	1	0	6	1	0	9	0	10	27	4	14.81%
6:15 PM	0	8	1	0	9	0	0	0	0	0	0	7	1	1	9	1	0	1	0	2	20	1	5.00%
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA
Total	3	12	2	0	17	3	0	0	0	3	0	12	2	1	15	2	0	10	0	12	47	5	10.64%
Grand Total	45	81	20	3	149	29	3	4	0	36	3	72	27	2	104	29	7	45	0	81	370	75	20.27%



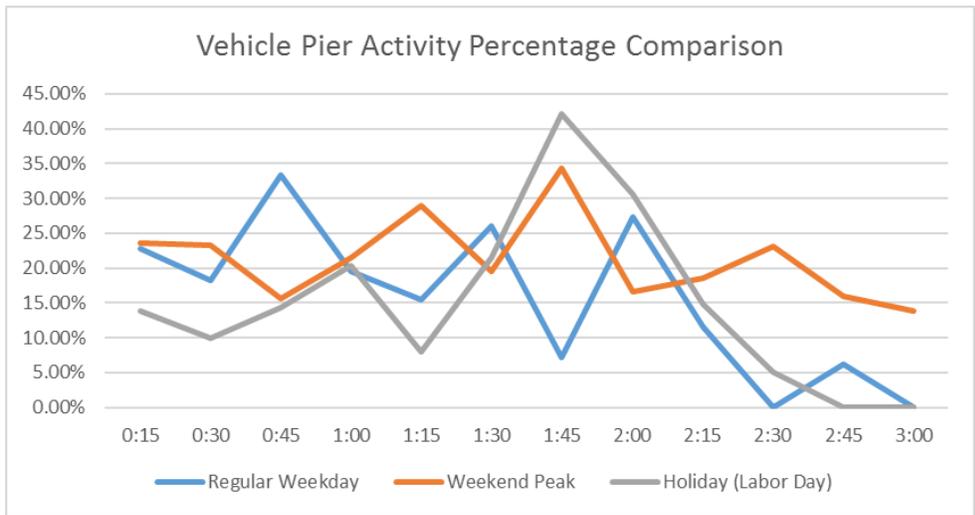


Figure 15 Percent of Vehicles going into Pier Area from Intersection of Island Ave and Welch St

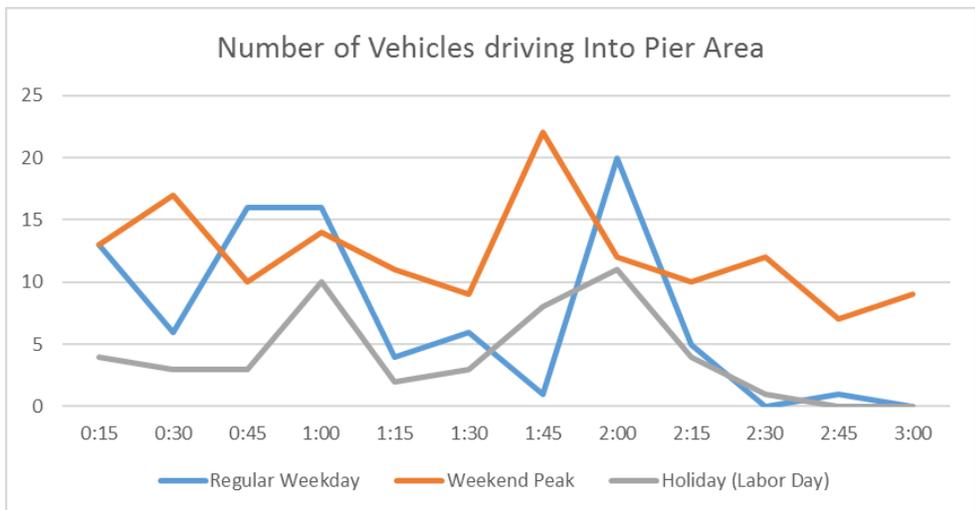


Figure 16 Number of Vehicles going into Pier Area from Intersection of Island Ave and Welch St



## Pedestrian and Bicycle Demand

- During summer peak season, the highest pedestrian and bicycle demands are on Saturdays and Sundays
- The highest ridership for Portland to Peak Island ferries is on Saturday morning, and the highest ridership for Peak Island to Portland ferries is on Sunday afternoon, which fits the tourists travel patterns.
- The highest bicycle ridership is on Saturday morning, with 41 bicycles on the 11:15 am ferry and 27 on the next.
- We expected to see a peak volume on holiday (Labor Day), but the volume on Labor Day is similar to the volume of a regular weekday

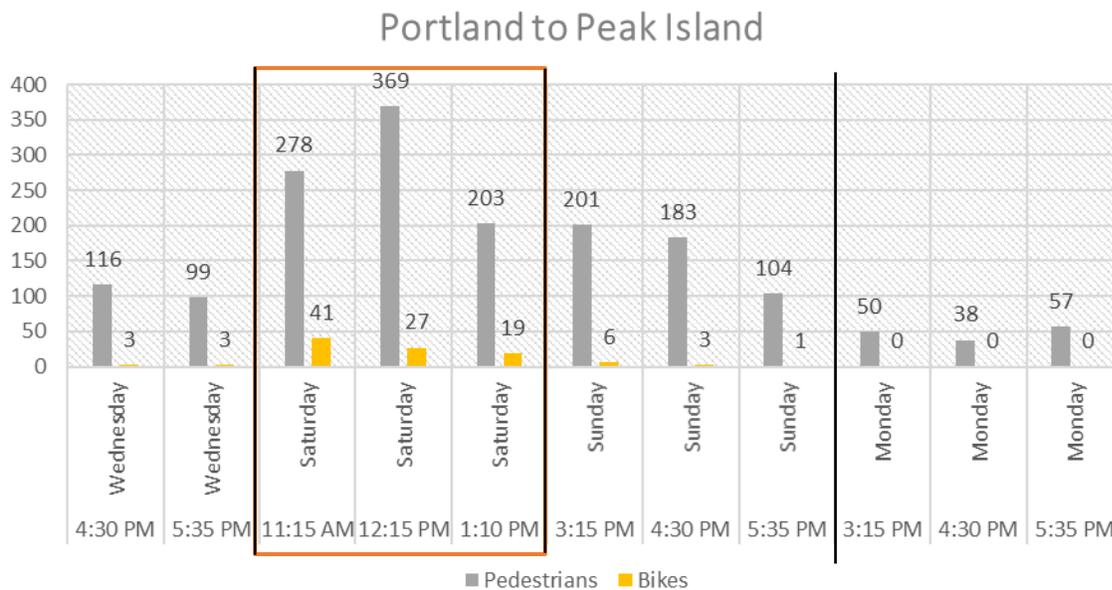


Figure 17 Portland to Peaks Island Ferry Ridership for Pedestrians and Bicycles



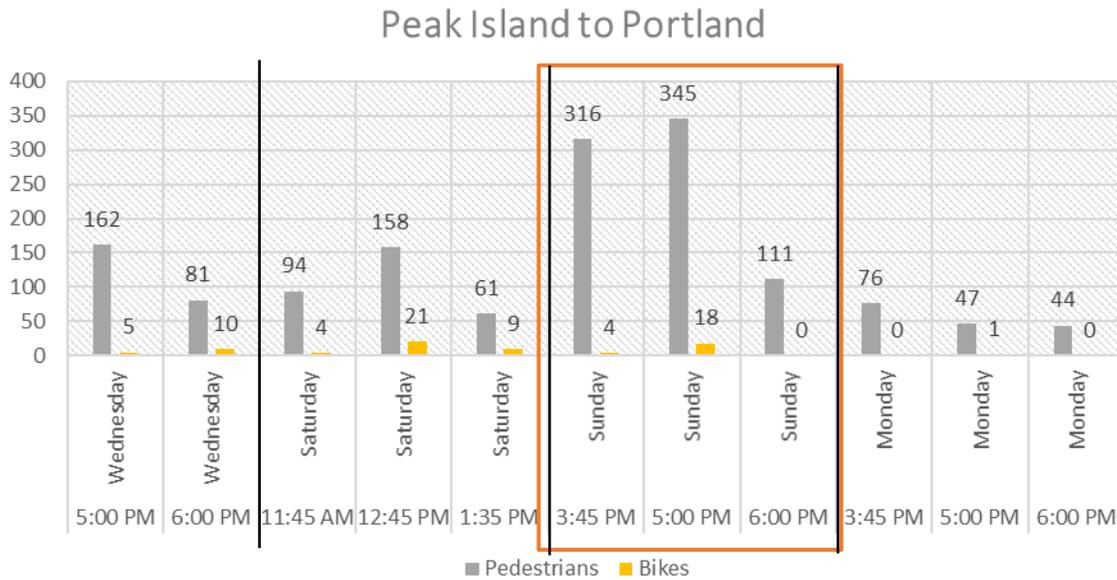


Figure 18 Peaks Island to Portland Ferry Ridership for Pedestrians and Bicycles

### Pedestrian and Bicycle Queuing

- Long pedestrian/bicycle queues were observed during peak hours.
- Significant pedestrian/bicycle volume increase in the intersection of Welch Street/Island Avenue during ferry peak hours comparing to weekday off-peak time.
- High pedestrian and bicycle demand is also apparent from the volume of people walking or riding along Island Avenue during weekends.
- There’s no shelter for pedestrian/bicycle queues.
- The pedestrian queue sometimes blocks the driveway on the north side of Welch Street.

#### *Peaks Island to Portland Peak:*

Time: Sunday 5:00 PM

Pedestrian/bicycle queue length observed: 180 ft.

Pedestrians on board: 345

Bicycles on board: 18





Figure 19 Pedestrian and Bicycle Queuing Area



Figure 20 Passengers/Bicycles Unloading During Peak Hours





Figure 21 Pedestrian/Bicycle Queuing During Peak Hours



Figure 22 Pedestrian/Bicycle Queue Blocking the Driveway During Peak Hours



*Portland to Peaks Island Peak:*

Time: Saturday, arriving Peak Island at 12:43 PM

Pedestrians onboard: 369

Bicycles onboard: 27

Vehicles onboard: 10

Between 12:30 pm and 1:15 pm, 440 pedestrians walked past the intersections of Island Ave and Welch St. 369 of them are passengers from the ferry arriving at 12:43 PM. Volume of pedestrians walking past the intersections during a three-hour period on a regular week day is 276, and volume of a three-hour period on Labor Day (3:30 pm – 6:30 pm) is 210.

*Table 4 Pedestrian TMCs during Weekend Peak Hours*

	Island Ave			Welch St			Island Ave			Welch St			Total
	from North			from East			from South			from West			
	CW-EB	CW-WB	Total	CW-SB	CW-NB	Total	CW-WB	CW-EB	Total	CW-NB	CW-SB	Total	
11:00 AM	0	3	3	0	0	0	1	3	4	16	16	32	39
11:15 AM	5	0	5	0	0	0	0	5	5	4	24	28	38
11:30 AM	5	11	16	0	0	0	3	0	3	8	23	31	50
11:45 AM	20	6	26	6	0	6	3	5	8	72	69	141	181
Total	30	20	50	6	0	6	7	13	20	100	132	232	308
12:00 PM	2	0	2	1	4	5	11	4	15	28	9	37	59
12:15 PM	3	1	4	3	5	8	4	4	8	34	28	62	82
12:30 PM	0	3	3	1	4	5	16	4	20	24	19	43	71
12:45 PM	6	0	6	1	5	6	21	24	45	136	57	193	250
Total	11	4	15	6	18	24	52	36	88	222	113	335	462
1:00 PM	1	2	3	0	5	5	9	8	17	51	43	94	119
1:15 PM	1	2	3	0	0	0	6	8	14	27	39	66	83
1:30 PM	1	1	2	1	0	1	5	2	7	34	27	61	71
1:45 PM	0	8	8	1	10	11	15	9	24	68	78	146	189
Total	3	13	16	2	15	17	35	27	62	180	187	367	462
Grand Total	44	37	81	14	33	47	94	76	170	502	432	934	1232



Table 5 Pedestrian TMCs during Weekday Afternoon Peak Period

	Island Ave			Welch St			Island Ave			Welch St			Total
	from North			from East			from South			from West			
	CW-EB	CW-WB	Total	CW-SB	CW-NB	Total	CW-WB	CW-EB	Total	CW-NB	CW-SB	Total	
4:00 PM	0	1	1	0	0	0	0	0	0	4	7	11	12
4:15 PM	0	4	4	0	0	0	0	0	0	20	13	33	37
4:30 PM	2	4	6	0	0	0	4	0	4	12	5	17	27
4:45 PM	6	3	9	0	0	0	1	9	10	14	3	17	36
Total	8	12	20	0	0	0	5	9	14	50	28	78	112
5:00 PM	1	1	2	0	0	0	3	7	10	9	13	22	34
5:15 PM	1	0	1	0	0	0	5	5	10	15	16	31	42
5:30 PM	1	0	1	0	0	0	0	2	2	6	9	15	18
5:45 PM	3	4	7	0	0	0	0	12	12	9	5	14	33
Total	6	5	11	0	0	0	8	26	34	39	43	82	127
6:00 PM	0	2	2	0	0	0	0	0	0	6	0	6	8
6:15 PM	0	0	0	0	0	0	0	3	3	1	10	11	14
6:30 PM	0	0	0	0	0	0	0	0	0	4	0	4	4
6:45 PM	0	0	0	0	0	0	2	0	2	7	2	9	11
Total	0	2	2	0	0	0	2	3	5	18	12	30	37
Grand Total	14	19	33	0	0	0	15	38	53	107	83	190	276



Table 6 Pedestrian TMC during Holiday (Labor Day)

	Island Ave			Welch St			Island Ave			Welch St			Total
	from North			from East			from South						
	CW-EB	CW-WB	Total	CW-SB	CW-NB	Total	CW-WB	CW-EB	Total	CW-NB	CW-SB	Total	
3:30 PM	0	11	11	0	0	0	5	7	12	20	18	38	61
3:45 PM	1	0	1	2	0	2	0	0	0	9	14	23	26
Total	1	11	12	2	0	2	5	7	12	29	32	61	87
4:00 PM	0	0	0	3	0	3	0	6	6	0	7	7	16
4:15 PM	2	1	3	1	0	1	4	5	9	14	6	20	33
4:30 PM	1	0	1	0	0	0	0	3	3	1	3	4	8
4:45 PM	2	2	4	0	0	0	3	2	5	10	5	15	24
Total	5	3	8	4	0	4	7	16	23	25	21	46	81
5:00 PM	0	0	0	0	0	0	0	0	0	7	5	12	12
5:15 PM	0	0	0	0	0	0	0	0	0	1	2	3	3
5:30 PM	0	0	0	0	0	0	1	0	1	5	3	8	9
5:45 PM	0	0	0	0	0	0	0	1	1	4	2	6	7
Total	0	0	0	0	0	0	1	1	2	17	12	29	31
6:00 PM	1	0	1	0	0	0	2	0	2	1	1	2	5
6:15 PM	0	0	0	0	0	0	0	0	0	2	4	6	6
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	1	0	0	0	2	0	2	3	5	8	11
Grand Total	7	14	21	6	0	6	15	24	39	74	70	144	210



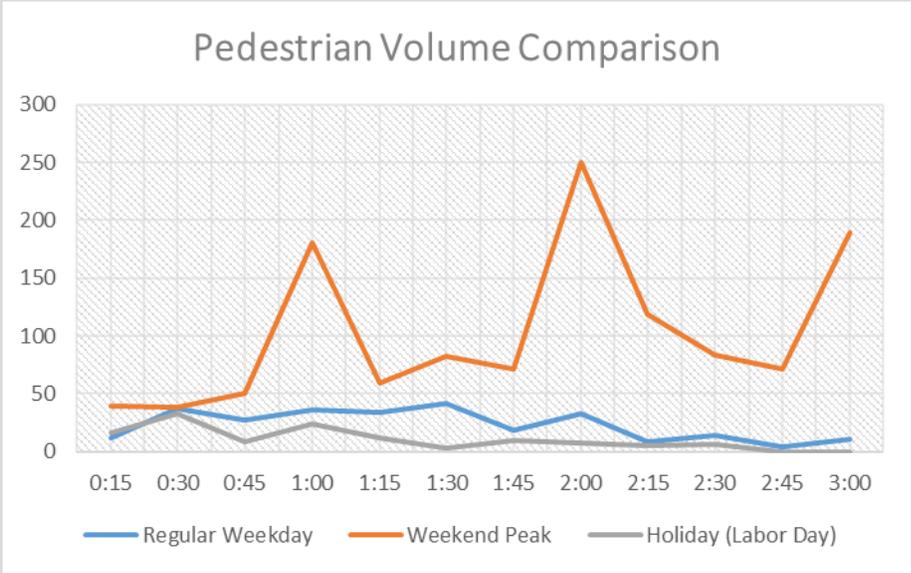


Figure 23 Pedestrian Volume at the intersection of Island Ave and Welch St



Table 7 Bicycle TMCs during Saturday Peak Hours

	Island Ave							Welch St							Island Ave							Welch St							Total
	From North							From East							From South							From West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
11:00 AM	0	21	0	0	0	0	21	0	0	1	0	0	0	1	0	5	0	1	2	0	8	0	0	0	0	1	2	3	33
11:15 AM	0	9	0	0	0	2	11	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	1	0	0	0	1	16
11:30 AM	12	6	0	0	0	1	19	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	1	0	0	3	4	27
11:45 AM	1	0	1	0	8	0	10	0	0	0	0	0	0	0	0	6	2	0	0	0	8	0	0	3	0	6	0	9	27
<b>Total</b>	<b>13</b>	<b>36</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>3</b>	<b>61</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>19</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>24</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>7</b>	<b>5</b>	<b>17</b>	<b>103</b>
12:00 PM	0	17	2	0	0	0	19	0	0	0	0	0	0	0	0	8	4	0	0	1	13	2	0	0	0	3	2	7	39
12:15 PM	2	16	0	0	0	0	18	6	0	0	0	0	0	6	0	18	1	0	0	1	20	0	0	0	0	1	3	4	48
12:30 PM	10	9	0	0	0	0	19	0	2	0	0	0	0	2	3	18	0	0	1	1	23	0	0	0	0	3	2	5	49
12:45 PM	1	12	1	0	1	0	15	0	0	0	0	0	0	0	1	7	0	0	3	1	12	4	1	1	0	6	3	15	42
<b>Total</b>	<b>13</b>	<b>54</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>71</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>	<b>51</b>	<b>5</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>68</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>13</b>	<b>10</b>	<b>31</b>	<b>178</b>
1:00 PM	3	15	1	0	0	0	19	0	1	0	0	0	0	1	2	21	1	0	3	1	28	0	0	1	0	0	0	1	49
1:15 PM	1	29	3	0	0	0	33	3	0	0	0	0	0	3	0	9	1	0	1	0	11	0	0	3	0	1	3	7	54
1:30 PM	5	8	0	0	0	0	13	1	0	0	0	0	0	1	2	13	0	0	0	0	15	0	0	2	0	0	0	2	31
1:45 PM	1	15	1	0	0	0	17	1	0	0	0	0	0	1	2	31	5	0	0	0	38	21	0	2	0	0	0	23	79
<b>Total</b>	<b>10</b>	<b>67</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>82</b>	<b>5</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>6</b>	<b>74</b>	<b>7</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>92</b>	<b>21</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>33</b>	<b>213</b>
<b>Grand Total</b>	<b>36</b>	<b>157</b>	<b>9</b>	<b>0</b>	<b>9</b>	<b>3</b>	<b>214</b>	<b>11</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>10</b>	<b>144</b>	<b>14</b>	<b>1</b>	<b>10</b>	<b>5</b>	<b>184</b>	<b>27</b>	<b>1</b>	<b>14</b>	<b>0</b>	<b>21</b>	<b>18</b>	<b>81</b>	<b>494</b>



Table 8 Bicycle TMCs during Weekday Afternoon Peak Period

	Island Ave							Welch St							Island Ave							Welch St							Total
	From North							From East							From South							From West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	1	2	0	0	0	0	3	0	0	0	0	0	0	0	0	1	4	0	0	0	5	0	0	0	0	0	1	1	9
4:15 PM	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	1	0	1	7
4:30 PM	1	1	1	0	0	0	3	1	3	0	0	0	4	0	0	0	0	1	0	1	1	0	3	0	0	0	4	12	
4:45 PM	2	2	3	0	0	1	8	0	0	0	0	0	0	0	2	0	0	0	0	2	1	0	3	0	0	8	12	22	
<b>Total</b>	<b>4</b>	<b>8</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>17</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>18</b>	<b>50</b>	
5:00 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
5:15 PM	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
5:30 PM	0	3	0	0	0	0	3	0	0	0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	7	
5:45 PM	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	0	1	3	0	0	8	0	0	0	8	12	
<b>Total</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>22</b>	
6:00 PM	0	2	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	1	1	5	
6:15 PM	0	2	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3	
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	1	1	3	
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>11</b>	
<b>Grand Total</b>	<b>4</b>	<b>18</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>28</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>17</b>	<b>4</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>23</b>	<b>2</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>1</b>	<b>11</b>	<b>28</b>	<b>83</b>	



Table 9 Bicycle TMCs on Holiday (Labor Day)

	Island Ave							Welch St							Island Ave							Welch St							Total
	From North							From East							From South							From West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	2	0	0	0	0	2	1	0	0	0	0	0	1	0	2	0	0	0	0	2	0	0	0	0	0	1	1	6
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	
4:45 PM	2	3	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	2	3	9	
<b>Total</b>	<b>2</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>5</b>	<b>17</b>	
5:00 PM	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	2	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	
<b>Total</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>5</b>	
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	1	0	0	0	0	0	1	3	
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>	
<b>Grand Total</b>	<b>3</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>25</b>	



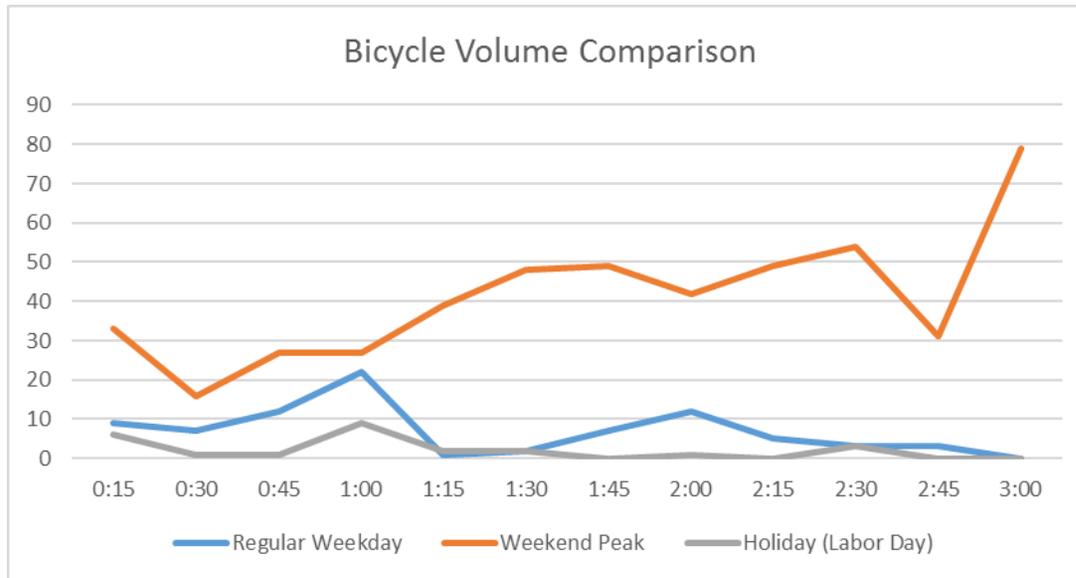


Figure 24 Bicycle Volume at the Intersection of Island Ave and Welch St



## Parking Operations

- One parking lot on the south side of Welch Street near the ferry pier offering about 53 parking spaces for cars and 8 spaces for golf cars
- Commuter parking with 72-hour limitation
- Parking lot always full during summer peak time
- On regular weekdays, most of the cars leave the parking lot before 8:00 pm. Some of the cars stay for the night
- There are few cars in the parking lot on Sunday night
- During weekend peak, a couple of the cars park on the side of the driveway on west side of the parking lot
- The drop-off area at the parking lot exit can be blocked during peak hours



*Figure 25 Full parking lot on Sunday afternoon*



Figure 26 Cars leaving on Wednesday evening



Figure 27 Few cars in the parking lot on Sunday evening



Table 10 Parking Occupancy and Ferry Vehicle Load

Time		Ferry Information			Ferry Load					Occupancy Change		Car Activity			Golf Cars Activity			Bicycle Activity		Notes	
Date	Day	Scheduled Departure Time	Direction on Peaks Island	Departure/Arrival on Peaks Island	Cars	Heavy Vehicles	Total Vehicles	Pedestrians	Bikes	Before	After	Pick up/Drop off	In	Out	Waiting	In	Out	In	Out		
28-Aug	Wednesday	4:30 PM	Arrive	4:47pm	10	1	11	116	3	80% - 90%	80% - 90%	3	3	3							
28-Aug	Wednesday	5:00 PM	Departure	4:59pm	5	0	5	162	5												
28-Aug	Wednesday	5:35 PM	Arrive	5:52pm	10	0	10	99	3	80% - 90%	60% - 70%	4	0	10	1	1	2	1	9		
28-Aug	Wednesday	6:00 PM	Departure	6:00pm	3	0	3	81	10												
28-Aug	Wednesday			7:30pm	-	-	-	-	-		~50%	4	1	5	0	0	3	0	1	End of day estimate. Heavy Rain	
31-Aug	Saturday	11:15 AM	Arrive	11:42am	10	1	11	278	41	~80%	~80%	5	3	2	0	1	0	5	0		
31-Aug	Saturday	11:45 AM	Departure	11:55am	12	0	12	94	4												
31-Aug	Saturday	12:15 PM	Arrive	12:43pm	10	0	10	369	27	~80%	~80%	2	5	7	2	2	2	0	3		
31-Aug	Saturday	12:45 PM	Departure	12:57pm	8	0	8	158	21												
31-Aug	Saturday	1:10 PM	Arrive	1:45pm	7	1	8	203	19	~100%	90% - 100%	3	2	3	1	2	4	2	4	Several cars came in and out	
31-Aug	Saturday	1:35 PM	Departure	1:56pm	3	1	4	61	9												
31-Aug	Saturday			8:30pm	-	-	-	-	-		~40%	-	-	-	-	-	-	-	-	End of day estimate	
1-Sep	Sunday	3:15 PM	Arrive	3:33pm	2	0	2	201	6	90% - 100%	~80%	0	3	9	1	3	3	2	2		
1-Sep	Sunday	3:45 PM	Departure	3:48pm	8	0	8	316	4												
1-Sep	Sunday	4:30 PM	Arrive	4:47pm	4	0	4	183	3	~70%	~60%	2	2	6	1	3	3	0	0		
1-Sep	Sunday	5:00 PM	Departure	5:05pm	7	1	8	345	18												
1-Sep	Sunday	5:35 PM	Arrive	5:59pm	8	0	8	104	1	~60%	~60%	4	2	2	2	0	2	1	0		
1-Sep	Sunday	6:00 PM	Departure	6:11pm	6	0	6	111	0												
1-Sep	Sunday			7:40pm	-	-	-	-	-		~40%	-	-	-	-	-	-	-	-	End of day estimate	
2-Sep	Monday	3:15 PM	Arrive	3:34 PM	3	0	3	50	0	~80%	~80%	4	2	5	2	1	1	0	0		
2-Sep	Monday	3:45 PM	Departure	3:45 PM	5	0	5	76	0												
2-Sep	Monday	4:30 PM	Arrive	4:47 PM	1	0	1	38	0	~80%	~80%	1	5	5	0	0	1	1	0		
2-Sep	Monday	5:00 PM	Departure	5:00 PM	4	1	5	47	1												
2-Sep	Monday	5:35 PM	Arrive	5:54 PM	2	0	2	57	0	~80%	~70%	2	3	7	0	0	0	0	0		
2-Sep	Monday	6:00 PM	Departure	6:01 PM	6	0	6	44	0												
2-Sep	Monday			7:40 PM	-	-	-	-	-		~30%	-	-	-	-	-	-	-	-	End of day estimate	



