AMATS: C Street /Ocean Dock Road Access Ramps Reconnaissance Study

IRIS Program No. CHFWY00159
Federal Project No. 0001572

Reconnaissance Study

May 2018

Prepared For:
Alaska Department of Transportation & Public Facilities

Prepared By:
Kinney Engineering, LLC
3909 Arctic Blvd, Ste 400
Anchorage, AK 99503
907-346-2373
AECL1102

Jeanne M Bowie, PE, PhD, PTOE

Table of Contents

Figures

Tables

Abbreviations

AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
AEDC	Anchorage Economic Development Corporation
AMATS	Anchorage Metropolitan Area Transportation Solutions
APV	Accident Prediction Value
ARRC	Alaska Railroad Corporation
CAR	Critical Accident Rate
DOT&PF	Alaska Department of Transportation and Public Facilities
FRA	Federal Railroad Administration
GHNP	*Government Hill Neighborhood Plan*
HCM	*Highway Capacity Manual*
ITE	Institution of Transportation Engineers
JBER	Joint Base Elmendorf-Richardson
KE	Kinney Engineering, LLC
LOS	Level of Service (performance grade)
MPH	Miles per Hour
MOA	Municipality of Anchorage
MTP	*Municipal Transportation Plan*
NHS	National Highway System
PGDHS	*A Policy on Geometric Design of Highways and Streets*
PHF	Peak Hour Factor
POA	Port of Anchorage
PTR	Permanent Traffic Recorder
SSD	Stopping Sight Distance
STAA	Federal Surface Transportation Assistance Act
STRAHNET	Strategic Highway Network
TMV	Turning Movement Volume
TOTE	Totem Ocean Trailer Express
V/C	Volume to Capacity
WBAPS	Web Accident Prediction System

Definition of Terms

Accessibility: Ability to enter and exit a given location from a public roadway. The desired access level for a given roadway is often expressed as a functional classification of the roadway, and the design also depends upon context and livability.

Annual Average Daily Traffic (AADT): Measurement of the number of vehicles traveling on a segment of highway each day, averaged over the year.

Capacity: Value of the maximum flow rate for a facility. When a facility is operating at capacity, the flow is often characterized by slower speeds, longer trip times, and increased vehicular queueing.

Critical Accident Rate (CAR): Statistical threshold used in crash rate analysis to determine statistical significance. If the crash rate of the location in question is above the CAR (also referred to as upper control limit) for that location, the crash rate is higher than average at a statistically significant level.

Flow Rate: Measurement of the number of vehicles passing a given point within a set amount of time, usually an hour.

Functional Classification: Classification method which defines the role that a facility plays in serving the flow of traffic through a network. The functional classification hierarchy defines the level of emphasis for a given roadway to provide accessibility or mobility. The broader functional classifications include: arterial (emphasis on mobility), local (emphasis on access), and collector (linking local and arterial, both access and mobility). In addition to functional classification, context and livability concerns help to guide the roadway design.

Interchange: Set of ramps and intersections used to allow traffic to travel to and from a controlled access freeway facility.

Level of Service (LOS): Performance measure concept used to quantify the operational performance of a facility and present the information to users and operating agencies. The actual performance measure used varies by the type of facility; however, all use a scale of A (best conditions for individual users) to F (worst conditions). Often, LOS C or D in the most congested hours of the day will provide the optimal societal benefits for the required construction and maintenance costs.

Mobility: Ability of people and goods to move from one place to another freely and easily. The desired mobility level is often expressed as a functional classification of the roadway, and the design also depends upon context and livability. Mobility and function reflects speed and time goals that are faster for higher function roadways.

Peak Hour: Hour-long period in which the volume of a given road is the highest for the day or other time period. Morning, midday, and evening peak hours are often used for analysis, although peak hours may occur at other times, such as at school dismissal.

Peak Hour Factor (PHF): Measure of traffic variability over an hour period calculated by dividing the total hourly volume by 4 times the peak 15-minute volume. The total hourly volume divided by the PHF yields the maximum flow rate in vehicles per hour, and is typically

the design condition. PHF values can vary from 0.25 (all traffic for the hour arrives in the same 15-minute period) to 1.00 (traffic is spread evenly throughout the hour).

Permanent Traffic Recorder (PTR): Permanently installed device that counts and records vehicles and vehicle attributes on a roadway.

Stopping Sight Distance: The minimum distance under good conditions that is required to stop a vehicle from the observation of an obstacle in the roadway ahead; a sum of the distance traveled during the perception-reaction time (while the driver recognizes the obstacle) and the braking distance.

Volume to Capacity Ratio (v/c): Measure of how much of the available capacity of a facility is being used, calculated by dividing the demand volume by the capacity of a facility. Values of v/c = 0.85 are typically design objectives so that there is reserve capacity if needed.

Executive Summary

The Alaska Department of Transportation and Public Facilities (DOT&PF) retained Kinney Engineering, LLC (KE) to prepare a Traffic Reconnaissance Study for the intersection of Ocean Dock Road and the C Street ramps. The purpose of the C Street / Ocean Dock Road Access Ramps Reconnaissance Study is to identify safety, maintenance, and freight mobility concerns in the area around the intersection of Ocean Dock Road and the C Street ramps. The study will also analyze alternatives with the aim of mitigating known concerns.

Ocean Dock Road is a north-south roadway with a single lane in each direction from the Port of Anchorage (POA) to Whitney Road. The C Street access ramps allow northbound and southbound traffic to enter and exit C Street from Ocean Dock Road. The study area contains multiple at-grade railroad crossings.

Concerns and issues for the study area were identified using a variety of methods including:

- *Data collection and analysis*. Turning movement volumes, speeds, sight distance, pedestrian paths and volumes, crash history, and field observations were collected by the study team. Analyses included evaluations of vehicle and pedestrian safety and operations.
- *Stakeholder input*. Participants in the agency field visit and in the advisory council meeting provided information regarding difficulties or concerns within the study area.
- *Public involvement*. An online survey was prepared to gather public input on issues or concerns within the study area. The survey was advertised via the members of the advisory council and through postcards that were mailed to 1,300 residents and businesses in the area.

East Loop Road (an extension of the A/C couplet) is the only roadway that provides civilian access to Government Hill, a residential and commercial district just north of the study area. Access to the Ship Creek multi-purpose trail is just south of the C Street and Ocean Dock ramps intersection, drawing pedestrian and bicyclists through the study area. The intersection is the most direct route to the Ship Creek boat launch and the POA. Almost half of the vehicles using the intersection are trucks moving into and out of the POA. This high number of trucks requires special consideration for mobility and safety.

The main issues and concerns identified for the study area are depicted in Figure 1 and include the following:

- Sight distance is limited by the retaining wall located on the north side of the intersection and inside the east/west horizontal curve that connects the west bound C Street off ramps and Ocean Dock Road. While the minimum stopping sight distance for passenger vehicles is met, participants in both the agency field visit and in the advisory council meeting expressed concerns about driver comfort. The measured sight distance for a variety of conditions and vehicles can be found in Sections 3.2.1 and 3.2.2.
- There are two at-grade railroad crossings in the study area, and several others nearby. Interactions between trains and vehicles cause operational delays for all parties involved.

- Pedestrians and bicyclists are prohibited from traveling along C Street; however, many pedestrians and bicyclists were observed traveling along the ramps. Observations of pedestrian and bicyclist travel through the study area can be found in Section 3.5.8.
- Poor drainage at the intersection creates ponding in the spring and has increased the rate of pavement degradation. Sections 3.2.4 and 3.2.5 describe the existing conditions for the pavement and drainage structures, respectively.

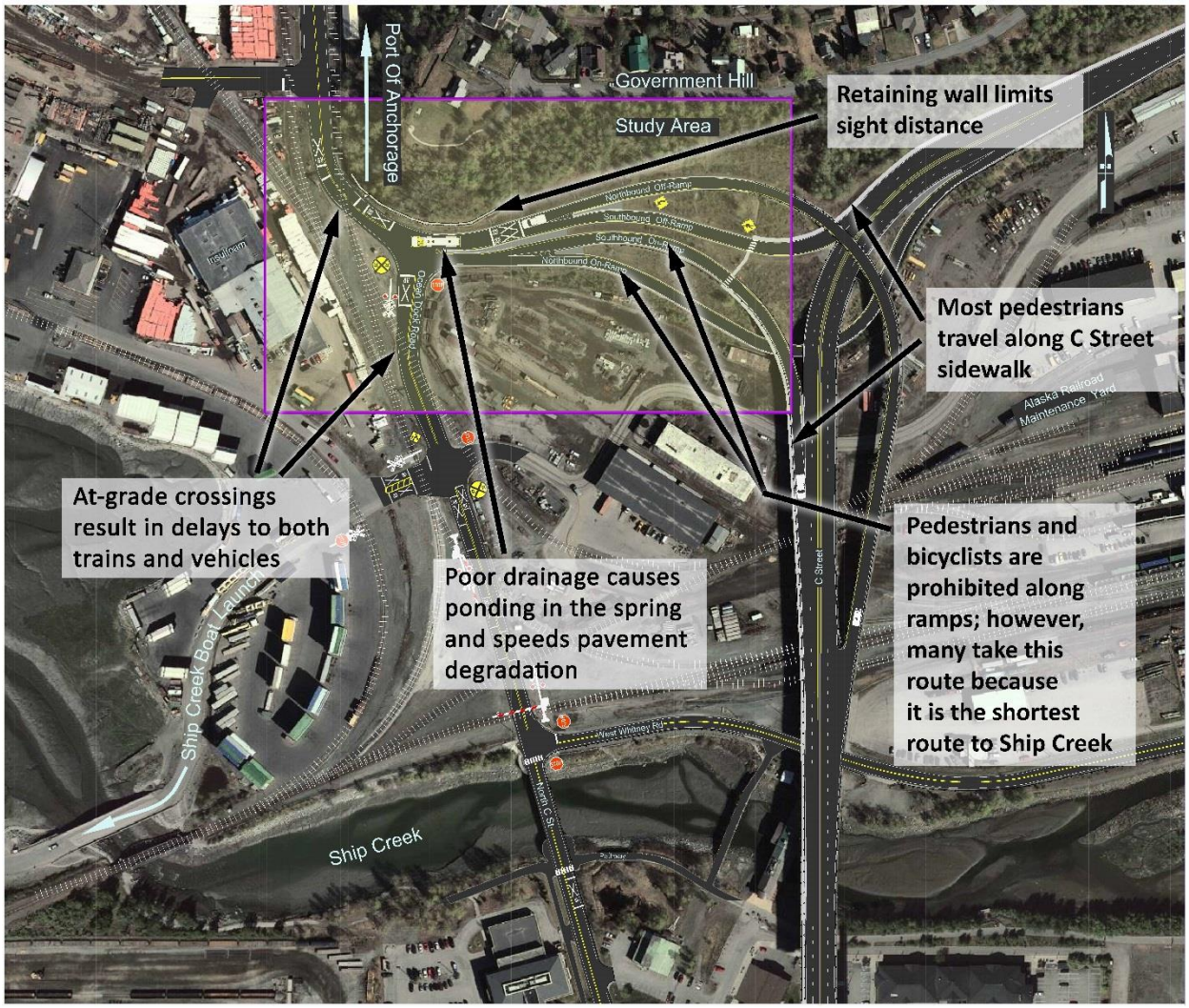


Figure 1: Identified Issues and Concerns

Four potential alternatives have been developed to address these concerns:

- Alternative 1 is the no build alternative. Under this alternative, none of the identified concerns would be addressed. The cost of this alternative is ongoing pavement maintenance at an accelerated rate. See Section 6.1 on page 44.
- Alternative 2 would keep the existing intersection geometry, but would repair the existing drainage system, add fin drains to improve drainage, and install an additional active advanced warning for the train crossing. However, pedestrian and bicyclist facilities would not be upgraded and at-grade railroad crossings would continue to cause delay and

discomfort. The cost of this alternative is estimated to be $2,605,000. See Section 6.2 on page 47.

- Alternative 3 would cut back the hill on the north side of the intersection and widen the roadway to improve sight distance and to provide for a left-turn lane into the railway yard to the north on Ocean Dock Road and to provide a pedestrian median refuge for a new pedestrian crossing at the intersection. The C Street pedestrian pathway would be connected to Ocean Dock Road via a sidewalk on the north side of the C Street ramps. The existing drainage system would be repaired or replaced and fin drains would be installed to improve drainage. At-grade railroad crossings would remain in their current configuration. The cost of this alternative is estimated to be $4,288,000. See Section 6.3 on page 52.
- Alternative 4 would completely realign the study intersection, with the potential to realign railroad tracks under coordination with ARRC, with the aim of reducing the number of railroad crossings. Drainage improvements and pedestrian/bicycle connectivity improvements would also be made. The cost of this alternative is estimated to be between $4 and $10 million, depending on the track improvements. See Section 6.4 on page 57.

1 Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) retained Kinney Engineering, LLC (KE) to prepare this Reconnaissance Study for the C Street / Ocean Dock Road Access Ramps intersection. The purpose of this study is to identify needed improvements and present possible solutions for the intersection.

As shown in Figure 2, the project is located within the Municipality of Anchorage, Alaska (MOA) and centers around the three-legged intersection of C Street and Ocean Dock Road. The intersection is a crossroads for commercial, recreational, military and residential land uses. Government Hill, Anchorage's oldest neighborhood, and Joint Base Elmendorf Richardson (JBER) spread to the northeast of the intersection. The Port of Anchorage (POA) extends north of the intersection, while Ship Creek, a popular fishing area, lies to the south. Additionally, Alaska Railroad Corporation facilities surround the intersection, and train tracks cross the west and south approaches. There are no designated pedestrian facilities at the intersection, although there is evidence of pedestrian movements.

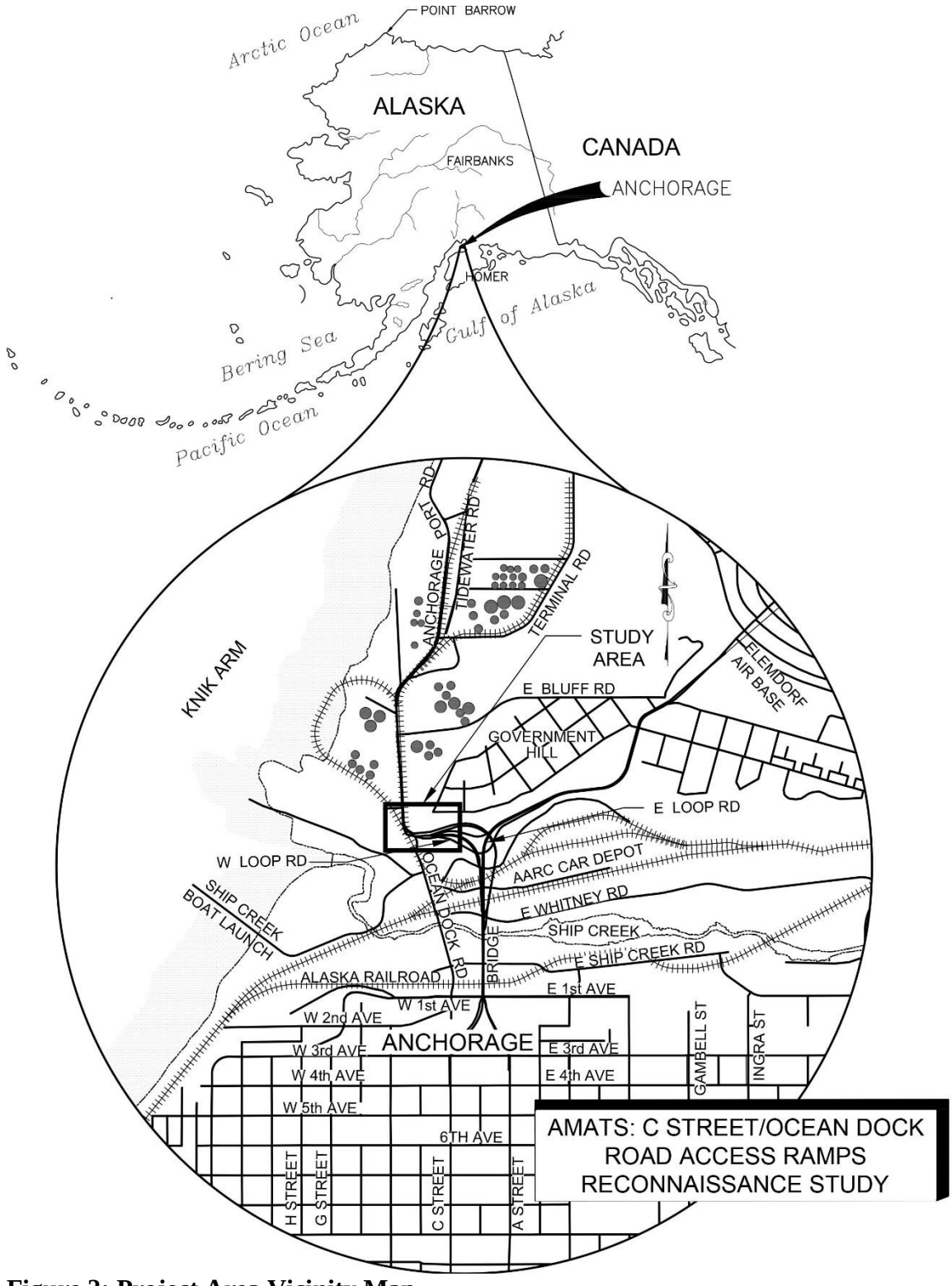


Figure 2: Project Area Vicinity Map

1.1 Area Plans

KE reviewed the following planning level documents, published studies, and concurrent projects to ascertain concerns that have previously been identified in the area and to ensure that alternatives proposed in this report would support the goals of these documents.

1.1.1 Interim 2035 Anchorage Metropolitan Transportation Plan (MOA – November 2015)

The *Interim 2035 Anchorage Metropolitan Transportation Plan (MTP)* recommends improvements within the MOA over a 20-year window. This project is listed in the MTP as a long-term project, and safety issues, maintenance issues, and freight issues are cited as reasons for improvement. The *MTP* enumerates two long term projects that could influence consideration of the alternatives presented in this study. The "Ingra-Gambell Extension – 3rd Avenue to Whitney Road" project would extend the Ingra/Gambell couplet to Ship Creek Avenue and Whitney Road. The extension would allow better freight access to the study area and provide a viable alternative route to the C Street ramps. The "Whitney Road – North C Street to Post Road" project would upgrade Whitney Road and improve its ability to accommodate freight traffic.

1.1.2 Government Hill Neighborhood Plan (MOA – February 2013)

The *Government Hill Neighborhood Plan (GHNP)* outlines a future vision for the oldest neighborhood in Anchorage, delineates improvements and recommends implementation strategies. It calls for the development of a pedestrian-oriented neighborhood center and an improved pedestrian and bicycle system that includes a new trail connecting the neighborhood with Ship Creek and the POA, which would likely interface with this project. Additional transportation improvements include improved gateways between Government Hill and Downtown and Government Hill and JBER.

1.1.3 Port of Anchorage Modernization Project

The POA is Alaska's primary cargo terminal, receiving 50% of all inbound Alaska cargo which then reaches 85% of the state's residents. As a Designated Department of Defense National Strategic Seaport, the POA provides support to the United States military. A secure roadway from JBER provides military access to the POA.

Since it opened in 1961, the POA has outlived its economic and design life and needs modernization. The combination of salt and silt in the Cook Inlet has caused extensive corrosion of the wharf piles and the port depth is insufficient to accommodate modern freight vessels. The modernization project, which began in 2017, is projected to span 7 years and cost $550 million. The new port, with a design life of at least 75 years, will improve operational efficiency and address seismic resiliency as well as other concerns. New berths will safely and efficiently support port operations and ship-to-shore cranes will allow larger container vessels to berth.

Additionally, storage yards for Totem Ocean Trailer Express (TOTE) and Horizon Lines/Matson are proposed to increase by up to 4.7 acres and 2.0 acres respectively as shown in Table 1.

Table 1: Shipping Company Storage

	Existing Lease Area (Acres)	Proposed Lease Area (Acres)
TOTE	39.06	43.74
Horizon	42.71	44.73

1.1.4 2017 3-Year Outlook Report (AEDC – 2017)

The Anchorage Economic Development Corporation (AEDC) produced the *3-Year Outlook Report* which explores factors that shape Anchorage's economy in the coming years. The amount of freight received in the POA is one of eight economic indicators included in the report.

In 2015, 3.78 million tons of cargo entered Alaska via the POA and petroleum products accounted for 42% (1.6 million tons) of all cargo. 2016 experienced a 7.3 percent decline, with 3.50 million tons of cargo moving through the POA. The tonnage is expected to further decrease by 3.5 percent in 2017 due to a reduction in construction activity and consumer spending. However, in 2019 and 2020, the amount of freight being imported into the POA is expected to grow by 1.0 percent.

As the AEDC report indicates, the POA will continue to handle millions of tons of cargo for the foreseeable future. A majority of these goods will travel through the study area either by truck or by train.

1.1.5 Anchorage Freight Mobility Study 2017 (AMATS – June 2017)

The Anchorage Metropolitan Area Transportation Solutions (AMATS) *Anchorage Freight Mobility Study* identifies freight issues, concerns, and needs for the Anchorage area and presents screening criteria to score future projects based on implementation potential. Project scores are used to rank each project's level of priority: low, medium, and high.

Because it is the single access point for trucks traveling to and from the POA, the intersection of C Street ramps and Ocean Dock Road is identified as a critical link. Delineated concerns for this intersection include intersection geometry and multiple railroad grade crossings. The Freight Mobility Study identifies two potential projects in the Ocean Dock Road and C Street ramps study area. The first project, the "C Street/Ocean Dock Road Access Ramp" recommends reconstruction of the ramp at Ship Creek, but received a low rating under level of priority. The second project, "Ocean Dock Road Alignment near POA Entrance" received a medium level of priority. No detailed suggestions are provided to accompany the project recommendations.

1.1.6 Ship Creek Redevelopment – Concept Presentation (MOA – 2013)

The presentation proposed three different mixed-use alternatives for the Ship Creek redevelopment mostly between 2nd Avenue and the south bank of Ship Creek and west of Cordova Street. The proposed alternatives consider different combinations of residential, office, commercial, and recreational land-uses, with a focus on a pedestrian friendly environment. The plan recognizes the importance of the Ship Creek area as the major receiver of goods and states

that vehicle access should be maintained and improved, while minimizing conflicts with pedestrians.

If mixed use development of this type is introduced in the Ship Creek area, pedestrian and bicycle connections between Government Hill and Ship Creek may become more important.

1.1.7 Anchorage Bicycle Plan (MOA – March 2010)

The *Anchorage Bicycle Plan* demarcates Government Hill as an isolated pocket without any connections to the Anchorage bicycle network. Due to unique challenges presented by the location and geography of Government Hill, an in-depth study to identify alternatives for connecting Government Hill to the Anchorage bicycle network is recommended by the *Anchorage Bicycle Plan*. While this current reconnaissance study does not consider connections to the bicycle network, opportunities for improvements within the study area are identified which can be included with system-wide connections.

1.1.8 Anchorage Pedestrian Plan (MOA – October 2007)

The *Anchorage Pedestrian Plan* is a 20-year plan laying out the framework for making Anchorage a more walkable city. Although the plan does not specifically list projects to improve the Ocean Dock Road and C Street Area, it presents sidewalks as a primary design element on all industrial roads, such as Whitney Road which is located just south of the study area. The Government Hill Community Council summary, which is included in the Pedestrian Plan, enumerates requests for better pedestrian access to downtown.

1.1.9 Downtown Trails Connection: Coastal Trail to Ship Creek Final Design Study Report (MOA – May 2017)

This design study memorandum describes alternatives that were considered for connecting the Tony Knowles Coastal Trail with the Ship Creek Trail in downtown Anchorage. Two alternatives were recommended: a short-term alternative and a long-term alternative. The short-term route would start where the Coastal Trail ends at West 2nd Avenue, turn north onto North C Street and connect to the Ship Creek Trail just south of Ship Creek. The long-term route would connect 2nd Avenue to Ship Creek Trail using a sky bridge over the railroad tracks. While neither of the alternatives connect to Government Hill, both would likely make Ocean Dock Road more attractive to bicyclists traveling between Government Hill and the Coastal Trail.

1.1.10 Alaska Railroad Plans (Personal Communication)

There are no immediate plans to upgrade any of the ARRC signal facilities, but future proposals include relocating Trailer-on-Flatcar operations to the POA. While relocation would result in a reduction of trucking traffic used to transfer port freight to the rail, it would mean an increase in the number of trains going in and out of the port.

2 System Users

User activity of the study intersection fluctuates both by day of the week and by season. Cruise ships arrive in the POA once every other week between May and June. Fish runs increase recreational activity during the fishing season. Year-round cargo ships arrive at the port twice weekly, on Tuesdays and Sundays.

2.1 Shipping

The POA website, www.portofanc.com, provides information on freight movement into and out of the POA, consisting of containers, petroleum products, bulk (including cement), and freight/cargo not otherwise specified (NOS), as shown in Table 2. About 50% of the total inbound Alaska non-petroleum based freight passes through the POA, and regionally, the POA receives about 74% of the non-petroleum waterborne cargo destined for Southcentral ports. The POA receives about 33% of the petroleum based products consumed in Alaska, but about 90% of waterborne petroleum shipments into Southcentral ports.

Table 2: Port of Anchorage Annual Dock Tonnage, 2007 – 2016

Commodity	Freight (not otherwise specified)	Dry Bulk Goods	Petroleum (all)	Vans/Flats/ Containers	Total Tons
2007	5,859	124,089	2,400,926	1,785,518	4,316,392
2008	10,940	116,789	2,410,732	1,831,816	4,370,277
2009	1,597	81,494	2,002,095	1,713,086	3,798,272
2010	-	109,228	2,116,791	1,736,943	3,962,962
2011	866	118,280	2,310,892	1,705,176	4,135,214
2012	15,333	119,939	1,877,990	1,740,969	3,754,231
2013	4,897	119,271	1,541,287	1,742,704	3,408,159
2014	5,463	140,684	1,498,424	1,811,136	3,455,707
2015	2,000	126,737	1,965,624	1,681,222	3,775,583
2016	4,451	122,005	1,788,760	1,582,951	3,498,167

Container shipments and petroleum products account for most of the POA freight and cargo activities. Two companies, Matson, Inc. and Totem Ocean Trailer Express (TOTE), each dock twice a week on Sunday and Tuesday. Matson uses cranes to unload box vans which are placed on flats for surface transportation. TOTE uses a roll-on/roll-off configuration in which tugs unload trailer vans and stage them for surface transportation. Petroleum moves off the port by pipeline and by tanker trucks.

2.2 Trucks

According to the POA website, approximately 50 – 55% of the freight shipped into the POA is transported by truck to locations in Anchorage. About 20% of the POA freight is trucked to the Matanuska-Susitna Borough, 15% is trucked to the Kenai area, and 15% is transported by rail

and truck to the Interior of Alaska. Except for some JBER military freight/cargo, all of the trucking activity coming from or into the POA passes through the study intersection.

Some of the goods containers are trucked directly to stores or other retail distribution points to be off-loaded and then returned to the POA. Other containers are shuttled to Midtown, South Anchorage, and Ship Creek locations for consolidation before delivery. Goods are also transferred from containers and loaded onto box trucks for distribution to retail destinations within the Anchorage area. Thus, individual commercial trucks can pass through the study area multiple times during a single day, especially during cargo ship off-loading operations. Figure 3 shows the preferred routes used by truck drivers in Anchorage.

Figure 3: Truck Drivers' Preferred Routes
Source: MOA Freight Mobility Study 2001

The most recent Permanent Traffic Recorder (PTR) Data (from 2013) indicates that the monthly percentage of commercial vehicles accessing or leaving the port varies between 43 – 67%. With AADTs of approximately 2,000 vehicles per day, this equates to 900 to 1,300 trucks per day. See Section 3.5.1 for further discussion of the traffic volume and Section 3.5.4 for discussion of truck operations.

2.3 Pedestrians

Pedestrian and bicycle movements are accommodated on 6-foot shoulders with rumble strips along Ocean Dock Road from Whitney Road north through the study area. Along the west side of C Street (or East Loop Road), a sidewalk runs from Erickson Street in Government Hill to the north side of the southbound C Street off-ramp. The sidewalk, which is the only non-motorized pathway into and out of Government Hill, then crosses the southbound C Street off-ramp from Government Hill and the southbound C Street on-ramp to downtown and then continues along the west side of C Street bridge to downtown.

Figure 4: Sidewalk on C Street Bridge

The sidewalk on the C Street bridge has railings on both sides for safety purposes but this also creates a narrower path, as presented in Figure 4. The sidewalk on the bridge is so narrow that pedestrians must stand against the rail to let bicycles pass. Bicycles also must be very careful not to hit the railing on either side as they ride.

Signs prohibit pedestrian and bicycle movements between Ocean Dock Road and the ramp crosswalks. If they heed the signs and stay off the ramps, pedestrians or bicyclists who are traveling between the Port or the Ship Creek area and Government Hill must cross the C Street bridge to 3rd Avenue, increasing the length of their trip by between 0.5 and 1 miles, depending on their final destination.

Desire paths can be seen connecting directly from W Harvard Avenue in the Government Hill neighborhood to the marked pedestrian crosswalks. Figure 5 and Figure 6 show the desire path from Government Hill to C Street ramps during summer and winter conditions. Section 3.5.8 presents field observations of pedestrian movements in the study area.

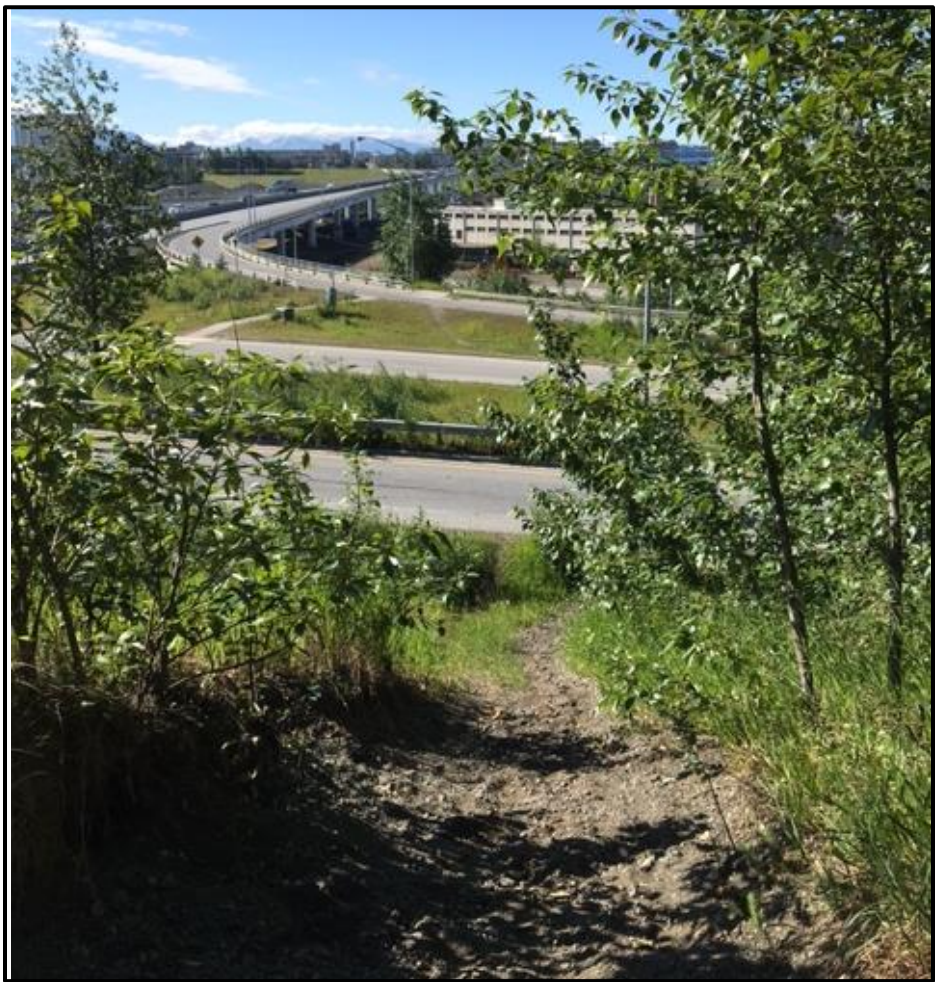


Figure 5: Desire Path from Government Hill to C Street ramps, Summer

Figure 6: Desire Path from Government Hill to C Street ramps, Winter

2.4 Fishing/Recreational

Ship Creek is an urban fishery with salmon fishing occurring between May and September. The 2000 Ship Creek Multi-Modal Transportation Plan states that as many as 750 anglers can fish at the dam at Ship Creek during a summer day. Fishing draws vehicular traffic through the study area, as there is public parking on Ship Creek Boat Launch Road just south of the study area.

For a ten-day period each June, the annual Slam'n Salm'n Derby draws anglers to Ship Creek. The competition to land the biggest king salmon from Ship Creek draws a lot of tourists and locals and benefits the Downtown Soup Kitchen.

2.5 Tourism

Most tourists visiting the Ship Creek Basin arrive by train or by cruise ship. During recent years, the cruise line Holland America has been docking at the POA once every other week during the summer cruise season, about 9 times a season. The cruise ships have up to 700 cabins, which equates to around 1,400 cruise patrons. Upon disembarking, guests are taken to downtown Anchorage or other city destinations mainly via buses or taxis that travel through the study intersection.

KE performed a turning movement study on Monday, September 5, 2016 (Labor Day) at the intersection of Ocean Dock Road and the C Street ramp from 9:00 AM to 1:00 PM and from 2:00 PM to 7:00 PM. Between 9:00 AM and 1:00 PM a total of 77 buses were counted at the intersection with a maximum of 29 buses per hour counted between 11:45 AM and 12:45 PM. Between 2:00 PM and 6:00 PM, 61 buses were counted with a maximum of 21 buses per hour counted between 4:00 PM and 5:00 PM. The buses mainly make eastbound and westbound through movements at the study intersection; however, a small number of buses were counted on the south approach of Ocean Dock Road. Holland America has indicated that these buses are carrying persons between the Holland America offices and the POA.

During the same periods, a total of 11 taxis were counted (2 in the earlier count and 9 in the evening count). During the latter period, a maximum of 6 taxis per hour were counted between 2:45 PM and 3:45 PM.

Cruise ship passengers are not allowed to walk from the POA through the Ship Creek area. However, KE observed a small number of pedestrians on a cruise ship day (9 in the earlier period and 12 in the later period) when conducting field observations.

2.6 Alaska Railroad Corporation

The ARRC is the only railroad provider in Anchorage, with more than 650 miles of freight and passenger rail operating in the state. ARRC owns and operates a rail yard north of downtown Anchorage which functions as a distribution center. The rail yard works as not only a hub for the railroad but also as a multi-modal transfer facility for freight to switch modes between truck, rail, and water.

The ARRC passenger depot is a half-mile to the south of the C Street and Ocean Dock Road intersection. According to the Ship Creek Multi-Modal Transportation Plan (2000), between 15 and 30 tour buses and 250 to 300 taxis and personal vehicles go to the depot when there is a

train. However, most of this traffic does not pass through the Ocean Dock Road and C Street intersection.

ARRC reported in 2015 that more than 10,000 loads of container freight passed through Anchorage. A significant amount of container traffic arrives in Anchorage from Whittier. A large volume of intermodal traffic originates in Anchorage on its way to Fairbanks. According to ARRC, Anchorage's main rail traffic includes petroleum trains to Fairbanks and gravel trains to the Matanuska-Susitna Valley.

ARRC tracks incorporate 63 at-grade rail crossings in the Anchorage area. Many of the crossings are near the POA in Ship Creek. The Federal Railroad Administration (FRA) has a publicly accessible online railroad inventory and crash database of various railroad entities including the ARRC. The FRA website indicates that train movements at crossings near the vicinity of the study area range from 2 to 24 trains or rail equipment daily, with speeds up to 10 mph. A query of train crashes showed that 10 crashes occurred in the vicinity; the latest crash occurred in 2000.

The Web Accident Prediction System (WBAPS) is a computer model found in the FRA website that is used to calculate the accident prediction value (APV) at a railroad crossing. The WBAPS calculated an APV of 0.015 for the rail crossing west of C Street and an APV of 0.009 for the crossing south of C Street. These values indicate that there is a low likelihood of crashes at these crossings. The existing crossing treatments include crossings with active flashers, and crossings with gates and active flashers. Gates with active flashers is recommended per the FHWA Railroad-Highway Grade Crossing Handbook where there is substantially higher than normal usage by trucks carrying dangerous or hazardous materials.

2.7 Port of Anchorage Employees

Data collected by the permanent traffic recorder on Ocean Dock Road near the entrance to the POA indicates that about half the vehicles entering the POA are passenger vehicles and pick-up trucks. Because the entrance to the POA is controlled with a gate, most of these vehicles likely belong to POA employees or visitors that have a business obligation.

2.8 Military

The POA has been a designated National Strategic Seaport since 2006. The military makes use of the port for both bringing in supplies and deploying troops and supplies. While the POA and JBER are directly connected by a secure road, most of the cargo traveling to JBER is carried through the study intersection. In addition, the POA is directly connected to 4 of the 5 military bases in Alaska by rail and imports 100% of the jet fuel used on Alaska military bases.

3 Existing Conditions

3.1 Functional Classification

The C Street ramps and Ocean Dock Road are both classified by DOT&PF as Principal Arterials, a designation that indicates the primary purpose of the roadway is to serve through traffic making long distance trips. Both roads carry relatively low volumes at lower speeds than what is typical for arterials. However, they receive the designation of arterials because they are the terminal segments of a National Highway System (NHS) corridor and are the primary access route to the POA.

The NHS is comprised of the Interstate Highway System and other roads throughout the country that are important to the United States' economy, defense, and mobility. Ocean Dock Road from the POA to C Street is part of the NHS and is designated as an Intermodal/STRAHNET Connector. The Intermodal label identifies Ocean Dock Road as a connection between different modes of transportation; it connects the port and the railroad to the rest of the highway system. The Strategic Highway Network (STRAHNET) is a designation given to roads that provide mobility during war or peace to personnel and equipment for emergency and defensive purposes. The Port of Anchorage provides transport of equipment and materials for the military installations located in Alaska.

3.2 Existing Roadway Elements

The study area includes a 3-legged intersection and two skewed railroad crossings. The intersection of Ocean Dock Road and the C Street ramps is stop controlled on the northbound Ocean Dock Road leg only. Eastbound and westbound traffic is uncontrolled. The speed limit on Ocean Dock Road is 30 miles per hour (mph). The C Street ramps are maintained by DOT&PF and provide access for entering and exiting both northbound and southbound directions of C Street. The speed limit on C Street ramps is 35 mph.

Figure 7 presents the intersection layout. The ramps in order from north to south at Ocean Dock Road are:

- *C Street Northbound Off-Ramp.* The northbound off-ramp carries northbound traffic from C Street to the POA. It is elevated over C Street, giving traffic a long sweeping downward curve as it moves towards Ocean Dock Road. The advisory speed on the northbound off ramp is 30 mph.
- *C Street Southbound Off-Ramp.* The southbound off-ramp carries southbound traffic from Government Hill and JBER to the POA. It is depressed under the northbound off ramp. The road angles upwards to join up with the other ramps at the Ocean Dock intersection. The advisory speed on the southbound off ramp is 25 mph.
- *C Street Southbound On-Ramp.* The southbound on ramp curves upward and to the right to meet with southbound C Street, carrying traffic from the POA towards downtown. The advisory speed is 30 mph on the southbound on ramp.
- *C Street Northbound On-Ramp.* The northbound on ramp veers to the right and then goes under C Street and the other ramps to carry traffic towards Government Hill and JBER. The advisory speed on the northbound on ramp is 20 mph.

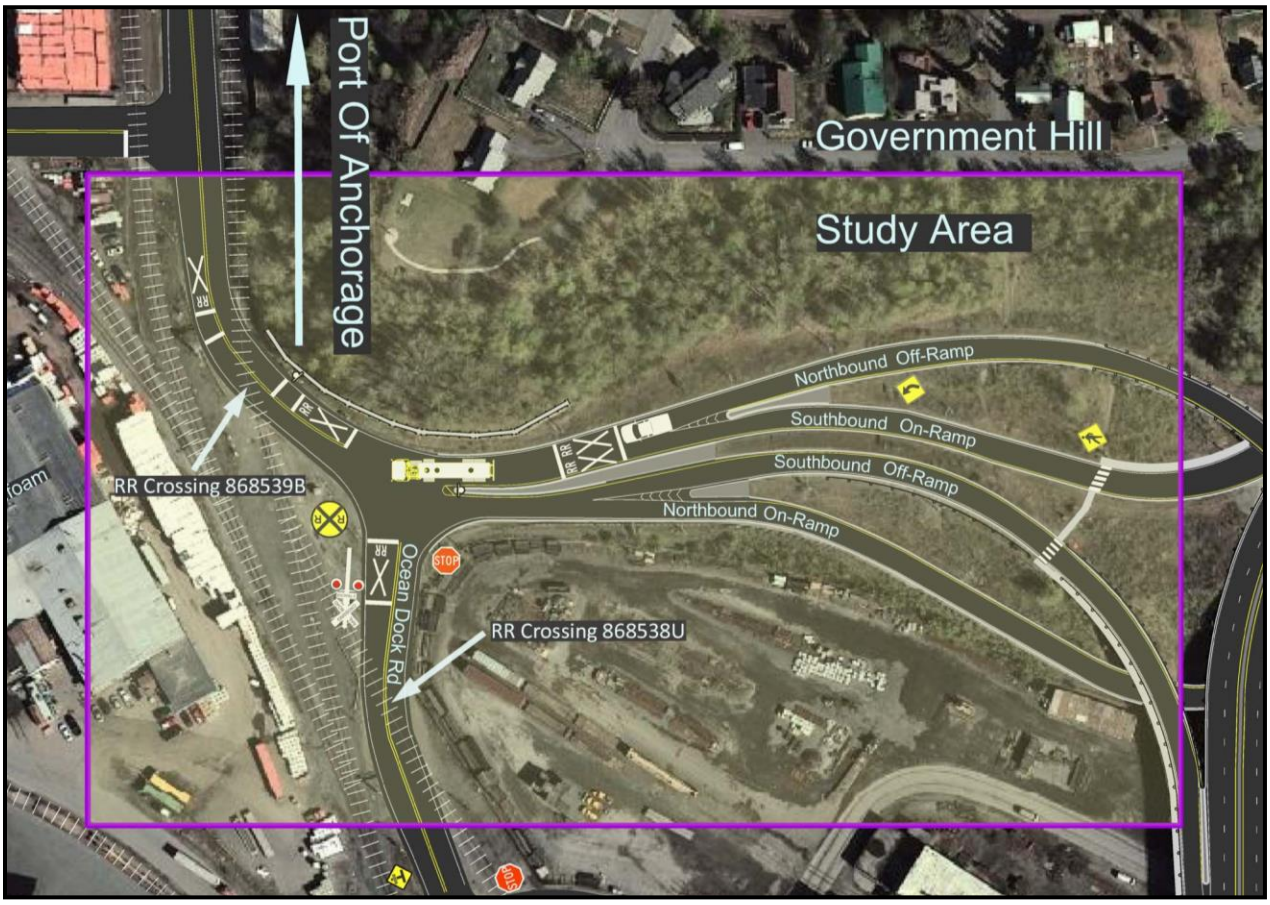


Figure 7: Existing Conditions

Railroad crossing 868539B on the north leg of Ocean Dock Road is marked with two overhead railroad warning flashers, one for each travel direction. Traffic in each direction is stopped by a red and white arm that lowers when a train is present. On the south leg of Ocean Dock Road, railroad crossing 868538U is marked with a single railroad warning flasher located on the west side of the road.

3.2.1 Required Stopping Sight Distance

Stopping sight distance (SSD) is the minimum sight distance that must be provided and maintained within the system of horizontal, vertical, and cross-sectional design elements for a vehicle traveling along the roadway to be able to see an object in the roadway and stop before reaching it. Sight lines for SSD are measured from the driver's eye to an object on the roadway which is assumed to be at 6 inches above the pavement. Sight lines are measured in the through traffic lane.

The American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on Geometric Design of Highways and Streets* (PGDHS) presents the following formula to compute SSD:

$$SSD = 1.47Vt + V^2/\left(30\left[\left(\frac{a}{32.2}\right) \pm G\right]\right)$$

Where:

t= brake reaction time, 2.5 s

V= design speed, mph

a= deceleration, ft/s^2, (11.2 ft/s^2 for passenger cars and 6.0 ft/s^2 for trucks)

G= grade, rise/run, ft/ft, (downgrades are "-" and tend to increase SSD, upgrades are "+" and decrease SSD)

The first term in the equation above is the distance that is traveled during the perception-reaction time of 2.5 seconds, and the second term is the distance travelled while braking to a complete stop.

Per the *Alaska Highway Preconstruction Manual*, the minimum design SSD is the stopping sight distance for passenger vehicles. Since truck drivers sit at a point higher off the ground than passenger vehicle drivers, they can typically see further distances and thus tend to have more time to react to objects in the road ahead. Given the high percentage of trucks in the study area, the SSD for trucks as well as passenger cars was calculated. However, since the retaining wall and vegetation on the wooded slope on the inside of the curve at the study intersection restrict the truck drivers' height advantage, the available sight distance is essentially the same for truck drivers as for passenger vehicle drivers.

Ocean Dock Road has grades that are flat enough that they can be ignored as a factor in SSD computations. However, the northbound off-ramp has a downward slope of 6 percent and the southbound off-ramp has a 5 percent downgrade (measured using LIDAR data). The posted speed limit on Ocean Dock Road and the 85th percentile speeds for both ramps (see Section 3.3) were used to calculate desired SSD. Table 3 shows the results of the SSD calculations for passenger cars and trucks.

Table 3. Stopping Sight Distance for C Street Ramps and Ocean Dock Road

Approach	Speed* (mph)	Reaction Distance (feet)	Braking Distance		SSD	
			Passenger Vehicle (feet)	Truck (feet)	Passenger Vehicle (feet)	Truck (feet)
Ocean Dock Road	30 (posted)	110	94	192	205	302
NB Off-Ramp	38 (85th percentile)	140	167	381	307	521
SB Off-Ramp	36 (85th percentile)	132	145	317	277	449

*NB=Northbound, SB=Southbound

KE performed a site visit to measure existing stopping sight distances in the study area. The sight distance for passenger vehicles was measured using 3.5 feet as the height of the driver's eye above the pavement. An eye height of 7.5 feet was used to measure sight distance for trucks. Table 4 compares measured SSD to calculated passenger vehicle (minimum) SSD and truck (desired) SSD.

Table 4. Minimum (Passenger Vehicle), Desirable (Truck), and Measured Stopping Sight Distance

Approach	Speed* (mph)	Minimum SSD (feet)	Desirable SSD (feet)	Measured SSD (feet)
Ocean Dock Road	30 (posted)	205	305	320
NB Off-Ramp	38 (85th percentile)	310	525	590
SB Off-Ramp	36 (85th percentile)	280	450	395

*NB=Northbound, SB=Southbound

The minimum required SSD is met for all directions of travel through the intersection. In addition, Ocean Dock Road and the northbound off ramp meet desired SSD based on the given speeds.

3.2.2 Intersection Sight Distance

Intersection Sight Distance (ISD) is the sight distance that a vehicle driver on a minor road needs in order to judge gaps that enable driver perception, vehicle entry, and acceleration on a major road without causing the major road traffic to significantly slow down in response. ISD is calculated using the methodology in AASHTO's *PGDHS.* Desired ISD is calculated utilizing the speed limit of the major road (v_{major}) and the time gap (t_g) required for a vehicle to safely enter traffic, according to the following equation: $ISD = v_{major} * t_g$. The minimum ISD is the SSD for the major roadway: the time an approaching vehicle on the major street can perceive, react and brake in time to avoid a vehicle that is egressing from the minor street.

Intersection sight distance was measured at the C Street ramps and Ocean Dock Road for both passenger vehicles and trucks. A driver's eye height of 3.5 feet for passenger vehicles and 7.5 feet for trucks were used during the measurement process. Intersection sight distance at

intersections is calculated based on the different types of traffic control. ISD calculations at the intersection of the C Street ramps and Ocean Dock Road require analysis of three distinct scenarios. The first analysis determines ISD for a driver headed north at the stop sign on Ocean Dock Road. The second analysis measures ISD for a driver turning right at the stop sign onto the ramps. The third analysis calculates ISD for a driver turning left onto Ocean Dock Road at the bottom of the ramps. ISD for these three scenarios is measured from the position of the driver in the stopped vehicle. Table 5 summarizes the measured and desirable ISD for passenger vehicles and trucks.

Table 5: Measured and Desirable Intersection Sight Distance

Mode of Transportation	Northbound Left		Northbound Right		Westbound Left	
	Measured	Desirable	Measured	Desirable	Measured	Desirable
Passenger Vehicle	412	386	352	334	298	283
Trucks	455	489	372	437	320	334

NOTE: Minimum Intersection Sight Distance is Stopping Sight Distance, shown in Table 4.

While the measured intersection sight distance does not meet the desirable intersection sight distance for trucks, desired intersection sight distance is met for passenger vehicles.

3.2.3 Geotechnical Conditions

KE reviewed two geotechnical reports when studying existing soil conditions at Ocean Dock Road and C Street ramps. The *Geotechnical Recommendations for C Street: Port Access to 40th Avenue Pavement Preservation* from April 2015 states that the pavement east of the intersection at the bottom of the ramp has severe fatigue cracking and surface potholing. A 16.5 foot bore hole was dug and the ground water level was found at 14 feet. Gradation analysis determined that the percent of soil passing the 200 sieve was 14%. The report recommends replacing asphalt on an 85-foot section of road. Drilling revealed that the existing foundation is adequate to support asphalt replacement and provide necessary strength for truck traffic.

The *Geotechnical Report for Ocean Dock Road: Whitney Road to Port of Anchorage,* dated June 1998, presents boring logs that show a 9.5-foot hole was dug and tested west of the intersection of Ocean Dock Road and C Street ramps. The ground water depth was recorded at 7.5 feet. The percent passing the 200 sieve was 28%.

3.2.4 Pavement Condition

The Federal Highway Administration has determined that an acceptable road surface should have an International Roughness Index (IRI) between 95 and 170 inches per mile. A higher IRI number means a rougher ride for drivers traveling along the road. As of October 2015, Ocean Dock Road had an IRI of 327 inches/mile north of the C Street ramps and 212 inches/mile to the south. The C Street ramps had IRI numbers ranging from 131 to 300 inches/mile with the worst being the southbound ramp onto C Street. A pavement resurfacing project was constructed in summer 2017.

Prior to reconstruction, the study intersections showed signs of pavement and structural damage due to improper draining conditions. When drainage is not adequate, excess water on and around

a roadway weakens the soil beneath the pavement. When ground is too saturated with water as it freezes, ice lenses can form, causing soil to expand and heave. When the ground thaws and loads are applied by traffic, the pavement can reach its failure point (known as fatigue). Once an area of pavement has reached fatigue, roadway damage such as potholes can appear. As evidence of improper drainage, the area between the study intersection and where the ramps separate was riddled with potholes. The railroad crossing at Ocean Dock Road experiences similar icing and heaving problems.

3.2.5 Drainage Conditions

KE investigated the existing condition of the drainage structures and pipes at the intersection of the C Street ramps and Ocean Dock Road on May 18, 2017. Drainage grates, field inlets, and manhole lids were removed to allow for a closer visual inspection. A video of each structure was also recorded to better view the structures and look down connecting pipes. The manhole in the center of the Ocean Dock intersection with the C Street ramps was not opened, for safety concerns. Figure 8 shows the existing drainage system.

The existing drainage related issues near the intersection of Ocean Dock Road and the C Street ramps and the findings from the field inspection include:

- Surface water often sheet flows across the C Street on and off-ramps and is not completely captured by the existing curb inlets. During thaw cycles snow and ice accumulation on the medians melts and contributes to additional sheet flow across the roadway.
- Potholes frequently develop immediately east of the intersection area on the C Street on-ramp approach.
- Groundwater was found infiltrating into one manhole within the embankment foreslope for the C Street on-ramps (southeast of the intersection). The infiltration may be an indicator of a saturated roadway structural section and/or subgrade. A continuous baseflow was observed in manhole MH-59 that originated from the upstream manhole MH-60. It is believed that this baseflow is from infiltration because all of the inlet structures connecting to manhole MH-60 were dry.
- All of the subdrains associated with the existing retaining wall are plugged with sediment at the drainage structures and the system does not appear to be functioning.
- There is localized shallow ponding near the railroad tracks although the ponding does not appear to have significant impacts on the railroad or roadway.
- No surface erosion issues were observed.

See Appendix E: Hydrologic and Hydraulic Considerations for the full report.

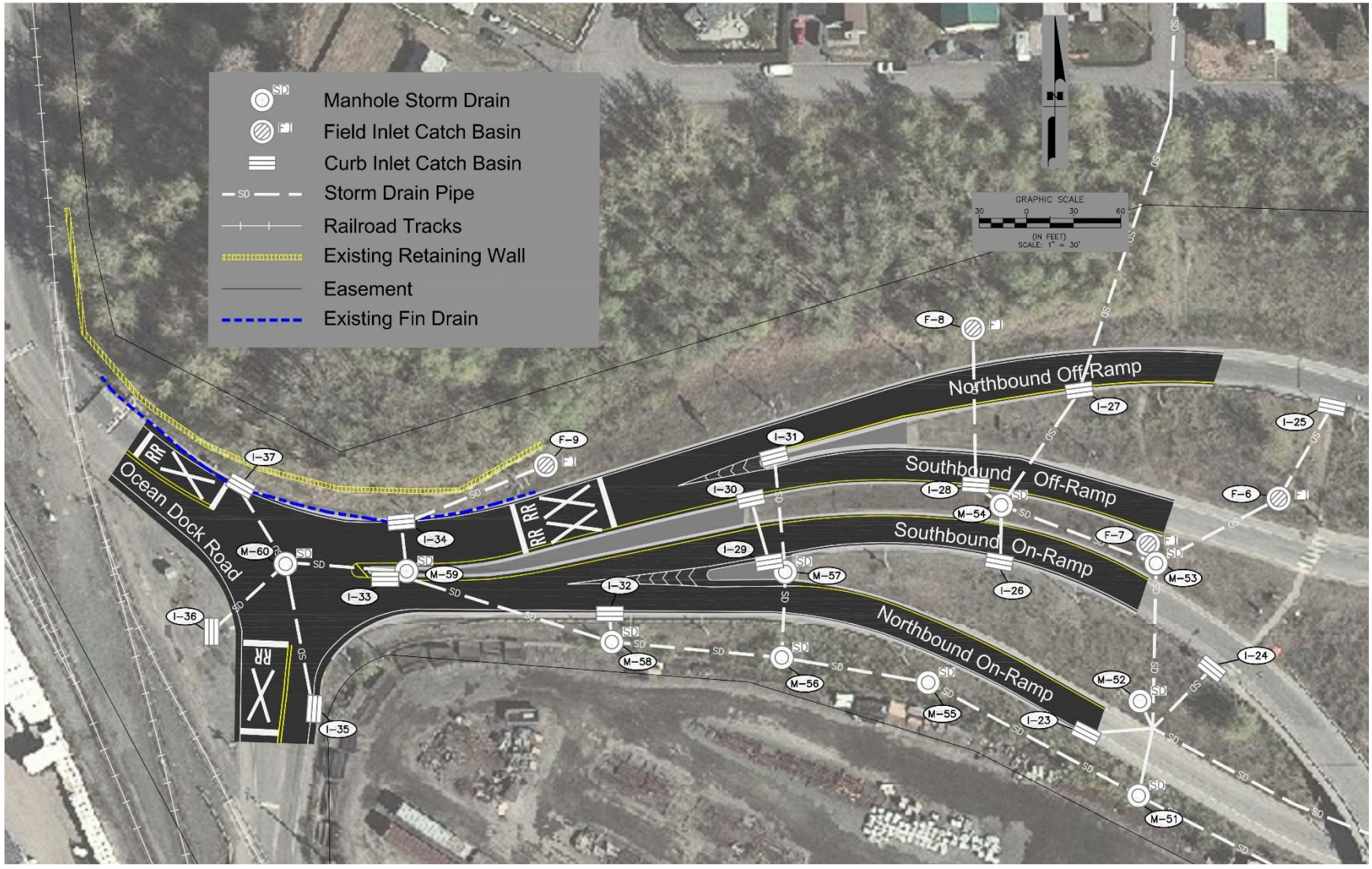


Figure 8. Existing Storm Drain System

3.3 Speed Study

In May 2017, KE collected volumes and speeds on each of the four C Street ramps using radar automatic traffic data collectors on the off-ramps and pneumatic road tube style data collectors for the on-ramps. Data collectors were deployed for 7 days.

The northbound off-ramp from downtown Anchorage has an advisory speed limit of 30 mph. The measured 85th percentile speed was 38 mph, with a pace range of 28 mph to 37 mph. The highest recorded speed was 65 mph. Figure 9 shows the speed frequency curves for this ramp.

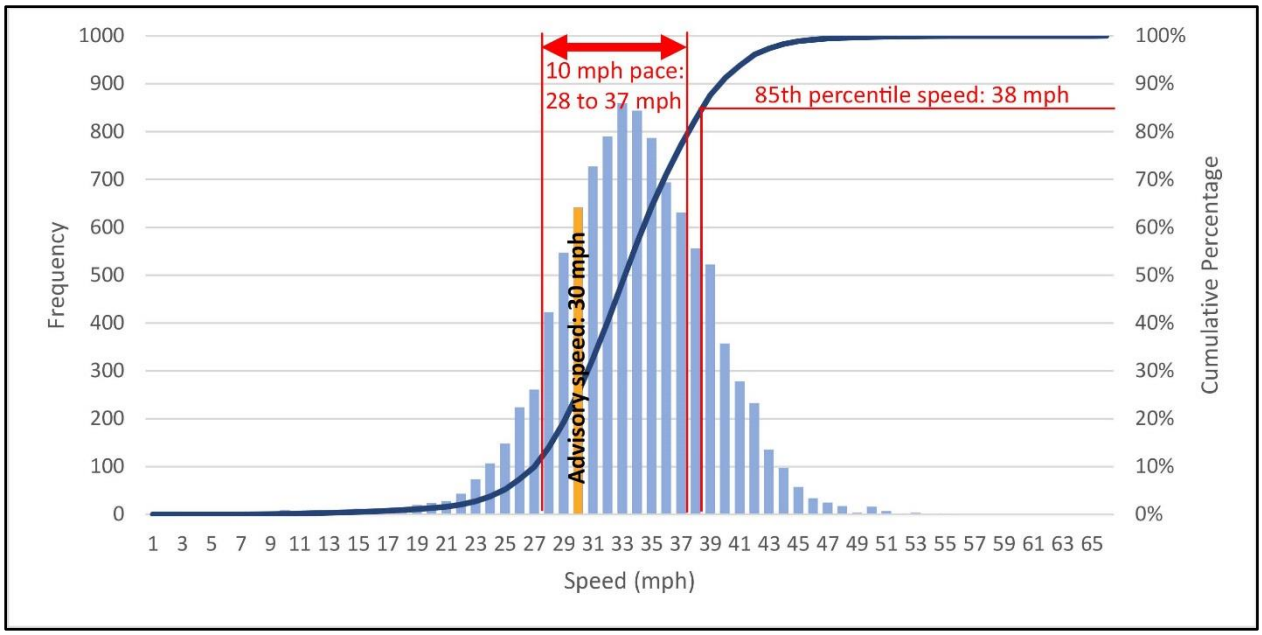


Figure 9: Speed Frequency Curves: Northbound Off-Ramp from Downtown

The southbound on-ramp to downtown Anchorage also has an advisory speed limit of 30 mph. The measured 85th percentile speed was 33 mph, with a pace range of 24 mph to 33 mph. Maximum speed recorded on this ramp was 51 mph. Figure 10 shows the speed frequency curves of this ramp.

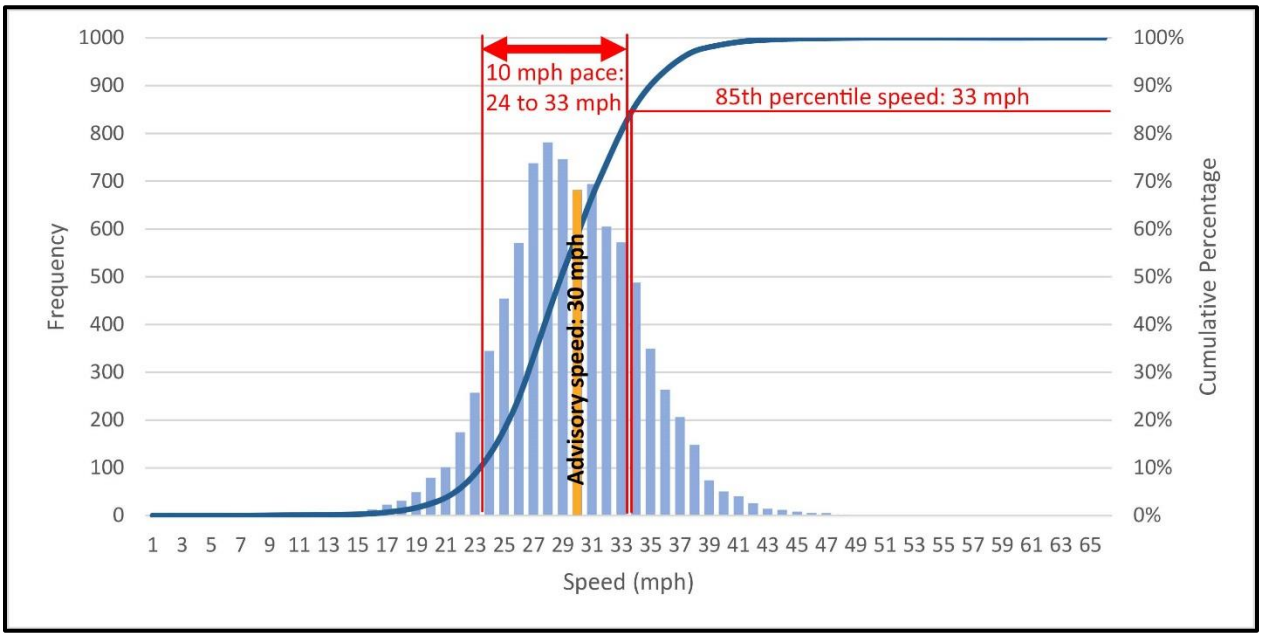


Figure 10: Speed Frequency Curves: Southbound On-Ramp to Downtown

The southbound off-ramp from Government Hill has an advisory speed limit of 25 mph. The measured 85th percentile speed was 36 mph, with a pace range of 27 mph to 36 mph. The highest speed recorded was 53 mph. The speed frequency curves are presented in Figure 11.

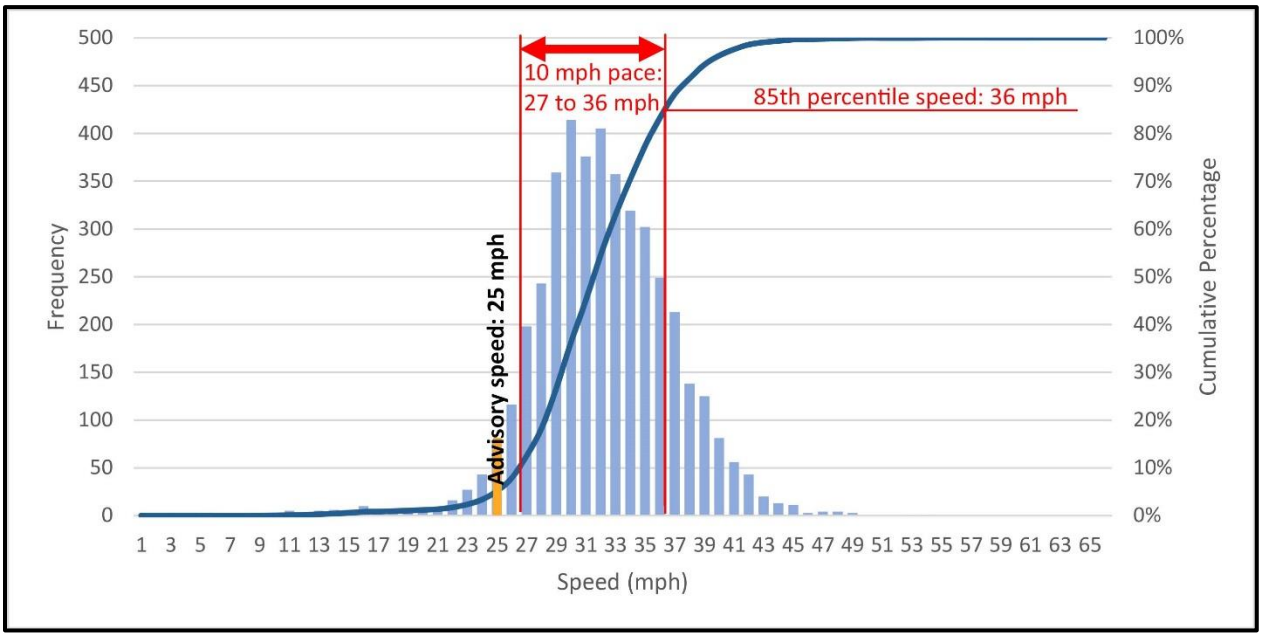


Figure 11: Speed Frequency Curves: Southbound Off-Ramp from Government Hill

The northbound on-ramp to Government Hill has an advisory speed limit of 20 mph. The measured 85th percentile speed was 33 mph, with a pace range of 25 mph to 34 mph. The highest speed recorded was 59 mph. Figure 12 presents the speed frequency curves from this ramp.

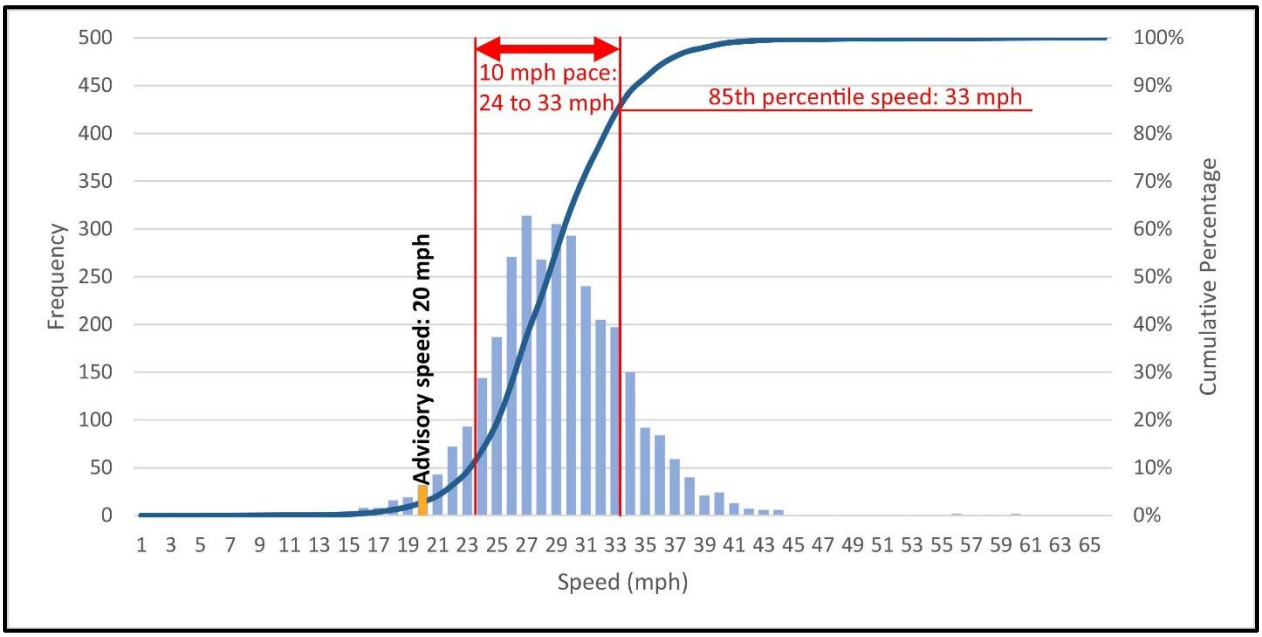


Figure 12: Speed Frequency Curves: Northbound On-Ramp to Government Hill

The speed limit on C Street in the study area is 35 mph, while the speed limit on Ocean Dock Road leaving the POA is 30 mph. Analysis of observations show that 85th percentile speeds for the four ramps fall between 33 and 38 mph, which is consistent with the posted speed limits. More than 50% of vehicles travel above the advisory speeds on all the ramps, except for the southbound C Street on-ramp (from the Ocean Dock Road intersection to Downtown Anchorage). On that ramp, about 59% of vehicles are traveling at or below the advisory speed.

A ball bank indicator could be used to determine whether higher speeds are appropriate or if curve warning signs need to be enhanced.

The measured 85th percentile speeds for the two ramps carrying traffic westbound to the study intersection were used to calculate sight distances (see Section 3.2.2). The speed data is also relevant for evaluating the pedestrian crossing experience. The 85th percentile speeds at the two ramp crossings are 36 mph (southbound off-ramp from Government Hill) and 33 mph (southbound on-ramp to Downtown Anchorage). According to Table 3B.101 of the *Alaska Traffic Manual* (ATM), the existing crosswalk markings on these ramps are appropriate for observed speeds and pedestrian volumes.

3.4 Safety

KE collected information on crashes that occurred at the intersection of C Street ramps and Ocean Dock Road for the 13-year period from 2000 through 2012. Four total crashes occurred at this location during the study period.

The first crash involved a passenger vehicle that drove down the northbound off-ramp from C Street, ran off the road and ended up on the embankment. This single vehicle incident occurred at night with wet road conditions. There were no injuries reported.

The second crash occurred when a passenger vehicle came from the northbound off-ramp of C Street, made a left onto Ocean Dock Road and ended up in the embankment. This crash happened during daylight hours on dry pavement. The driver reported being on prescription medication and sustained a non-incapacitating/possible injury.

The third crash resulted when a passenger vehicle on Ocean Dock Road headed for the southbound on-ramp of C Street and hit a roadside light pole. The single vehicle crash took place during daylight hours on dry pavement. No injuries were reported.

The fourth crash occurred when a truck stopped at the stop sign heading north on Ocean Dock Road at the C Street ramps was rear-ended by another truck. The at-fault truck was reported as driving at an unsafe speed for the icy conditions. There were no injuries reported.

With so few reported accidents occurring in this area, no crash pattern is visible. It appears that most drivers are familiar with this area and are careful when going around the curve and are watchful for train traffic. However, as part of the public involvement efforts for this project, some comments that were received related anecdotal reports of trucks having near misses and jackknifing especially during winter time.

3.5 Operations

3.5.1 Historical AADT

Average Annual Daily Traffic (AADT) volumes were collected from the DOT&PF Central Region Annual Traffic Volume Report(s). Table 6 and Table 7 summarizes the AADT for each road segment in the study area.

Table 6: AADTs – Ocean Dock Road Segments (2006-2015)

Segment	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
POA to C Street ramps	1,931	1,902	1,892	2,002	1,968	1,890	1,911	2,176	2,259	2,263
C Street ramps to Whitney Road	2,738	2,697	2,580	2,590	2,550	2,650	2,628	3,322		

Table 7: AADTS – C Street ramps (2006-2015)

Segment	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006
Northbound Off Ramp	2,058	1,984	2,056	1,669	2,121	1,930	2,008	2,360	2,240	2,210
Southbound Off Ramp	339	342	304	328	328	286	367	446	340	344
Southbound On Ramp	1,794	1,901	2,091	1,977	2,041	1,733	1,949	2,374	2,050	2,054
Northbound On Ramp	450	361	430	430	420	440	440	445	370	374

3.5.2 Turning Movement Volumes

Turning movement volumes (TMVs) for the Ocean Dock Road intersection with C Street ramps were collected by KE. Observations were conducted on multiple days to identify how traffic varies throughout the week in response to port activities such as a cruise ship docking in port and a cargo ship being off loaded. Figure 13 depicts TMVs for an average weekday when port activities are quiet. Figure 14 shows TMV observations for a weekday with a cruise ship in port (in this case, on Labor Day). TMVs for a cargo ship day are delineated in Figure 15. The TMV observations indicate that the highest traffic volumes occur on days when cargo ships are being off loaded.

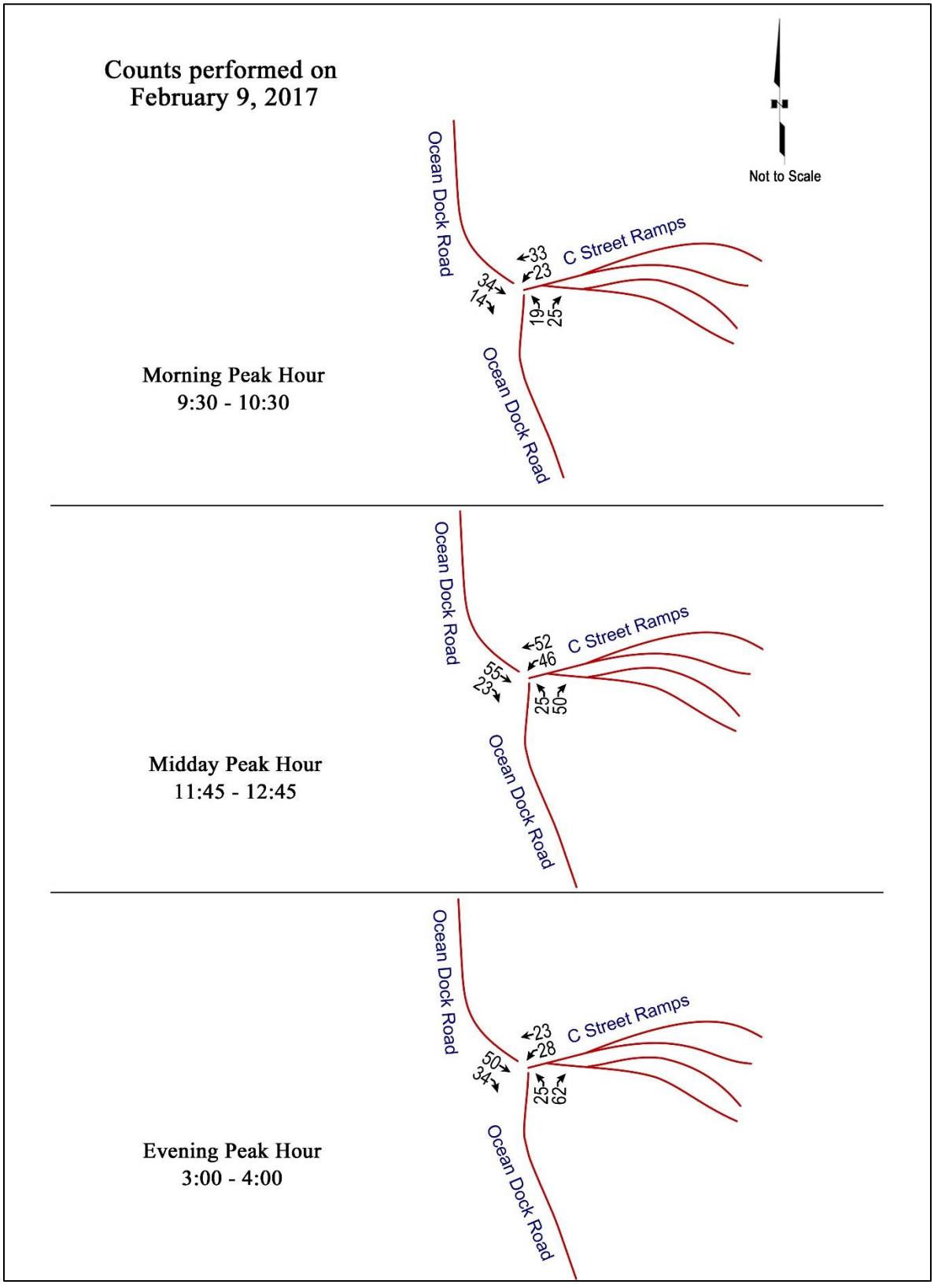


Figure 13: Turning Movement Volumes Summary for Weekday

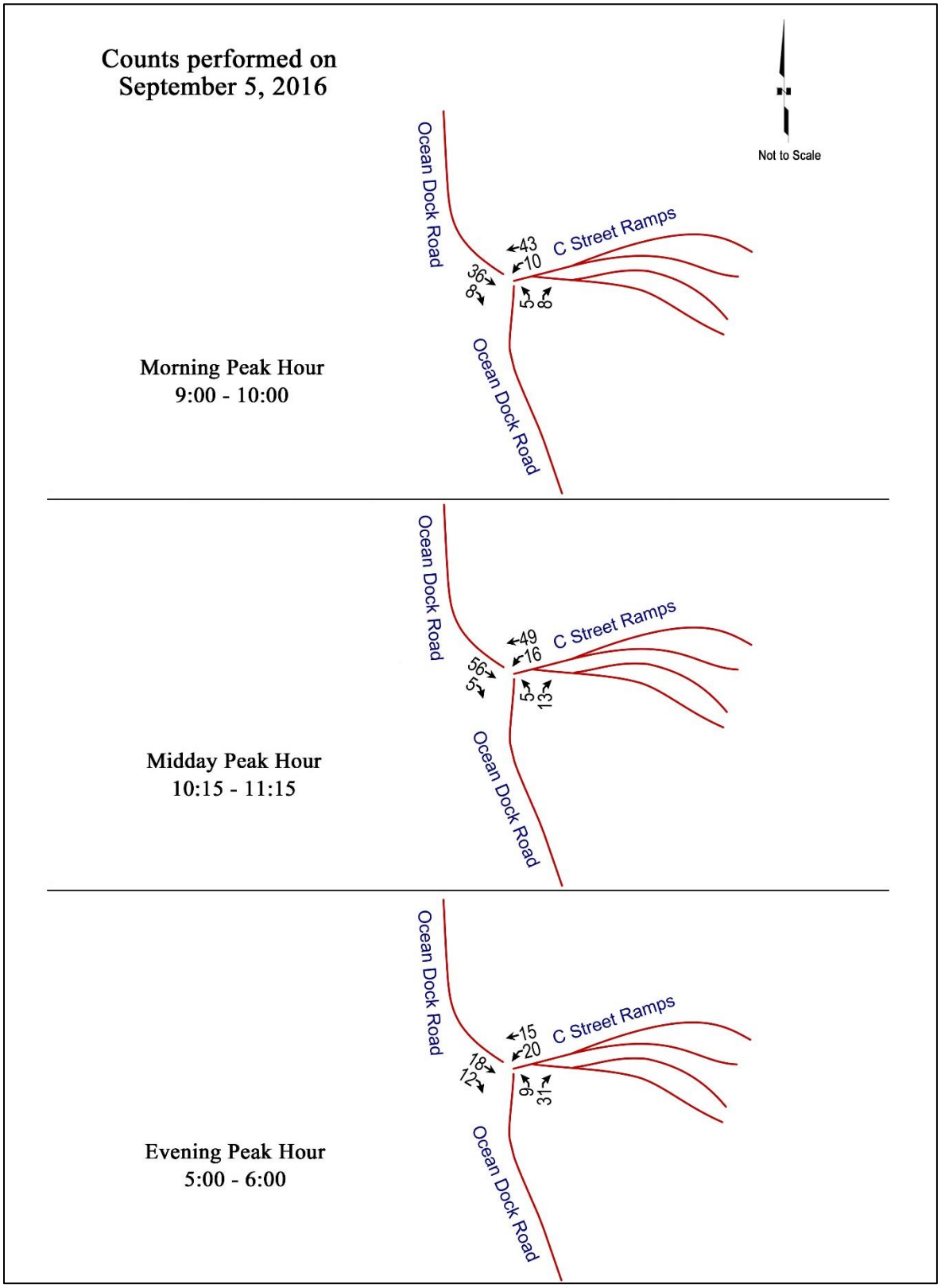


Figure 14: Turning Movement Volumes Summary for Day with Cruise Ship in Port

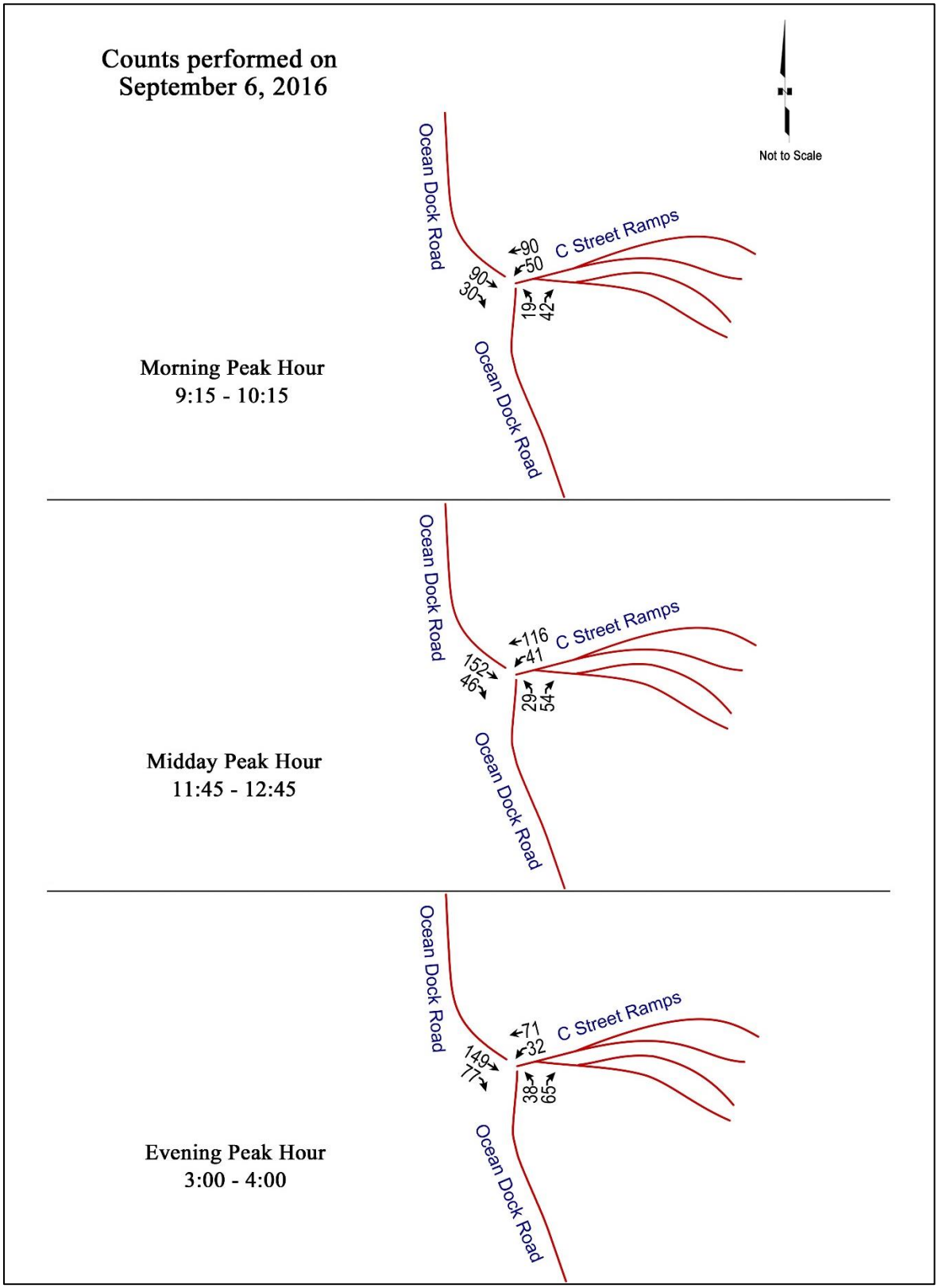


Figure 15: Turning Movement Volumes Summary for Day with Cargo Ships in Port

3.5.3 Heavy Vehicle Percentages

Hourly truck volumes at the study intersection were collected from the turning movement counts. As depicted in Table 8, weekday truck volumes peaked between 10-11 am, while truck volumes on a cruise ship day and a cargo day peaked between 3-4 pm. KE's observations indicate that the peak hour on cargo days varies from week to week.

Table 8. Hourly Truck Volumes

Peak Hour	Weekday	Cruise Ship Day	Cargo Day
9 AM - 10 AM	78	63	162
10 AM - 11 AM	96	59	142
11 AM - 12 PM	89	76	156
12 PM - 1 PM	46	49	152
1 PM to 2 PM	Not Counted		
2 PM - 3 PM	34	66	184
3 PM - 4 PM	30	80	212
4 PM - 5 PM	24	51	181
5 PM - 6 PM	20	8	97

Existing heavy vehicle percentages were determined from the turning movement counts. Table 9 shows the percentage of heavy vehicles by peak hour on a weekday and a cargo day.

Table 9: Percent Heavy Vehicle by Peak Hour

	Weekday (February 9, 2017)			Day with Cargo Ship in Port (September 6, 2016)		
	Eastbound	Northbound	Westbound	Eastbound	Northbound	Westbound
AM	54%	39%	41%	66%	34%	44%
NOON	33%	19%	22%	34%	29%	42%
PM	46%	24%	39%	48%	43%	59%

Figure 16 through Figure 21 show 8-hour car volumes compared to 8-hour truck volumes on a weekday, a cruise ship day and a cargo day.

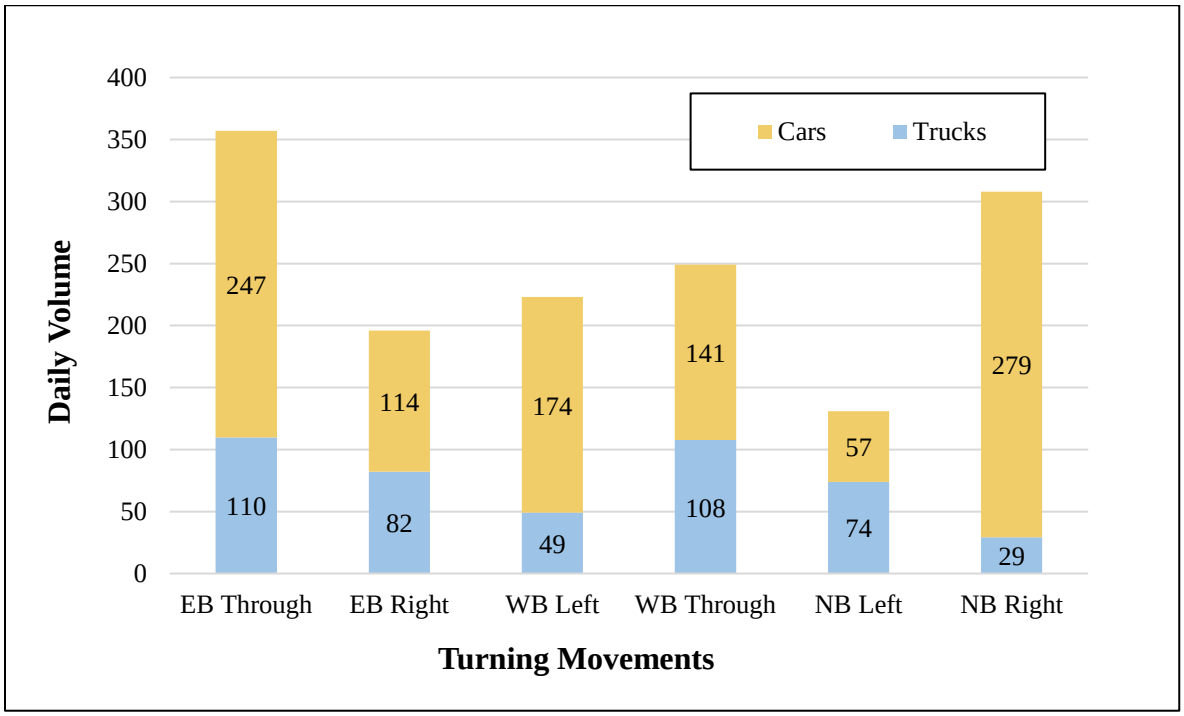


Figure 16. 8-Hour Car and Truck Volumes on a Weekday

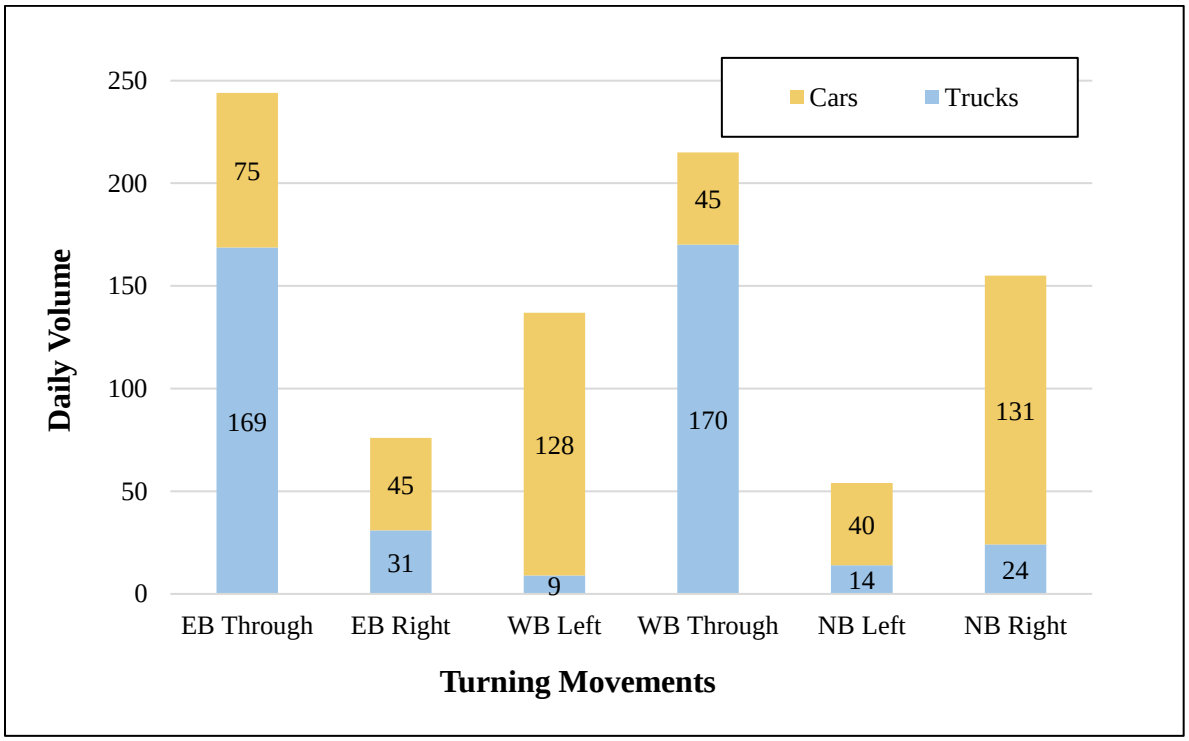


Figure 17. 8-Hour Car and Truck Volumes on a Cruise Ship Day

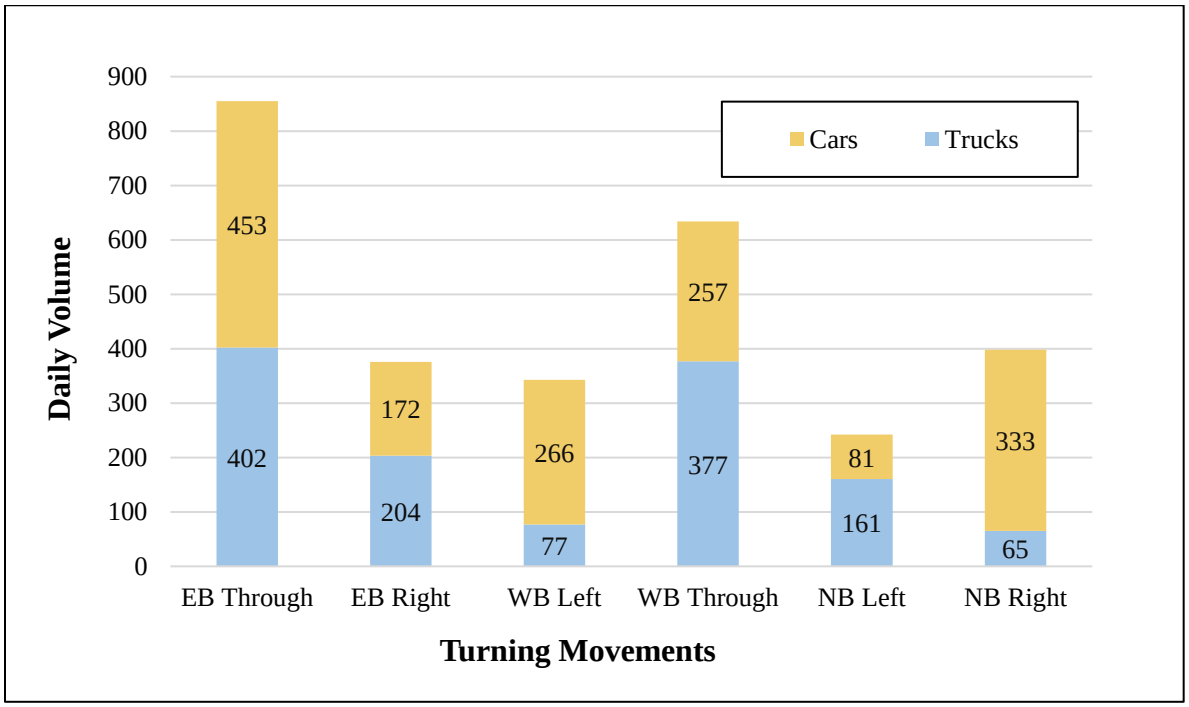


Figure 18. 8-Hour Car and Truck Volumes on a Cargo Day

3.5.4 Peak Hour Factors

Peak hour factors (PHFs) convert hourly volumes to 15-minute design flow rates for capacity analyses. They represent the uniformity of traffic volumes over an hourly period and range from 0.25 (all traffic arrives in one 15-minute period and no additional traffic arrives for the rest of the hour) to 1.0 (equal number of vehicles arrive during each 15-minute period).

Table 10 shows the intersection PHFs for the morning, midday, and evening peaks for a regular day. These PHFs are representative of locations where traffic is evenly spaced out throughout the hour, with some periods being slightly higher volume than others.

Table 10: Existing PHFs for Major Peak Periods

Peak Period	Peak Hour Factor (PHF)		
	Weekday	Cruise	Cargo
Morning Peak	0.90	0.87	0.93
Midday Peak	0.91	0.80	0.83
Evening Peak	0.90	0.82	0.81

3.5.5 Intersection Capacity

Capacity analysis for the study intersection was conducted utilizing the 2010 Highway Capacity Manual (HCM) methodology for unsignalized intersections and the Highway Capacity Software 2010. The existing PHFs detailed in Table 10 were used to approximate conditions during the highest 15-minute period of each peak hour.

Capacity analysis at stop-controlled intersections focuses on delay for the stop-controlled approaches. Two-way stop-controlled intersections include three-legged intersections, when the stem of the T is controlled by a stop sign. At locations with two-way stop control, the main street through traffic experiences no delay, thus level of service (LOS) is reported only for approaches under stop control. Movements that are free flowing are not analyzed.

Analysis indicates the T-intersection of C Street ramps and Ocean Dock Road experiences little delay due to traffic control, with the controlled movements operating at a LOS B or better in all periods. Table 11 summarizes the volume to capacity ratio (v/c), control delay, and the LOS results for each movement.

Table 11: Existing LOS for the Intersection of Ocean Dock Road and C Street Ramps

Period	NB* or WB	Movement	AM Peak			Midday Peak			PM Peak		
			V/C Ratio	Control Delay (sec/veh)	LOS	V/C Ratio	Control Delay (sec/veh)	LOS	V/C Ratio	Control Delay (sec/veh)	LOS
Weekday	NB	Left+Right	0.06	9.7	A	0.10	9.8	A	0.11	9.5	A
	WB	Left	0.02	7.6	A	0.04	7.6	A	0.02	7.5	A
Cruise	NB	Left+Right	0.02	9.2	A	0.03	9.3	A	0.05	8.8	A
	WB	Left	0.01	7.3	A	0.01	7.4	A	0.02	7.3	A
Cargo	NB	Left+Right	0.09	10.3	B	0.16	11.7	B	0.16	11.3	B
	WB	Left	0.04	7.6	A	0.04	8.1	A	0.03	8.0	A

*NB = Northbound, WB = Westbound

While collecting turning movement volumes, the study team noted that there is significantly more delay when a train crosses the roadway. Figure 19 shows the queue when vehicles are delayed at a train crossing. Trains are generally moving fairly slowly within the study area and vehicle delay will depend upon the length of the trains, which is variable

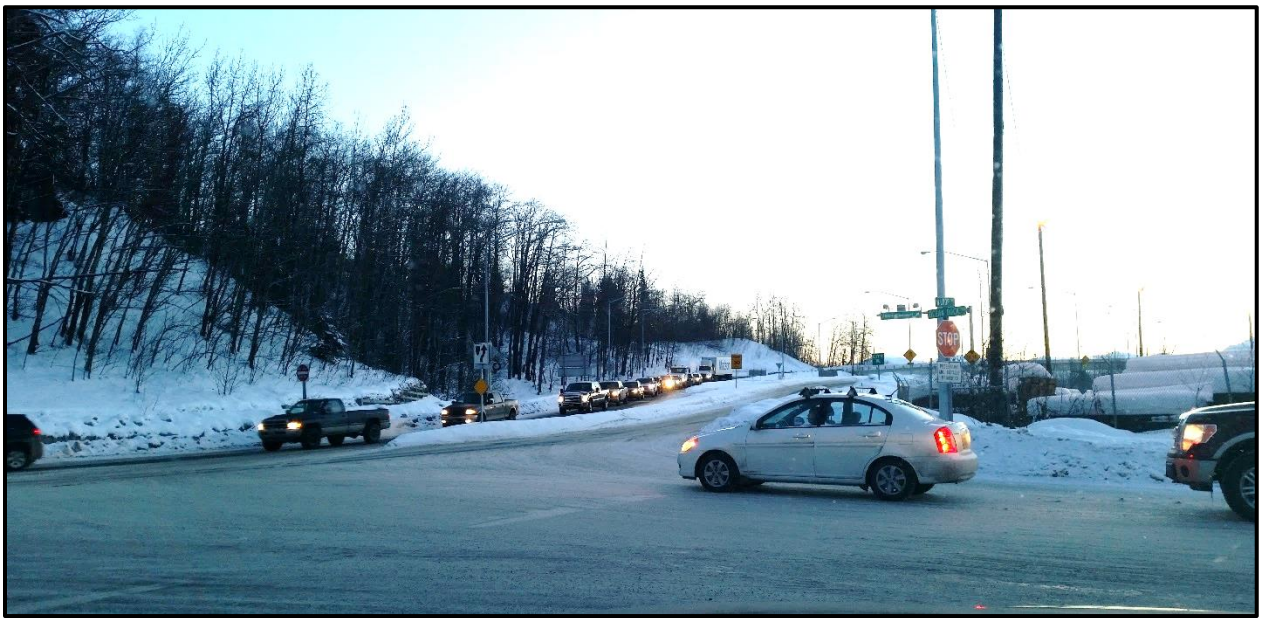


Figure 19: Looking East at Queue due to Occupied Train Crossing

3.5.6 Truck Operations

Half of all Alaska's freight is transported through the POA and much of this freight is distributed using trucks that travel through the intersection of C Street ramps and Ocean Dock Road. The highest truck volumes occur on Sundays and Tuesdays, when cargo ships are being off loaded (see Section 2.2).

Long combination vehicles (LCV) are tractor trucks that pull multiple trailers. Since extra trailers increase the truck length, extra regulations control the movement of LCVs. The Federal Surface Transportation Assistance Act (STAA) of 1982 required states to develop a National Network of approved routes on which combination vehicles are permitted to travel. Within 5 miles of the National Network, vehicles are granted reasonable access to freight terminals, loading or unloading points, and facilities for food, fuel, repairs, and rest.

Within Anchorage, the State of Alaska limits approved routes for combination vehicles to Alaska Route 1 (Glenn and Seward Highways). The Municipality designates reasonable access routes within Anchorage, as shown in Figure 20. When combination trucks leave the POA the designated route leads south on Ocean Dock Road and left onto Whitney Road to Post Road. KE observations indicate that some LCVs use the C Street ramps instead of the designated route. These vehicles may have destinations within the 5-mile area.

3.5.7 Railroad Operations

A major component of operations in the study area is the Alaska Railroad, as it provides services to private companies, the U.S. Military, and the POA. The Alaska Railroad has both freight and passenger trains utilizing train/road crossings in the study area every day. Trains are required to cross roads at several locations to perform daily operations such as bringing cars in or out of the maintenance yard, locomotive fueling, or switching freight and passenger trains.

The number of trains using the various crossings in this area changes every day based on customer needs, passenger train schedules, and barge deliveries. It can range from 5 trains on a slow winter day to around 30 trains on an average summer day. Additionally, one train might use one or several of the crossings multiple times while switching cars. ARRC reported that the busy times of the day for freight train crossings tends to be 8:00-10:00 AM then 2:00-4:00 PM and for passenger trains is 5:00-9:00 AM then 6:00 PM-3:00 AM.

The speed and length of trains determine how long they occupy the crossings, and since all movements in this area are low speed, the determining factor is length. Trains will vary from a single locomotive to a full-length freight train which can occupy the crossing from one minute up to twenty minutes, respectively.

The mix of public vehicles, trucks, and trains in the study area leads to an increased safety concern for both the public and ARRC employees, as well as an increase in maintenance. Due to traffic and increased safety issues, the ARRC limits its use of the tracks at Ocean Dock Road as much as possible. Railroad operations are affected by large trucks damaging crossing facilities which require repairing and cause train delays. Train delays also occur when train operations are altered to allow traffic to clear.

Figure 20: Approved Routes for Reasonable Access for Long Combination Vehicles Within the Municipality of Anchorage

3.5.8 Pedestrian Operations and Connectivity

Pedestrian and bicycle movements were observed for the study area, including the C Street bridge, the ramps to Ocean Dock Road, the sidewalk to Government Hill, and dirt paths up the hill to the Government Hills neighborhood. Observations were made on Wednesday April 26, 2017 from 9:15 to 10:15 AM and 4:45 to 5:45 PM and on Thursday May 11, 2017 from 2:00 to 3:00 PM and 4:45 to 5:45 PM. Observed movements for all pedestrians and bicyclists were recorded on aerial maps.

The majority of the pedestrians were observed walking on the sidewalk to and from Government Hill and across the C Street bridge to Downtown Anchorage. Roughly half of the bicyclists utilized the sidewalk as well; the other half used the C Street ramps down to Ocean Dock Road, despite signs prohibiting pedestrian and bicycle travel along the ramps. Figure 21 shows the observed travel paths.

Difficulties that pedestrians and bicyclists experienced along the route were also noted. The sidewalk along the C Street bridge is narrow enough that it can be uncomfortable to pass others using the sidewalk. In one instance, over one hundred pedestrians were observed crossing the bridge as part of an elementary school class field trip. A bicyclist attempting to pass them ended up climbing over the railing onto the road to travel past the pedestrians.

At both ramp crosswalks, observations indicate that vehicles rarely yield to pedestrians or bicyclists. Most pedestrians and bicyclists waited for a gap in traffic before crossing.

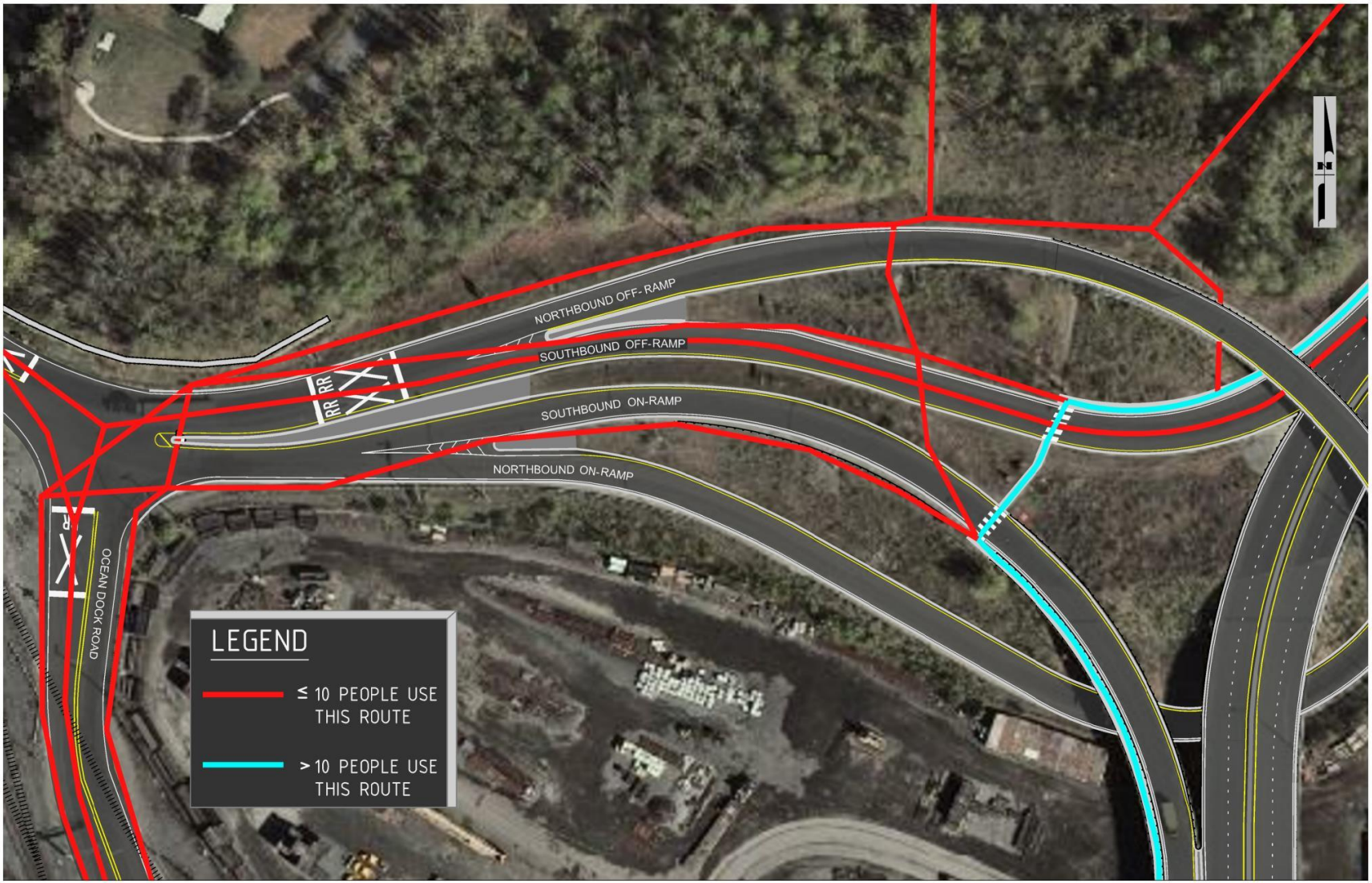


Figure 21: Observed Pedestrian and Bicycle Routes and Volumes

Since pedestrians were observed crossing all four ramps, pedestrian delay was calculated for all the ramps using crossing distance and vehicle flowrate, even though there are only marked crosswalks on two of the ramps. Sight distance was also measured for vehicles approaching each crosswalk.

Table 12 shows pedestrian delay for crossing the ramps on a typical weekday and on a cargo day (Tuesday), which is generally the highest volume day in the study area. Due to the narrow landing on the south side of the C Street Southbound On-Ramp (from Ocean Dock to Downtown), pedestrians traveling together are forced to walk single file, resulting in slightly more delay. Thus, pedestrian delay was calculated for two cases of pedestrian platoon size: 1 pedestrian and a group of 6 pedestrians. At the other ramps, it was assumed that pedestrians traveling in a group incur the same delay as a single pedestrian. For calculations, it was assumed that no vehicles yielded to pedestrians. Crossing width was measured from curb to curb.

Table 12. Existing Pedestrian Delay – Peak Hour

Road Segment	Crossing Width (feet)	Typical Weekday			Cargo Day		
		Volume	Delay (sec)		Volume	Delay (sec)	
			N=1 Ped	N=6 Ped		N=1 Ped	N=6 Ped
C St Northbound Off-Ramp	25	225	4	-	260	4	-
C St Southbound Off-Ramp	25	50	1	-	60	1	-
C Street Southbound On-Ramp	23	155	2	3	195	3	5
C Street Northbound On-Ramp	25	60	1	-	55	1	-

According to the HCM2010, as pedestrian delay increases, the likelihood of pedestrian risk-taking increases (choosing gaps that require the pedestrian to run across the road or require on coming vehicles to brake, for example). As the data shown in the tables indicates, the ramps to and from the downtown area (C Street Northbound Off-Ramp and C Street Southbound On-Ramp) have higher volumes and therefore pedestrian delay is higher for crossing those ramps. However, all pedestrian delay is slight and according to the HCM 2010 methodology, pedestrian risk taking is minimal. Despite minimal delay, the curvature of the ramps, the lack of marked crosswalks on two of the ramps, and the occurrence of pedestrians walking along and crossing the ramps at random locations are of concern.

3.6 Summary of Existing Conditions

The study area is a vital link in the National Highway System, carrying all truck and rail traffic to and from the POA, which imports about 85% of everything Alaskans eat, wear, or drive (www.portofanc.com). The study area also provides access to Government Hill to the northeast, the Ship Creek boat launch, and the Ship Creek trail. The last two locations are attractors of pedestrian and bicycle trips.

Several possible concerns regarding the infrastructure within the study area were identified and examined:

1. Vehicle 85th percentile speeds on the ramps are generally higher than the advisory speeds for each ramp; however, the 85th percentile speeds are compatible with the speed limits on Ocean Dock Road (30 mph) and C Street (35 mph).
2. Concerns regarding available sight distance were examined by measuring stopping sight distance and intersection sight distance for passenger cars and for commercial trucks. While the available sight distance is restricted by the hill/retaining wall located on the north side of the study intersection, the required stopping sight distance is met.
3. Ponding in the spring due to poor drainage deteriorates the condition of the pavement in the study area, requiring more frequent than usual repairs. This also affects the railroad tracks.
4. Only four crashes were reported in the study area over a 13-year period. The crashes were all low severity (property damage only or minor injury).
5. The study intersection handles the existing levels of traffic with little delay. The majority of the vehicle delay which occurs within the study area is due to train crossings.
6. The speed and length of trains determine how long they occupy the crossings, and since all movements in this area are low speed, the determining factor is length. Trains will vary from a single locomotive to a full-length freight train which can occupy the crossing from one minute up to twenty minutes, respectively. Sometimes, train operations are halted or delayed allowing traffic to clear.
7. A sidewalk carries most of the pedestrian and bicycle traffic between Government Hill and Downtown Anchorage. The sidewalk is built on the west side of C Street and crosses the C Street bridge. The pedestrian route crosses two of the four ramps in the study area. While delay for a single pedestrian to cross these ramps is minimal for most hours of the day, the lack of sight distance on the southbound off-ramp coupled with heavy truck traffic causes discomfort for drivers and pedestrians alike.
8. Although pedestrian and bicycle travel is prohibited along the ramps, observations show that some pedestrians and bicycles use the ramps when traveling from Ship Creek to Government Hill. For destinations at the POA or in Ship Creek, traveling along the C Street bridge instead of using the C Street ramps increases the trip length by 0.5 to 1 mile.

4 Public Involvement

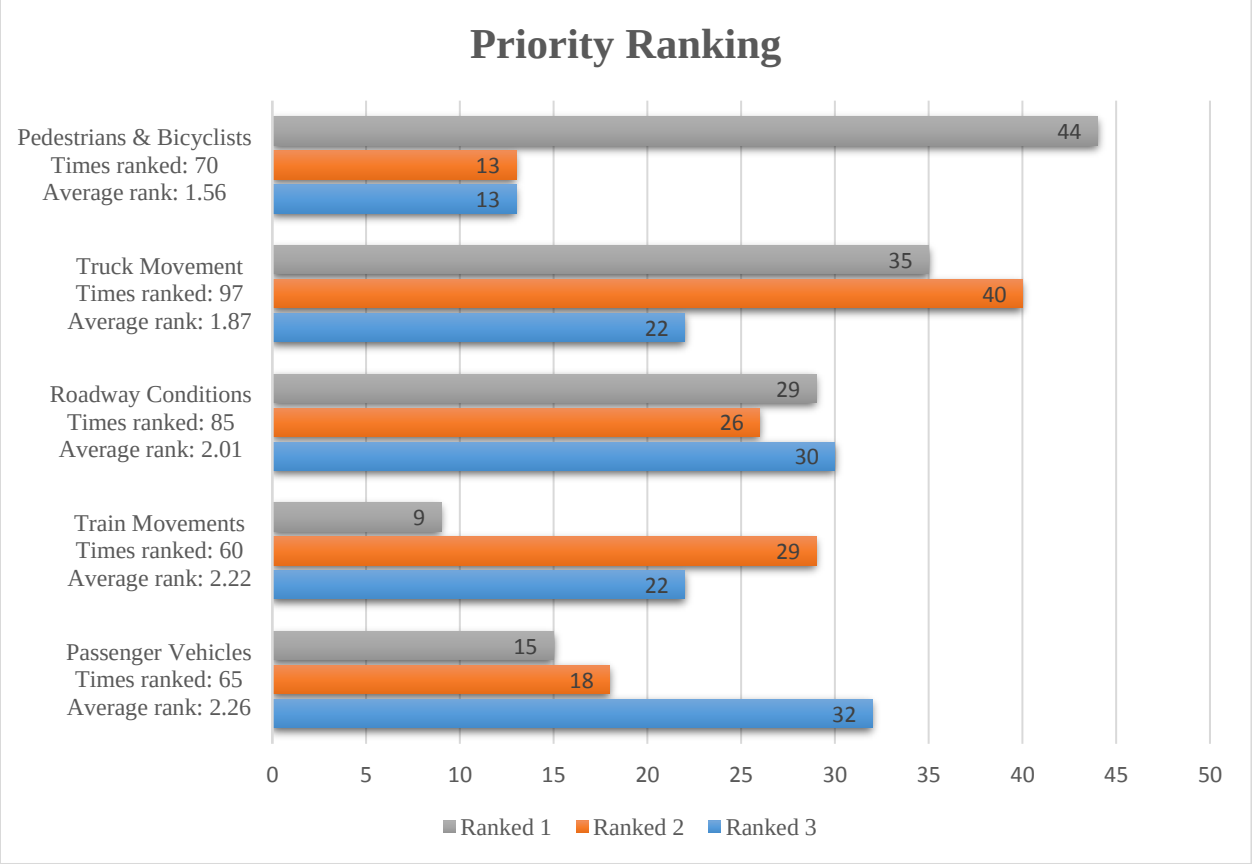
4.1 MetroQuest Survey Results

An online software program known as MetroQuest was used to prepare and operate an online survey that allowed the public to provide input on the problems within the study area. The website was advertised through local trucking companies and government agencies that were invited to the Advisory Council Meeting, as well as through postcards that were mailed to nearly 1,300 residents and businesses within the Government Hill and JBER communities.

The survey was interactive and allowed users to prioritize their top three concerns for the study area. The participants could choose from a pre-determined set of concerns (Roadway Conditions, Passenger Vehicles, Train Movements, Pedestrians & Bicyclists, and Truck Movement) or write their own concerns. After rating topics of concern, the participants were asked to rank the importance of sub-categories related to the concerns they had identified as most important. Participants were then asked to point out specific locations where they had concerns on a map. Users placed symbols related to different modes of transport on the precise location of their concerns within the study area. The final stage of the survey asked a few optional questions about how and why the participant travels through the area. Throughout survey, there was an opportunity for the participant to provide comments.

The web-based survey was available from February 15 to May 17, 2017. There were 136 participants in the survey. Figure 22 shows each category in order by the lowest average ranking, with a lower ranking indicating greater importance. The figure also shows the number of times each category was selected as one of the top three concerns. Note that Pedestrians & Bicyclists had the lowest average ranking (was ranked the number 1 concern the most often) and Truck Movement was selected as one of the top three concerns the most.

Screen shots of the survey are provided in Appendix A: MetroQuest Survey.



NOTE: Lower average rank indicates greater importance

Figure 22: Priorities by Ranking

Table 13 shows the average star rating given to each of the subcategories under each main topic. Participants were asked to rate their level of concern with each subcategory on a scale from 1 to 5, with 5 being the most concerned. In this case, a higher score means participants felt the subcategory was more important. Generally, the highest scores were given to subcategories under the Pedestrian and Bicycle main topic, which means that of those who feel that pedestrians and bicycles are one of the top concerns, all of the proposed subcategories are important.

Other subcategories that were considered most important include conflicts between users, pavement conditions, and the safety of the train crossings.

Table 13: Average Star Ratings for Subcategory Priorities

Truck Movements				
Delay at Intersection	Consistency of Delays	Maneuverability	Steep Grades	Conflicts between Users
2.792	2.817	2.972	2.986	4.026
Train Movements				
Number of Crossings	Delay at Crossings	Predictability	Other Conflicts	Safety Tracks
2.872	3.000	3.043	3.109	3.378
Passenger Vehicles				
Intersection Delay	Reliability	Navigating through the Area	Safety	Conflicts
2.612	3.041	3.122	3.600	3.725
Roadway Conditions				
Grades	Alignment Curvature	Drainage	Sight Distance	Pavement Conditions
2.985	3.167	3.515	3.537	4.118
Pedestrians & Bicyclists				
Traffic Mix	Connectivity	Lack of Crosswalks	Lack of Sidewalks	Accommodations for Bikes
3.862	4.317	4.356	4.500	4.567

NOTE: Higher rank means greater importance

116 participants left responses for the optional Wrap Up questions at the end of the survey. The summary of their answers can be seen in Table 14. Note that truck drivers were underrepresented in the survey results; however, the concerns of truck drivers were captured through other outreach efforts, such as the agency field visit and the advisory committee meeting.

Table 14: Summary of Wrap Up Questions

Question	**Answer Number of Responses**				
Do you live or work in the project area?	Work 41	Live 36	Neither 28	Both live and work 11	
How do you travel thru the area?	Passenger Vehicle 66	Bike 23	Truck 14	Walk 7	Other Vehicle 5
How often do you use the intersection?	Daily 39	A few times a month 29	A few times a week 26	A few times a year 18	Rarely or never 4
Why do you travel thru the area?	To/From work 30	As part of my job 25	To/From home 23	To/From ship creek area 23	Other 15

4.2 Agency Field Visit

On March 6, 2017 representatives from DOT&PF, POA, ARRC, KE, and local trucking companies met together to discuss known issues and concerns in the area including Ocean Dock Road and the C Street ramps. After introductions were made and the scope of the project was outlined for everyone, attendees rode in vehicles to tour the project area. This facilitated moving together as a group which made it easier for everyone to hear the discussion.

Some of the issues discussed include:

- Drivers feel that the available sight distance does not allow them to see a vehicle stopped ahead of them because the retaining wall on the inside of the horizontal curve limits sight distance. In poor road conditions, vehicles will need to travel more slowly.
- Trees on the hill above the retaining wall appear to be tilting downhill.
- Trucks have difficulty accelerating up the ramps, especially during winter, and swing wide as they pass Ocean Dock Road when leaving the POA to gain adequate speed.
- There are drainage issues in the study area, especially during the spring thaw period. Potholes and cracking are common problems at this intersection.
- The railroad tracks have experienced similar heaving and other soil/water related concerns.
- The best days to do construction work in this area are Thursday, Friday, and Saturday. On Sunday and Tuesday, the cargo ships come into the dock and trucks travel in and out of the POA from 7 AM to 7 PM.

Notes from the agency field visit can be found in Appendix B: Agency Field Visit Notes.

4.3 Advisory Council Meeting

On March 30, 2017 representatives from DOT&PF, POA, ARRC, MOA, JBER, Anchorage Police Department, Government Hill, and local companies operating out of the POA met in the conference room at DOT&PF's building to discuss issues and concerns with C Street ramps and Ocean Dock Road.

First, the scope of the project was outlined, followed by an opportunity for each attendee to express their concerns. Attendees were encouraged to share specific concerns viewed from their agency's perspective. Some topics that were highlighted include:

- Discussion regarding the need for pedestrian and bicycle facilities to help organize non-motorized traffic in the area and to connect routes.
- Discussion of alternative routes in and out of the POA during the construction phase. The main concerns were accessibility in the event of an emergency, allowing for normal business operations, and maintaining security for the POA and JBER.
- Sight distance and drainage concerns were described.
- While there have been few crashes in the study area, drivers frequently report being almost hit. Increased sight distance and earlier warning of train crossings would be helpful.

Following the discussion, the project schedule was described. Notes from the advisory council meeting can be found in Appendix C: Advisory Council Meeting Notes.

5 Future Traffic Volumes

Future traffic volumes for the study area were developed using a preliminary version of the Anchorage Metropolitan Area Transportation Solutions (AMATS) 2040 travel demand model (TDM).

5.1 Annual Average Daily Traffic

Existing AADT values for the 2013 base year were supplied by the DOT&PF Annual Traffic Volume Reports. Design year volumes were projected using the TDM. These volumes were then adjusted using post-processing methodologies presented by the National Cooperative Highway Research Program (NCHRP) Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design*. Table 15 shows existing AADT values for 2013 and forecasted model volumes for the 2040 design year. While the model predicts that traffic on individual ramps may decrease, overall, the average annual daily traffic increases.

Table 15. Average Annual Daily Traffic Volumes

Road Segment	2013 AADT	2040 Model AADT
C Street Northbound Off-Ramp (Downtown to Ocean Dock Road)	2056	2232
C Street Southbound Off-Ramp (Government Hill to Ocean Dock Road)	304	353
C Street Southbound On-Ramp (Ocean Dock Rd to Downtown)	2091	1875
C Street Northbound On-Ramp (Ocean Dock Road to Government Hill)	430	284
Ocean Dock Road, North Leg	1892	2069
Ocean Dock Road, South Leg	2580	2553

5.2 Future Year 2040 Turning Movement Volumes

Future intersection TMVs were calculated based on AADT projections for the approach roads, expected turning movement proportions, and design hour volume percentages determined from observed turning movement counts. Future turning movement volumes were only analyzed for two conditions: weekday peak hour and cargo day peak hour. In general, the peak hour was found to occur during the middle part of the day.

Based off the 30th highest peak hour from 2013 PTR data from the PTR station located within the study area on the north leg of Ocean Dock Road, the design hour percentage for a cargo day was assumed to be 16%. Based on average percent of AADT by hour, the weekday noon peak hour design hour percentage was assumed to be 12%. The C street ramps receive twice as much traffic as the other two legs of the study intersection. Because of this, the trip distribution model normally used to calculate future TMVs heavily weighted through movements, producing unlikely results. Thus, simple growth rates were applied to each leg of the intersections to forecast future turning movements proportionally to projected design year AADTs and in agreement with DHVs.

Figure 20 and Figure 21 show projected future TMVs for a weekday and a cargo day, respectively.

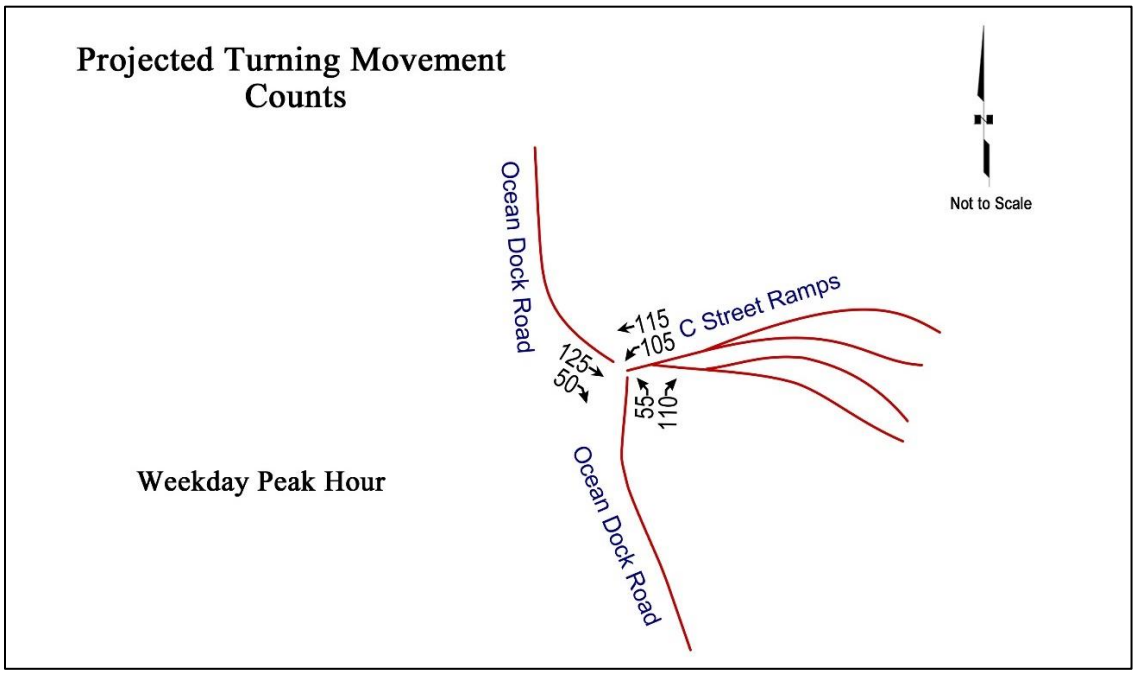


Figure 23. Future Year 2040 TMV Summary for a Weekday at the Peak Hour

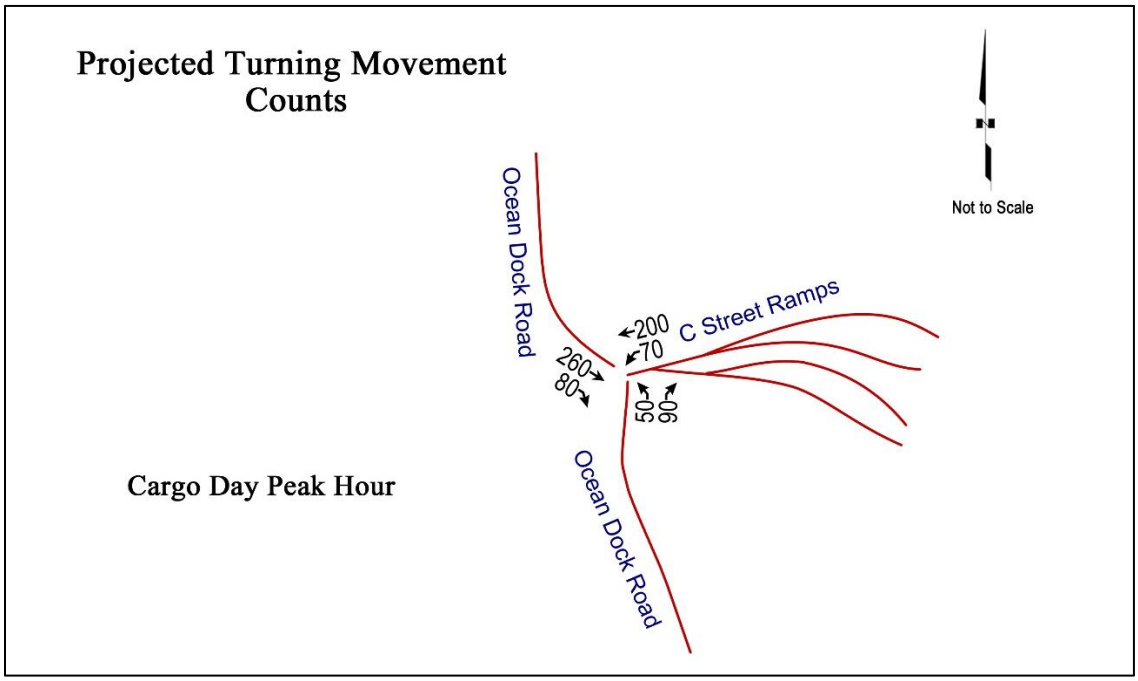


Figure 24. Future Year 2040 TMV Summary for a Cargo Day at the Peak Hour

6 Design Alternatives

Several concerns with the study area were identified and are addressed by the design alternatives:

- Poor drainage and resulting pavement damage requires frequent pavement repairs.
- Limited sight distance is uncomfortable for truck drivers. Drivers coming from C Street indicate they would like advanced warning of trains at the train crossing, as well as advanced warning of trucks on Ocean Dock Road turning left into the railway yard on the north leg of Ocean Dock Road.
- The horizontal curve at the study intersection makes accelerating up the ramps difficult for eastbound trucks.
- Lack of non-motorized connectivity (no pedestrian or bicycle infrastructure along the ramps) results in pedestrian and bicycle movements that are difficult to predict, which is a safety concern.
- Two skewed railroad grade crossings cause delays for both vehicle and train traffic.

The existing prohibition of pedestrians and bicyclists on the C Street ramps are consistent with the desire to separate pedestrian and bicycle traffic from truck traffic; however, pedestrian/bicycle attractors such as the Ship Creek Trail, fishing in the Ship Creek, and even the Port make it desirable for some pedestrians/bicyclists to travel along the ramps to Ocean Dock Road to reach their destination, reducing travel distance by between 0.75 mile and 1 mile compared to walking over the C Street bridge and back down to Ship Creek. Furthermore, some bicyclists have indicated that pedaling on the C Street bridge pathway is so uncomfortable in the winter that they choose to take Ocean Dock Road to the C Street ramps instead. Thus, there may be a benefit to considering a formal pedestrian/bicycle connection, if one can be found that has improved safety over the existing condition.

During development of the four alternatives presented below, warrants for signalization were considered. Operational LOS and low crash rate indicated no conditions that would require signalization as a countermeasure.

6.1 Alternative 1: No Build

The intersection was repaved in the summer of 2017. Under this alternative, no further action would be taken. The design of the intersection would remain the same. None of the current issues would be fixed and the project area would remain in its present condition. There are no costs associated with this option, beyond the expected on-going pavement preservation projects.

6.1.1 Measures of Effectiveness

6.1.1.1 Safety

The no build alternative would not address safety concerns. Few crashes have occurred in the study area within the last decade. While it is unlikely that the crash rate would increase if the intersection configuration remained the same, driver discomfort due to limited sight distance, steep grades, and poor drainage would continue to be a concern.

6.1.1.2 Intersection Capacity

To determine the future intersection capacity for critical peak hours under the no build alternative, the intersection was analyzed using future volumes and existing PHFs. The analysis was conducted utilizing the Highway Capacity Software 2010. Results are delineated in Table 16 and compared to existing levels of service. While the vehicle delay would increase if no action were taken, movement LOS would still be LOS C or higher.

6.1.1.3 Truck Operations

Under the no build alternative, heavy truck use would continue to characterize the study area. Trucks would continue to have difficulty gaining adequate speed on the C Street on-ramps, seeing around the intersection bend, and navigating ongoing pavement concerns due to poor drainage.

Table 16. Future LOS – No Build Alternative

Period	Approach	Movement	Midday Peak - Existing (2017)			Midday Peak - Future (2040)		
			V/C Ratio	Control Delay (sec/veh)	LOS	V/C Ratio	Control Delay (sec/veh)	LOS
Weekday	NB	Left+Right	0.10	9.8	A	0.28	12.9	B
	WB	Left	0.04	7.6	A	0.09	8.0	A
Cargo	NB	Left+Right	0.16	11.7	B	0.37	17.8	C
	WB	Left	0.04	8.1	A	0.09	9.1	A

6.1.1.4 Railroad Operations

Railroad operations would continue unchanged.

6.1.1.5 Pedestrian Operations

For future traffic volumes on the ramps, pedestrian delays calculated utilizing the HCM 2010 methodology are very low, as described in Table 17. However, pedestrian discomfort when crossing the ramps would likely continue due to high truck traffic, unmarked crossings on two of the ramps, and difficulty seeing down the roadway due to the curvature of the ramps. Pedestrians would likely continue to walk on and cross the ramps at random locations, creating hazardous and unpredictable situations for pedestrians and drivers alike. Without an alternative pathway to the narrow sidewalk on C Street Bridge, bicyclists would continue having difficulty navigating the area.

Table 17. Future Year 2040 Pedestrian Delay - No Build Alternative

Road Segment	Crossing Width (feet)	Typical Weekday		Cargo Day	
		Volume	Delay (sec)	Volume	Delay (sec)
C St Northbound Off-Ramp	25	230	4	310	6
C St Southbound Off-Ramp	25	50	1	80	1
C Street Southbound On-Ramp	23	130	2	190	3
C Street Northbound On-Ramp	25	40	0.6	40	0.6

6.1.2 Environmental Impacts

There are no environmental considerations to take into account for the no-build alternative.

6.1.3 Hydrologic and Hydraulic Considerations

For this alternative no improvements would be made to repair the existing condition of the storm drain system in the project area. The existing system would be cleaned of sediments to bring it back up to its intended service level. The system pipes should be inspected with a video system after cleaning to determine if they are still serviceable. Regular maintenance will assist in keeping the existing system working as designed over a longer period of time and with fewer services issues. It is unlikely that this alternative will address the potholes that typically develop on the C Street on-ramp approach and therefore this alternative assumes that seasonal pothole repair will be required.

6.1.4 Utility Conflict

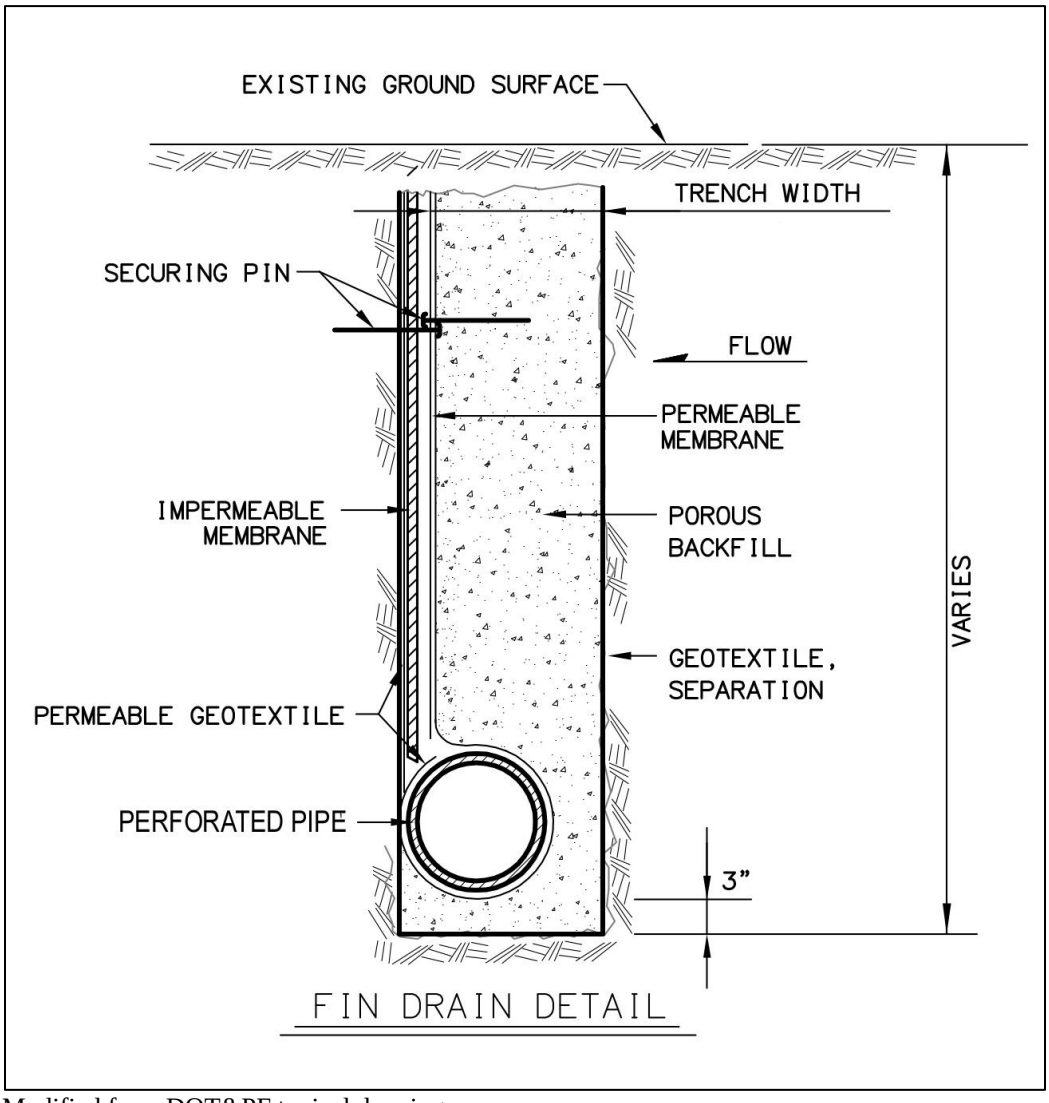
There are no utility conflicts associated with the no-build alternative.

6.1.5 Cost Estimates

No additional costs are associated with the no-build alternative. However, ongoing maintenance of the pavement surface would be needed.

6.2 Alternative 2: Repair Damaged Pavement and Install Drainage Improvements

This alternative would replace the existing road structure while maintaining the existing road geometry. Damaged drainage structures would be replaced and a fin drain would be installed to improve drainage in the area and reduce recurring pavement damage. Depicted in Figure 25, fin drains incorporate geotextiles and perforated pipes covered with a layer of gravel (porous backfill) and could help lower the high ground water table around the study intersection.



Modified from DOT&PF typical drawings

Figure 25. Typical Fin Drain

Currently, a manhole is located in the middle of the study intersection. Due to its location and the relatively high traffic volumes in the study area, it is nearly impossible to access the manhole for maintenance purposes without significant traffic flow disruption. In order to better enable maintenance operations and facilitate adequate drainage, this alternative would move the manhole. Figure 26 depicts Alternative 2 with the location for the new fin drain.

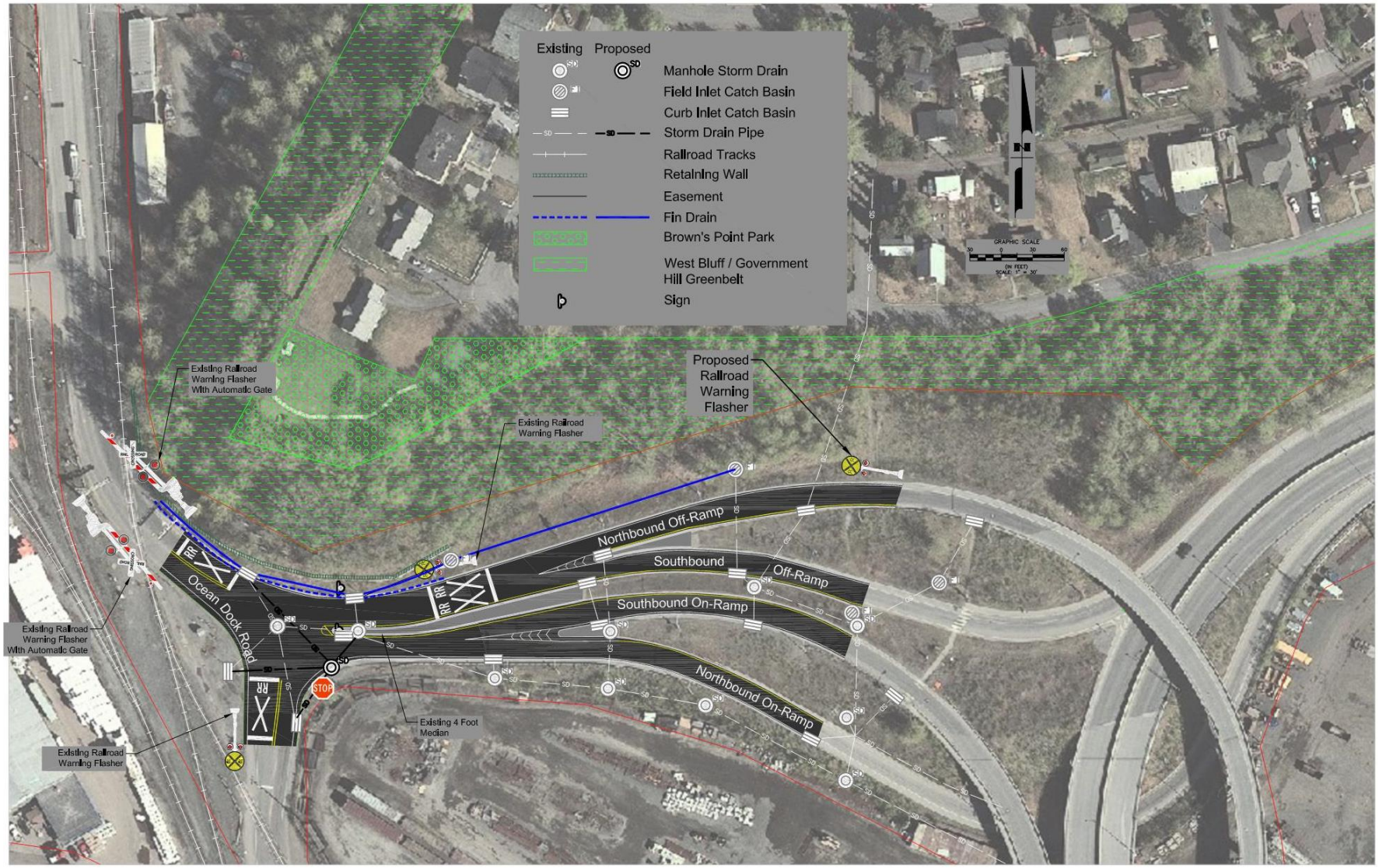


Figure 26. Alternative 2 - Repair Damaged Pavement and Install Drainage Improvements

To address safety issues due to limited sight distance, a railroad warning flasher would be added on the Northbound C Street Off-Ramp to alert vehicles if a train is present. Alternative 2 as envisioned would not address pedestrian/cyclist concerns; however, some of the pedestrian improvements included in Alternative 3 could potentially be included in the Alternative 2 design, if desired.

6.2.1 Measures of Effectiveness

6.2.1.1 Safety

Alternative 2 would improve safety via improved drainage structures: ponding and resulting icy and potholed conditions would be dramatically reduced. The new railroad warning flasher on the Northbound C Street Off-Ramp would mitigate sight distance issues. However, driver discomfort due to limited sight distance and railroad crossings would likely continue and pedestrian facilities would not be improved.

6.2.1.2 Intersection Capacity

Since the road geometry would remain unchanged, the future intersection capacity for Alternative 2 is the same as for the No Build Alternative. See Table 16 in Section 6.1.2.2.

6.2.1.3 Truck Operations

Because of its location, heavy truck use would continue to characterize the study intersection. Without a change in intersection geometry, trucks would continue to have difficulty gaining adequate speed on the C Street on-ramp. However, drainage upgrades would improve the driving experience and reduce the need for pavement maintenance. The new railroad warning flasher would address sight distance concerns and inform truck drivers of the upcoming railroad crossings.

6.2.1.4 Railroad Operations

Railroad operations would continue unchanged; however, drainage improvements would also decrease maintenance needs for the railroad tracks in the vicinity.

6.2.1.5 Pedestrian Operations

Since the road geometry would remain unchanged, the future pedestrian delay for Alternative 2 is the same as for the No Build Alternative. See Table 17 in Section 6.1.2.5. Pedestrians and bicyclists would likely continue walking on the ramps, creating unpredictable situations and safety concerns. Bikers would continue to have difficulty sharing and riding safely on the narrow C Street bridge sidewalk.

Note that under Alternative 3 a pedestrian walkway would be installed along the north side of the C Street ramps, with a pedestrian crossing at the Ocean Dock Road intersection. Since Alternative 2 does not provide a widened median to allow two-stage crossings, it would be less desirable to install a pedestrian crossing at that location due to the limited pedestrian sight distance. Therefore, a walkway is not recommended with this alternative.

6.2.2 Environmental Impacts

Alternative 2 would be within the existing easement. Should Alternative 2 proceed, no wetlands or water body permits are anticipated, no fish or wildlife are likely to be threatened, no historic places are likely to be involved, noise pollution is not likely to increase, and the economics of the

area are not likely to be affected. Measures would be taken to avoid the spread of invasive species that are present in the study area. Additionally, water quality of surface runoff would likely increase due to the installation of fin drains, which should trap more sediment before it enters the storm drain system.

Reference Appendix D: Environmental Impacts for more information on environmental considerations.

6.2.3 Hydrologic and Hydraulic Considerations

Alternative 2 would update the drainage system. Any of the storm drain pipes or structures that are no longer serviceable will be removed and replaced. All remaining pipes or structures will be cleaned then repaired as needed.

As a needed improvement for the drainage system, a 600-foot long subdrain or fin drain extension is recommended to be installed near the base of the retaining wall. The purpose of the subdrain or fin drain is to lower the potential for a seasonal high groundwater table to saturate the roadway embankment and toe of the retaining wall. The existing storm drain system remains hydraulically and structurally adequate with the addition of the subdrain or fin drain to replace the existing subdrain. These improvements coupled with the required cleaning of the drainage system will adequately allow for proper drainage of water out of the project area.

The storm drain manhole currently located in the middle of the intersection of Ocean Dock Road and the C Street ramps would be moved to the southeast corner. The manhole's current location is a challenge for maintenance access due to truck and vehicle traffic. Moving the manhole will also require redirecting storm drain pipes from the associated curb inlets.

See Appendix E: Hydrologic and Hydraulic Considerations for full hydrologic and hydraulic recommendations.

6.2.4 Utility Conflict

Within the project area all major utility organizations are present with utility lines crossing Ocean Dock Road or the ramps. None of the utilities would have a major impact on Alternative 2 because they are not in the areas of the proposed improvements. Buried cables and powerlines are on the ramps at the start of the bridge and go towards Government Hill. A gas main line crosses Ocean Dock Road at the north end of the project area. There is a 12-inch ductile iron water pipe that runs from the railroad maintenance yard, crosses Ocean Dock Road on the south leg of the intersection then continues north to the port.

6.2.5 Cost Estimates

Estimated cost estimates for Alternative 2 are listed in Table 18.

Table 18. Cost Estimates – Alternative 2

Work	Total Cost	Comments
Construction	$1,730,000	
Preliminary Design	$170,000	~ 10% of construction costs
Right-of-Way (ROW)	$0	~ No ROW Acquisition
Utilities (placeholder)	$10,000	
Contract	$260,000	~ 15% of construction costs
Contingencies	$435,000	~ 20% of (preliminary design+ROW+utilities+contract administration
Total	**$2,605,000**	**Estimated design and construction costs**

6.3 Alternative 3: Increase Radius of Horizontal Curve and Relocate Retaining Wall

Under this alternative, all current existing roadway and drainage structures would be replaced, and a fin drain would be installed. The manhole located in the study intersection would be moved to the southeast corner of the intersection to allow for ease of access. See the Hydrologic and Hydraulic Recommendations report for more information. To address sight distance concerns, the hill on the north side of the intersections would be cut back and a new 10 foot retaining wall would be built 30 feet north of the existing retaining wall location, as depicted in Figure 27. To minimize sight distance issues caused by vehicle queues, the new design would also include a left-turn lane into the North Star driveway on the north leg of Ocean Dock Road.

The roadway would be widened at the intersection. While the outer edge of the curve would remain in the same place, the eastbound through lane on the inside of the curve would be widened towards the north, effectively increasing the inner curve radius. This would allow trucks leaving the POA to maintain speed instead of slowing down as they enter the intersection, giving them the needed momentum to more comfortably climb up to C Street.

To address the demand for pedestrian and bicyclist connectivity and to encourage compliance with the prohibition against pedestrian and bicycle travel on the ramps, Alternative 3 would include a new pedestrian and bicyclist pathway and crosswalk. Installing a pedestrian pathway on the south side of the C Street ramps would reduce vehicle conflicts; however, connecting the existing pathway to one on the south side of the ramps is not practical because of the steep grades near the C Street bridge structures. Instead, the proposed pathway would extend along the north side of the Northbound Off-Ramp, from C Street to Ocean Dock Road. The widened roadway at the study intersection would allow space for a widened median at the intersection. A new pedestrian crosswalk would be installed on the east leg of the intersection, and the widened median would serve as a pedestrian refuge, facilitating two-stage crossings. Pedestrian refuge medians reduce crossing distance and allow pedestrians to cross one direction of traffic at a time, decreasing pedestrian exposure.

At the existing pedestrian crossing that connects to the C Street bridge pathway, the landing area would be widened, to allow pedestrians to cross in larger groups.

Note that the proposed left turn lane into the North Star driveway on the north leg of Ocean Dock Road would increase the length of the skewed at-grade rail crossing and could result in left turn trucks being queued on the tracks. To allow left-turn trucks to clear the tracks if a train approaches, it is recommended to install flashing lights and gates north of the North Star driveway and across the North Star driveway.

This alternative would improve sight distance, drainage and pavement deterioration issues, and would provide pedestrian and bicycle connectivity. However, delay due to the railroad crossing would not be addressed.

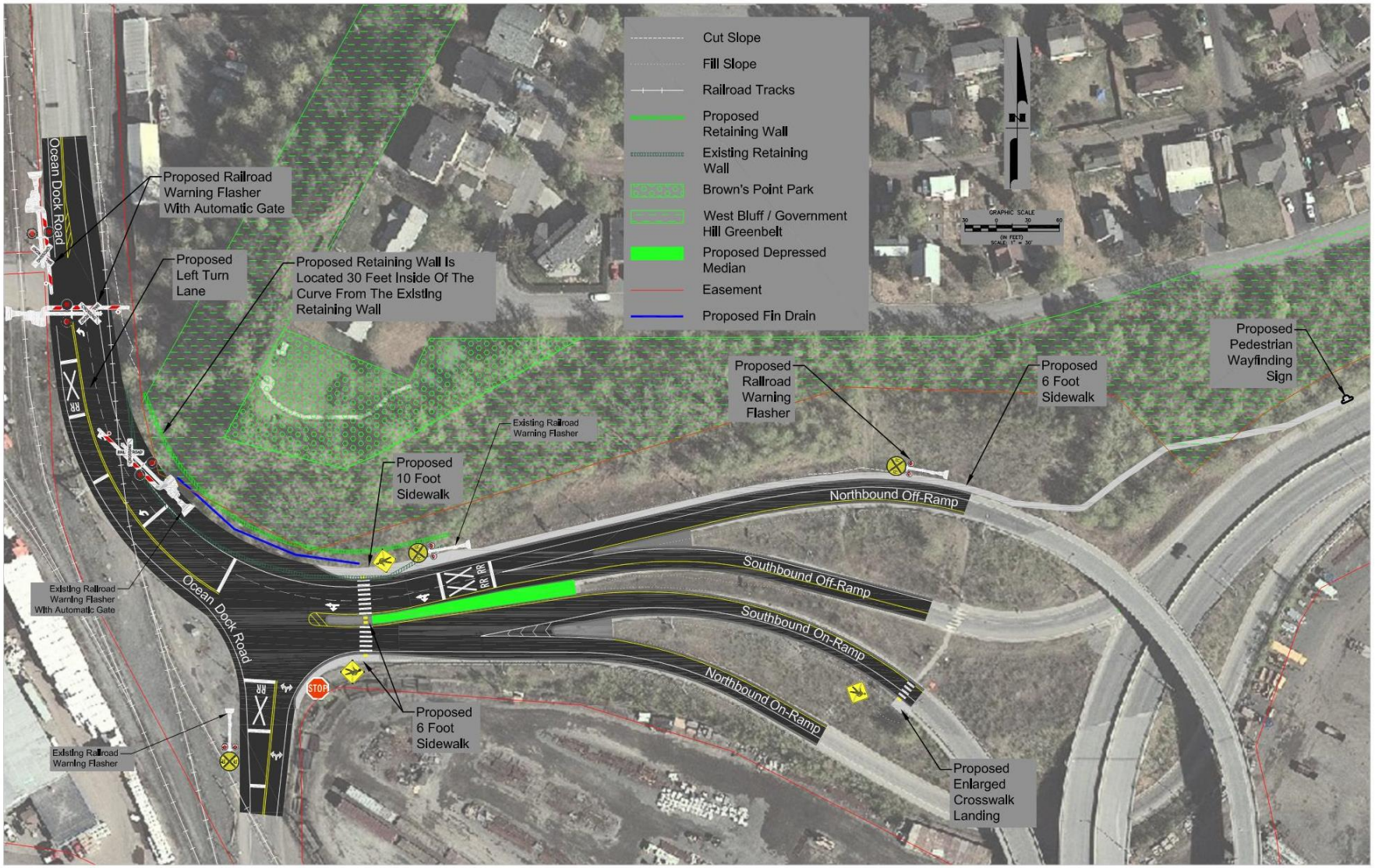


Figure 27. Alternative 3 - Increase Radius of Horizontal Curve and Relocate Retaining Wall

6.3.1 Measures of Effectiveness

6.3.1.1 Safety

All safety concerns would be addressed under this alternative. The new pavement structure design, updated drainage structures, and new fin drains would resolve drainage issues, reducing the occurrence of icy conditions and pot-holes. Sight distance would be improved due to moving the retaining wall 30 feet to the north and installing a left turn lane into the North Star driveway north of the intersection. Few crashes have occurred in the study area within the last decade, and improved sight distance would likely result in even fewer crash incidents occurring in the future while also improving driver comfort. In terms of pedestrian safety, the existing pathway would continue to provide access across the C Street Bridge, while pedestrian and bicyclist travel through the Ship Creek area would be consolidated by the new pathway. The new pathway and crosswalk would help keep pedestrians and cyclists off the ramps, resulting in a safer and more predictable experience for all facility users. While a crossing at the study intersection would not be ideal, as it would be a conflict point between pedestrians or bicyclists and heavy trucks, the widened median would provide refuge for pedestrians and bicyclists, allowing two-stage crossings.

6.3.1.2 Intersection Capacity

Although the inner radius of the horizontal curve at the intersection would be increased, the intersection geometry would essentially remain unchanged. Hence, the future intersection capacity for Alternative 3 is the same as for the No Build Alternative and Alternative 2. See Table 16 in Section 6.1.2.2. However, the left turn lane into the railyard on the north leg of Ocean Dock Road would prevent cars from backing up into the study intersection. Note that no turning movement volumes were collected at the North Star driveway; therefore, a change in delay could not be calculated.

6.3.1.3 Truck Operations

The study area would continue to be characterized by heavy truck use. Alternative 3 would allow trucks to gather adequate speed to comfortably climb the C Street on-ramps and would increase driver comfort. The addition of a northbound left turn lane on the north leg of Ocean Dock Road would relieve delay caused by vehicles waiting in the through lane to turn left into the railyard, improving the flow of truck operations.

6.3.1.4 Railroad Operations

Railroad operations would continue unchanged; however, the width of the pavement at the railroad crossing on the north leg of Ocean Dock Road would be increased. Additionally, drainage improvements would decrease maintenance needs for the railroad tracks in the vicinity.

6.3.1.5 Pedestrian Operations

Alternative 3 would add a pedestrian crossing on the east side of the intersection of the C Street ramps and Ocean Dock Road. The median on the east leg of the intersection would be widened to provide median refuge for crossing pedestrians, enhancing safety by allowing two-stage crossings. Table 19 depicts pedestrian delay at the peak hour for each pedestrian crossing location. Delay

calculated for the proposed crossing on the east leg of the study intersection assumes that pedestrians will cross the roadway in two stages.

Table 19. Future Pedestrian Delay – Alternative 3

Road Segment	Crossing Width (feet)	Typical Weekday		Cargo Day	
		Volume	Delay (sec)	Volume	Delay (sec)
C Street Northbound Off-Ramp	25	230	4	310	6
C Street Southbound Off-Ramp	25	50	1	80	1
C Street Southbound On-Ramp	23	130	2	190	3
C Street Northbound On-Ramp	25	40	1	40	1
East Leg of Intersection of Ocean Dock Road with C Street Ramps	30/26*	450	11	620	18

*Westbound/Eastbound

A sidewalk on the north side on the Northbound C Street Off-Ramp would provide connectivity and promote safety.

The Institute of Transportation Engineers (ITE) published *Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges.* Guiding principles for pedestrian facilities are presented in the publication. Specifically, a design should ensure that the proposed crosswalk provides the pedestrian with adequate visibility and that the proposed sidewalks are appropriate to accommodate both bicyclists and pedestrians with minimal conflicts.

Pedestrian sight distance is the distance a pedestrian must be able to see down the roadway in order to comfortably enter the roadway and make a crossing. It is calculated in a similar way to how intersection sight distance is calculated for vehicles: the speed of the oncoming traffic multiplied by the time it takes for the pedestrian to cross the road. Table 20 presents calculated desirable pedestrian sight distances and compares them to measured pedestrian sight distance. The measured sight distance is greater than the desirable distance for the Southbound C Street On-Ramp and for two-stage crossings of the proposed crosswalk on the east leg of the study intersection. However, sight distance on the Southbound C Street Off-Ramp does not achieve the desired distance, and crossing the east leg of the study intersection without taking refuge on the median would likely be uncomfortable.

Table 20. Pedestrian Sight Distance

Crossing Location	85th Percentile Speed	Crossing Width	Desirable Ped Sight Distance	Measured Ped Sight Distance
SB C Street Off-Ramp (Government Hill to Ocean Dock Road)	36	24	362	240*
SB C Street On-Ramp (Ocean Dock Road to Downtown)	33	24	332	>400
East Leg of Study Intersection: Entire Crossing Width	37	55	853	>400
East Leg of Study Intersection: Crossing the Westbound Lane	30	24	302	>400
East Leg of Study Intersection: Crossing the Eastbound Lane	37	24	372	>400

*Measurement taken in winter. During summer, bushes (if not pruned) would further reduce sight distance.

6.3.2 Environmental Impacts

The proposed 10 foot retaining wall and a section of the new sidewalk on the north side of the Northbound C Street Off-Ramp are located outside of the existing easement. Thus, Alternative 3 would require acquisition of 5,875 square feet (0.13 acres) of land from the railroad easement to the north of the intersection. Should Alternative 3 proceed, no wetlands or water body permits are anticipated, no fish or wildlife are likely to be threatened, noise pollution is not likely to increase, and the economics of the area are not likely to be affected. The proposed retaining wall is near two historic site limits, the Government Hill Federal Housing Historic District and Brown's Point Park Historic Site. A section 4(f) consultation is likely needed for the project to advance. Measures would be taken to avoid the spread of invasive species that are present in the study area. Additionally, water quality of surface runoff would likely improve due to the installation of fin drains, which should trap more sediment before it enters the storm drain system.

Reference Appendix D: Environmental Impacts for more information on environmental considerations.

6.3.3 Hydrologic and Hydraulic Considerations

Alternative 3 would include repairs and upgrades to the drainage system. This includes replacing all unserviceable storm drain pipes and structures. The existing downstream storm drain system will be cleaned out and proper repairs made.

Recommended improvements include adding a 600-foot long subdrain or fin drain at the base of the retaining wall. Adding a new curb inlet is also proposed uphill of the crosswalk improvements. This alternative also proposes to depress the existing medians to keep seasonal meltwater from icing the on and off ramps. Subdrain should be installed in the center of the medians to collect runoff.

If Alternative 3 is implemented, the storm drain manhole located in the study intersection should be relocated to the southeast corner of the intersection to facilitate easier access for maintenance

purposes. Moving the manhole will also require redirecting storm drain pipes from the associated curb inlets.

Reference Appendix E: Hydrologic and Hydraulic Considerations for full hydrologic and hydraulic recommendations.

6.3.4 Utility Conflict

Within the project area all major utility organizations are present with utility lines crossing Ocean Dock Road or the ramps, as described in Section 6.2.4 on page 50. As with Alternative 2, most of the utilities will not be impacted by this alternative. However, a gas main line crosses Ocean Dock Road at the north end of the project area. Under Alternative 3, the gas line would be impacted by the building of the new retaining wall.

6.3.5 Cost Estimates

Cost estimates for Alternative 3 are listed in Table 21.

Table 21. Cost Estimates – Alternative 3

Work	Total Cost	Comments
Construction	$3,189,000	
Preliminary Design	$310,000	~ 10% of construction costs
Right-of-Way (ROW)	$100,000	~ 0.13 acres of railroad easement
Utilities (placeholder)	$40,000	~ Fire hydrant and gas line relocates
Contract Administration	$478,000	~ 15% of construction costs
Contingencies	$827,000	~ 20% of (preliminary design+ROW+utilities+contract administration
Total	**$4,944,000**	**Estimated design and construction costs**

6.4 Alternative 4: Total Realignment of Roadway and Railroad Tracks

This alternative would involve completely redesigning and realigning both the roadway and the railroad tracks to reduce the number of grade crossings, especially skewed crossings. Ocean Dock Road would be straightened at the study intersection, and the east leg of the intersection (the C Street Ramps) would be extended westward. Stop control would be removed from the northbound leg of Ocean Dock and would be placed on the westbound leg of the intersection. Drainage and sight distance concerns would also be addressed, and a pathway would be constructed for pedestrians and bicyclists (not shown in the figure). Figure 28 shows the realignment of the roadway with two options. Under option A, the westbound traffic is all brought to the stop sign at Ocean Dock Road. Under option B, the westbound right turn traffic (headed to the port) uses a slip ramp and enters Ocean Dock Road under yield control. On the diagram, the assumed radius is 255 feet, with 2% superelevation, which would give a 25-mph design speed. Figure 28 depicts a condition where the railroad tracks remain in roughly the same positions as existing (the tracks on the east side of Ocean Dock Road are relocated to the east to allow space for a left turn lane from Ocean Dock Road). Depending on the actual needs for train

movements in the study area, a complete reorganization of the railway tracks may be possible. Alternative 4 would be the only alternative to potentially reduce vehicle-train interactions. However, it would require collaboration with the ARRC to redesign their tracks, in coordination with the roadway redesign.

Figure 28 offers a rudimentary sketch of a total realignment. However, since developing Alternative 4 would require collaboration with the railroad, detailed conceptual design has not been completed as part of this study.

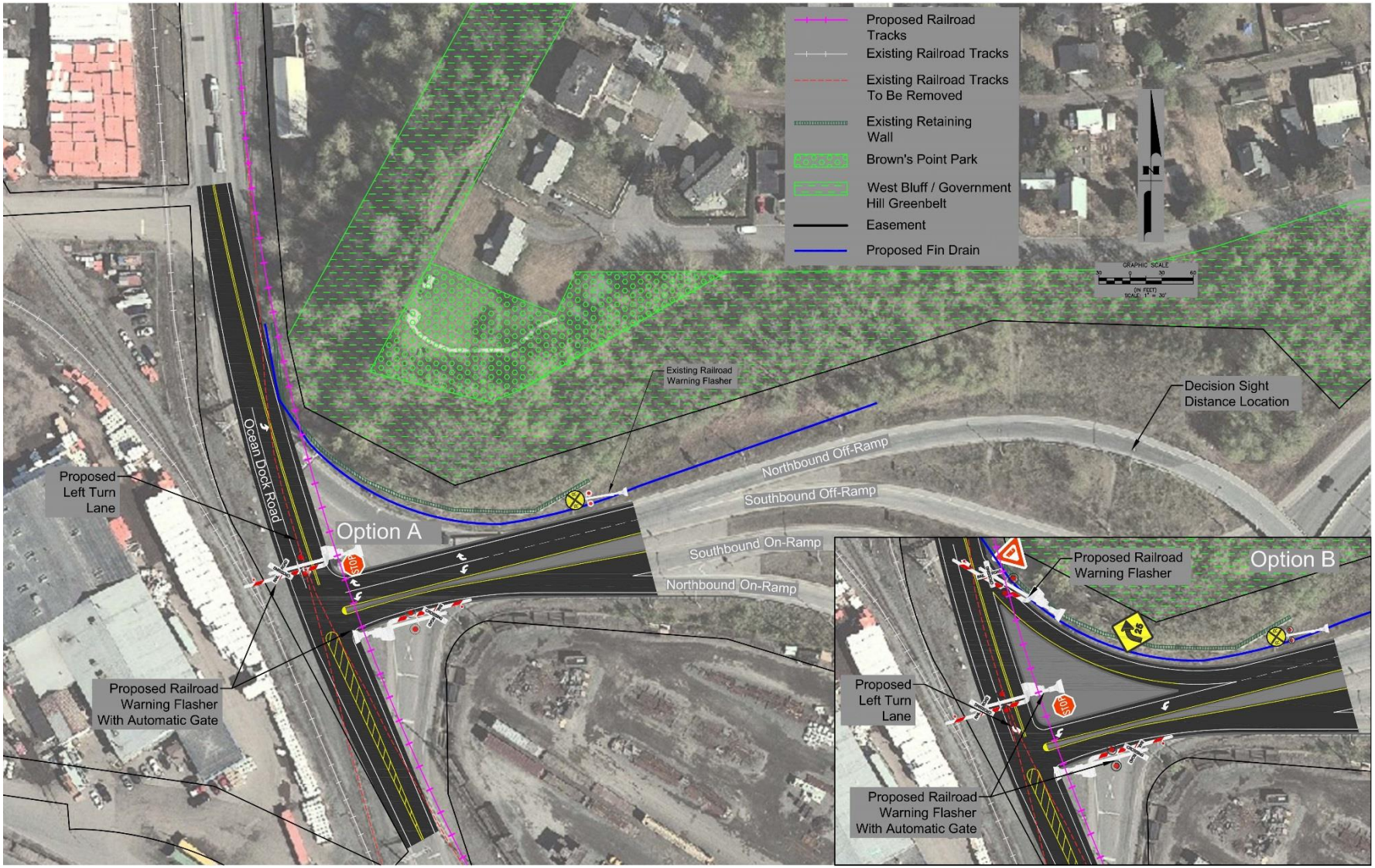


Figure 28. Alternative 4 - Total Realignment of Roadway and Railroad Tracks

6.4.1 Measures of Effectiveness

6.4.1.1 Safety

All safety concerns could be addressed under this alternative. The new pavement structure design, updated drainage structures, and new fin drains would resolve drainage issues, reducing the occurrence of icy conditions and pot-holes. Sight distance would be improved by moving the intersection westward and straightening the north and south legs of Ocean Dock Road. Improved sight distance would likely reduce the already low incidence of crashes while also improving driver comfort. The existing pathway would continue to provide access across the C Street Bridge, while pedestrian and bicyclist traveling through the Ship Creek area could be consolidated by a new pathway.

6.4.1.2 Intersection Capacity

To determine the future intersection capacity for the critical peak hours for Alternative 4, the realigned intersection was analyzed using future volumes and existing PHFs. The analysis was conducted utilizing Highway Capacity Software 2010. Results for the two options are delineated in Table 22 and Table 23, comparing the no build alternative to the two realigned intersection options.

Table 22. Future LOS – Alternative 4A

Period	Midday Peak – Existing Geometry and 2040 Volumes					Midday Peak – Alternative 4A Geometry and 2040 Volumes				
	Approach	Movement	V/C Ratio	Control Delay	LOS	Approach	Movement	V/C Ratio	Control Delay	LOS
Weekday	NB	Left+Right	0.28	12.9	B	SB	Left	0.11	8.2	A
	WB	Left	0.09	8.0	A	WB	Left	0.27	16.3	C
						WB	Right	0.15	10.0	B
Cargo	NB	Left+Right	0.37	17.8	C	SB	Left	0.25	8.9	A
	WB	Left	0.09	9.1	A	WB	Left	0.49	44.1	E
						WB	Right	0.30	11.3	B

Table 23. Future LOS – Alternative 4B

Period	Midday Peak – Existing Geometry and 2040 Volumes					Midday Peak – Alternative 4B Geometry and 2040 Volumes				
	Approach	Movement	V/C Ratio	Control Delay	LOS	Approach	Movement	V/C Ratio	Control Delay	LOS
Weekday	NB	Left+Right	0.28	12.9	B	SB	Left	0.11	8.2	A
	WB	Left	0.09	8.0	A	WB	Left	0.27	16.8	C
						WB	Right Slip	0.14	9.5	A
Cargo	NB	Left+Right	0.37	17.8	C	SB	Left	0.25	8.9	A
	WB	Left	0.09	9.1	A	WB	Left	0.49	44.1	E
						WB	Right Slip	0.27	10.6	B

Moving the stop sign from the northbound leg to the westbound leg of the study intersection would reduce delay for vehicles that stay on Ocean Dock Road rather than utilizing the C Street ramps as they enter and exit the POA. However, neither Whitney Road nor Ship Creek Road to the south of the study intersection are currently configured to adequately handle high truck volumes such as the Glenn or Seward Highways. Thus, the capacity analysis described in Table 20 utilizes volumes that assume the C Street ramps will continue to be the more heavily trafficked route in the intersection. For this reason the westbound stop-controlled movement experiences an increase in delay and a decrease in level of service.

There is little difference between the two options from the perspective of delay and LOS; however, Option A has some operational benefits that are not captured in the delay and LOS calculations. Under Option A, there is a longer weaving distance for vehicles coming from northbound C Street and from southbound C Street to change lanes, as needed. Additionally, Option A eliminates a skewed railroad crossing – the right-turning traffic would cross the tracks at a right angle under Option A.

The *Interim 2035 Metropolitan Transportation Plan* (MTP) lists two long-term projects that have bearing on consideration of Alternative 4. The "Ingra-Gambell Extension – 3rd Avenue to Whitney Road" project would extend the Ingra/Gambell couplet to Ship Creek Avenue and Whitney Road to allow better freight access to the area. The "Whitney Road – North C Street to Post Road" project would upgrade Whitney Road to improve the handling of freight traffic. If these projects are implemented, the changes recommended in Alternative 4 would be a more effective solution for all of the concerns delineated for the study area.

6.4.1.3 Truck Operations

Heavy truck use would continue to characterize the study area. Alternative 4 would resolve drainage and sight distance issues and could reduce delay due to railroad crossings, depending on final design of the railroad track alignment. Due to the configuration of the realigned intersection, trucks would continue to have difficulty gaining adequate speed on the C Street on-ramps. However, trucks could use Ocean Dock Road to Whitney Road, especially if the Ingra/Gambell Extension and the Whitney Road projects are actualized. Desirable decision sight distance (the distance desired to see where a decision will need to be made, to make a decision, and to act on it) for the weaving section, where westbound vehicles may need to change lances to turn left or right, is 720 feet for an urban roadway at 35 mph (85th percentile speed on the ramps). Figure 28 shows the decision sight distance location for Option A. While this point is on the curve of the ramp, a driver can see the intersection from this location. For Option B, the decision must be made about 150 feet earlier, which puts the decision sight distance point about 150 feet earlier on the curve. While drivers can still see the intersection from this location, they may be less likely to turn their head to see the intersection ahead. In either case, signage indicating the approaching decision point may be desirable.

6.4.1.4 Railroad Operations

There are two railroad crossings within the study area, and two additional crossings just south of the study area on Ocean Dock Road. Alternative 4 would reduce the number of skewed crossings and could potentially also reduce the number of at-grade railroad crossings, depending upon the extent to which the study intersection and railroad tracks are realigned. Fewer railroad crossing

would result in reduced delay for both trains and vehicle drivers. Additionally, drainage improvements could decrease maintenance needs for the railroad tracks.

6.4.1.5 Pedestrian Operations

Alternative 4 would address the demand for increased pedestrian and bicyclist connectivity in the study area. It could provide a solution that would minimize conflicts with vehicular traffic. Pedestrian delay for Alternative 4 has not been calculated since the exact locations of sidewalks and crosswalks for this alternative have not been identified. The guiding principles for pedestrian facilities delineated in ITE's *Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges* should be consulted prior to design. Special attention should be made to ensure that pedestrian sight triangles are adequate at the crosswalk, that the crosswalk does not deviate excessively from desire paths, and that the proposed sidewalks can smoothly accommodate both pedestrians and cyclists.

6.4.2 Environmental Impacts

Alternative 4 would require additional ROW/easements. Since the conceptual design for the alternative is not developed, the amount of needed ROW is unknown. Should Alternative 4 proceed, environmental impacts would likely be similar to those anticipated for Alternative 3.

6.4.3 Hydrologic and Hydraulic Considerations

The roadway and railroad tracks would be reconfigured under this alternative which means a completely different drainage system would have to be designed to match the roadway. These changes would likely mean much of the existing storm drain system would be removed and replaced. Roughly the same number of curb inlets and other structures would be used for the new drainage configuration. The proposed system would reconnect to the storm drain pipes coming down from the Government Hill subdivision and also to the downstream outlet pipes that continue underneath C Street.

6.4.4 Utility Conflict

Within the project area all major utility organizations are present with utility lines crossing Ocean Dock Road or the ramps. The buried cables and powerlines are on the ramps at the start of the bridge and go towards Gov't Hill. There is a 12-inch ductile iron water pipe that runs from the railroad maintenance yard, crosses Ocean Dock Road on the South leg of the intersection then continues North to the port. A gas main line cross Ocean Dock Road at the north end of the project area. This Alternative would have a greater impact on several of the utilities due to the major changes in the road and railroad layouts.

6.4.5 Cost Estimates

An alternative such as the one shown in Figure 28, with minimal changes to the train tracks could cost around $4 million, while a project with more extensive changes to the train tracks could cost closer to $10 million.

6.5 Summary of Alternatives

Alternative 1, the no build alternative, would leave the intersection as is. It would not address any of the concerns but would also not require funding, except to repair ongoing pavement degradation exacerbated by existing drainage issues.

Alternative 2 would repair damaged pavement and upgrade the drainage system. A railroad warning flasher would be installed to mitigate the lack of sight distance. However, the C Street ramps would still block pedestrian and bicyclist connectivity and drivers and trains would continue to experience delay and discomfort due to at-grade railroad crossings. Implementing Alternative 2 would cost around 2.6 million dollars. Stakeholders representing the trucking industry indicated that this alternative would fix their most prominent concern.

Alternative 3 would solve drainage issues and sight distance issues by replacing inadequate pavement and drainage structures, moving the retaining wall north, and adding a left turn lane into the railyard north of the study intersection. Pedestrians and bicyclists would be served by a new pathway and crosswalk. However, at-grade railroad crossings would continue to clog vehicle, truck and railroad operations. Alternative 3 is estimated to cost about 4.9 million dollars. In general, some stakeholders representing the trucking industry were in favor of Alternative 3; it addresses the majority of their concerns. The fire department also expressed a preference for this alternative. The railroad does not prefer this alternative because it widens the skewed at-grade crossing north of the intersection.

Alternative 4 would provide solutions for all concerns in the study area by completely realigning the study intersection and minimizing the number of railroad crossings. While providing the most solutions, Alternative 4 would cost between 4 and 10 million dollars, depending upon the level of railroad reconfiguration and realignment. Note that implementation of Alternative 4 would encourage trucks to use Ocean Dock Road more heavily than the C Street ramps. Therefore, Alternative 4 would be most useful if the MTP projects to upgrade Whitney Road and extend the Ingra/Gambell couplet are going to be implemented. As part of the stakeholder outreach, the railroad indicated they are most in favor of this alternatives. They value the reduced number of skewed at-grade rail crossings and think it may be possible to eliminate all of the skewed crossings. Some stakeholders representing the trucking industry indicated that they do not prefer this alternative because it increases the likelihood that trucks will have to stop, increasing delay for travel in and out of the port. Other stakeholders representing the trucking industry indicated that they like this alternative best, because it would straighten out the road.

The planning level cost estimates for each alternative are summarized in Table 24. The concerns addressed by each alternative are detailed in Table 25 and summarized in Table 1

Table 24. Cost Estimates

Alternative Analyzed	Alternative Description	Estimated Cost of Implementation
1	No Build	-
2	Repair Damaged Pavement and Install Drainage Improvements	$2,605,000
3	Increase Radius of Horizontal Curve and Relocate Retaining Wall	$4,944,000
4	Total Realignment of Roadway and Railroad Tracks	$4,000,000 to $10,000,000

Table 25. Concerns Addressed by Each Alternative

Identified Concern	Recommended Solutions	Concern Addressed by Alternative			
		1	2	3	4
Poor drainage results in pavement damage requiring frequent pavement repairs	Replace damaged road structure		✓	✓	
	Replace damaged drainage structures		✓	✓	
	Clean and repair remaining drainage structures		✓	✓	
	Install fin drain		✓	✓	
	Move manhole located in study intersection		✓	✓	
	Replace entire road structure and drainage system in study area				✓
Limited sight distance is uncomfortable for truck drivers	Add railroad warning flasher on Northbound C Street Off-Ramp		✓	✓	
	Move retaining wall 30 feet north			✓	
	Add left-turn lane on north leg of Ocean Dock Road			✓	
	Realign entire intersection and railroad tracks within study area				✓
Horizontal curve at the intersection makes accelerating up ramps difficult for trucks	Increase inner radius of horizontal curve at intersection			✓	
	Widen roadway on west leg of intersection			✓	
Lack of adequate pedestrian and bicycle facilities on the ramps results in unpredictable pedestrian and bicycle movements	Add pathway along north side of Northbound C Street Off-Ramp		✓	✓	
	Add pedestrian crossing on east leg of study intersection		✓	✓	
	Widen median between off and on-ramps to provide pedestrian refuge			✓	
	Widen landing on south side of crossing on Southbound Off-Ramp		✓	✓	
	Create entirely new pathway system				✓
Skewed railroad crossings cause safety concerns and delays for vehicles and trains	Add railroad warning flasher on Northbound Off-Ramp		✓	✓	
	Realign entire intersection to reduce number of railroad crossings				✓

✓ Indicates that concerns are addressed by Alternative

✓ Indicates solutions that could be included in Alternative

7 References

Alaska Highway Preconstruction Manual, DOT&PF.

Anchorage Bicycle Plan: Bicycles as a Mode of Transportation, MOA, 2010.

Anchorage Bowl 2025 Long Range Transportation Plan, MOA, 2005.

Anchorage Freight Mobility Study, AMATS, June 2017.

Anchorage Pedestrian Plan: Making Anchorage a Better, Safer Place to Walk, AMATS, October 2007.

A Policy on the Geometric Design of Highways and Streets, AASHTO.

Downtown Trails Connection: Coastal Trail to Ship Creek Final Design Study Report, MOA, May 2017.

Geotechnical Recommendations C Street: Port Access Road to 40th Avenue Pavement Preservation, ADOT&PF, 2015.

Geotechnical Report Ocean Dock Road: Whitney Road to Port of Anchorage, Shannon & Wilson, Inc., 1998.

Government Hill Neighborhood Plan, MOA, 2013.

HCM 2010 Highway Capacity Manual, TRB.

Interim 2035 Metropolitan Transportation Plan, MOA, November 2015.

Modernization Project, Port of Anchorage, accessed 11/10/2016 http://www.portofanc.com/modernization-project/.

Office of Safety Analysis website, Federal Railroad Administration. http://safetydata.fra.dot.gov/OfficeofSafety/Default.aspx, 2017.

Recommended Design Guidelines to Accommodate Pedestrians and Bicycles at Interchanges, ITE, 2014.

Railroad-Highway Grade Crossing Handbook, FHWA, 2007.

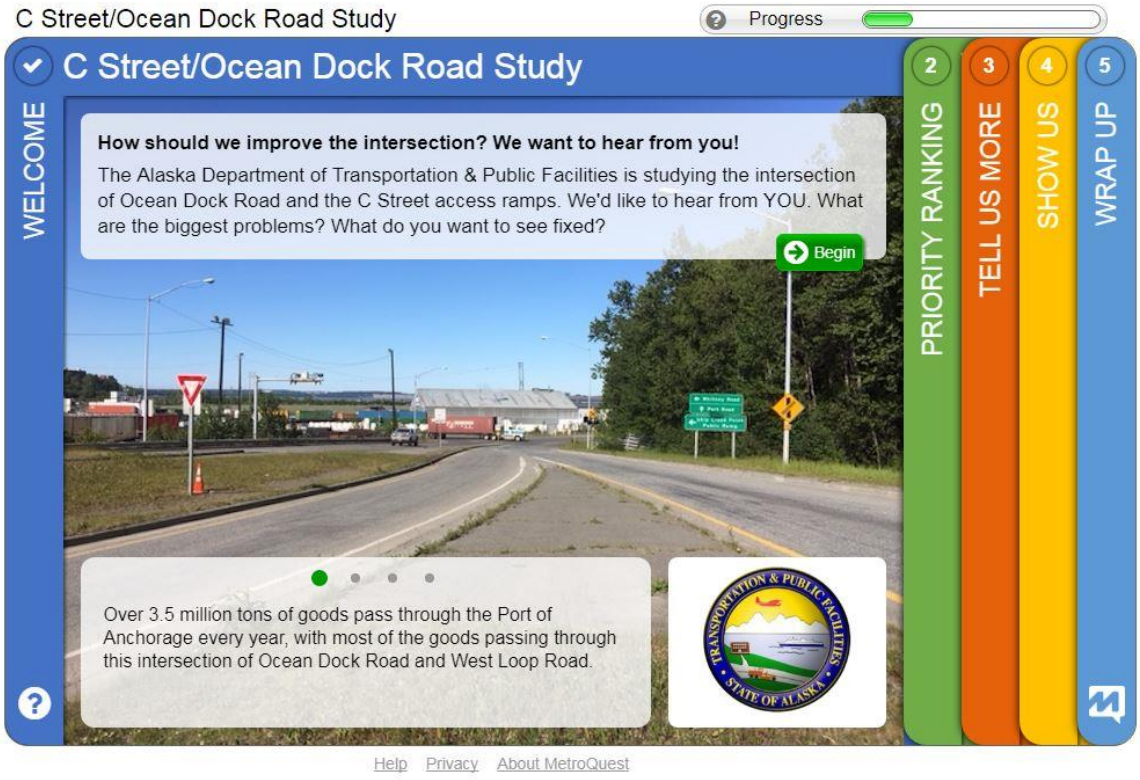
Ship Creek Multi-Modal Transportation Plan, Kittelson & Associates, Inc., 2000.

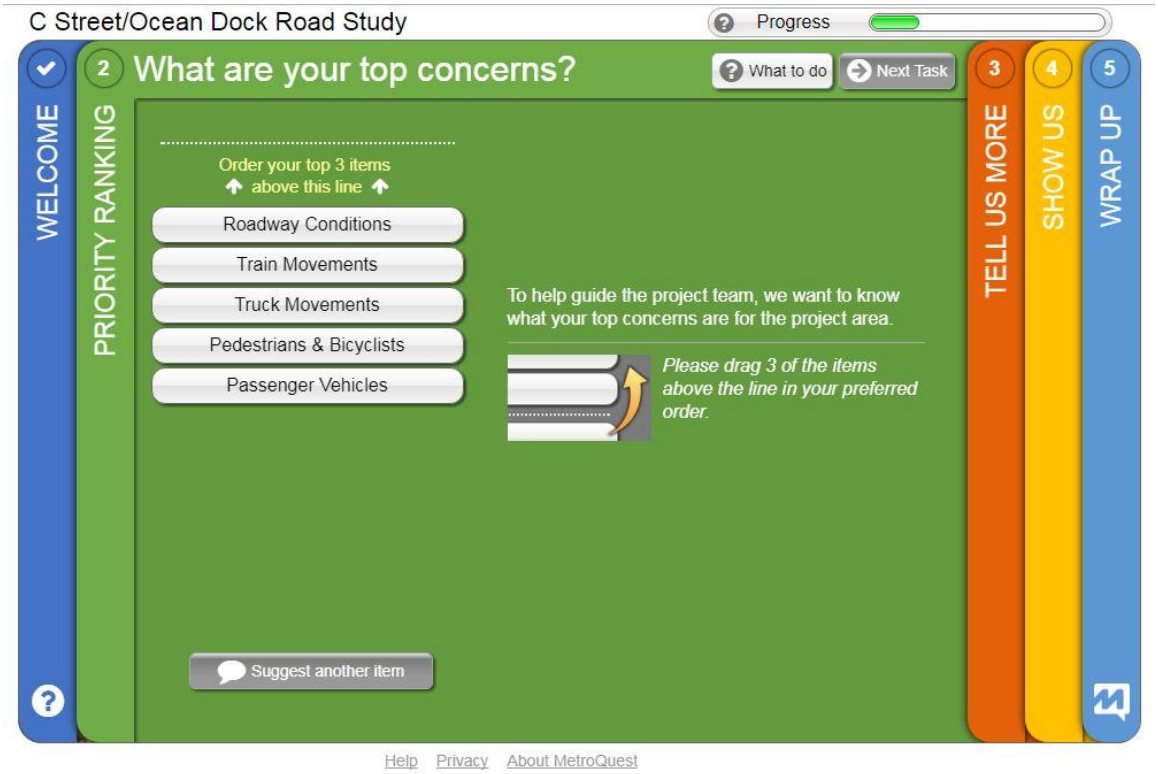
Ship Creek Redevelopment – Concept Presentation, Kling Stubbins, July 2013.

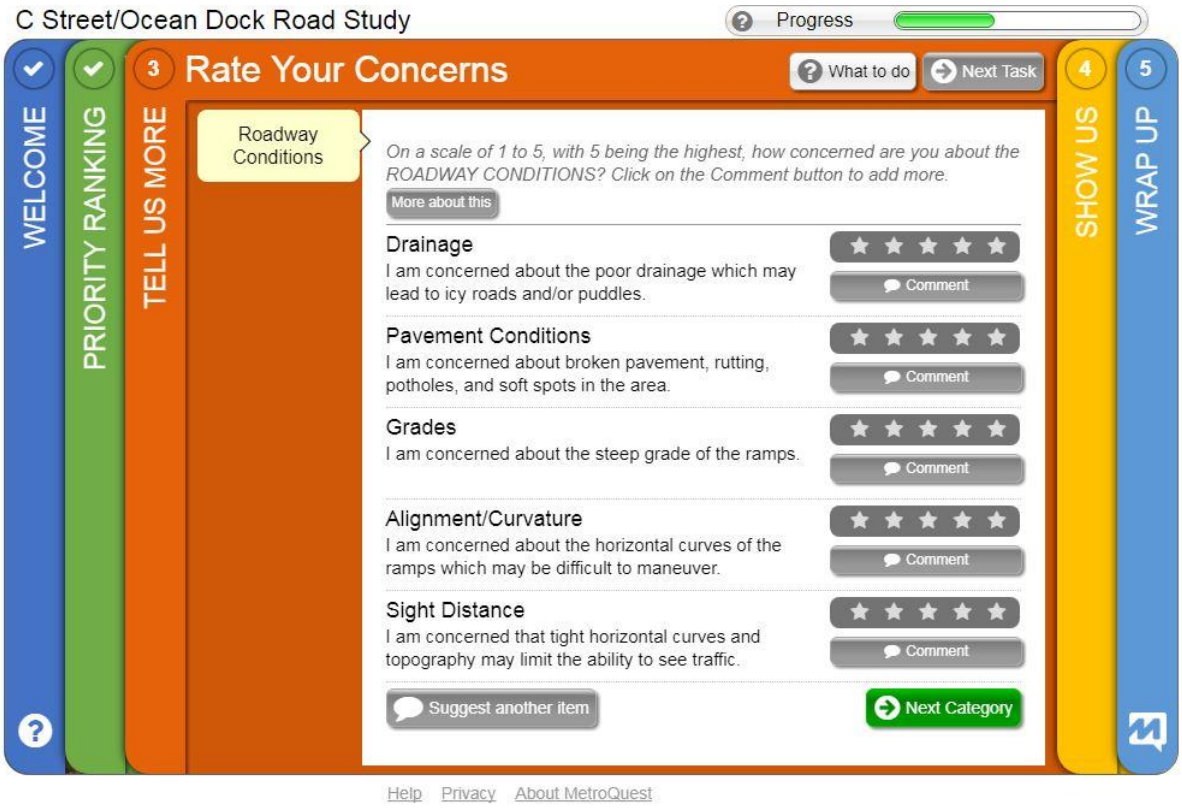
3-Year Outlook Report 2017, Anchorage Economic Development Corporation, 2017.

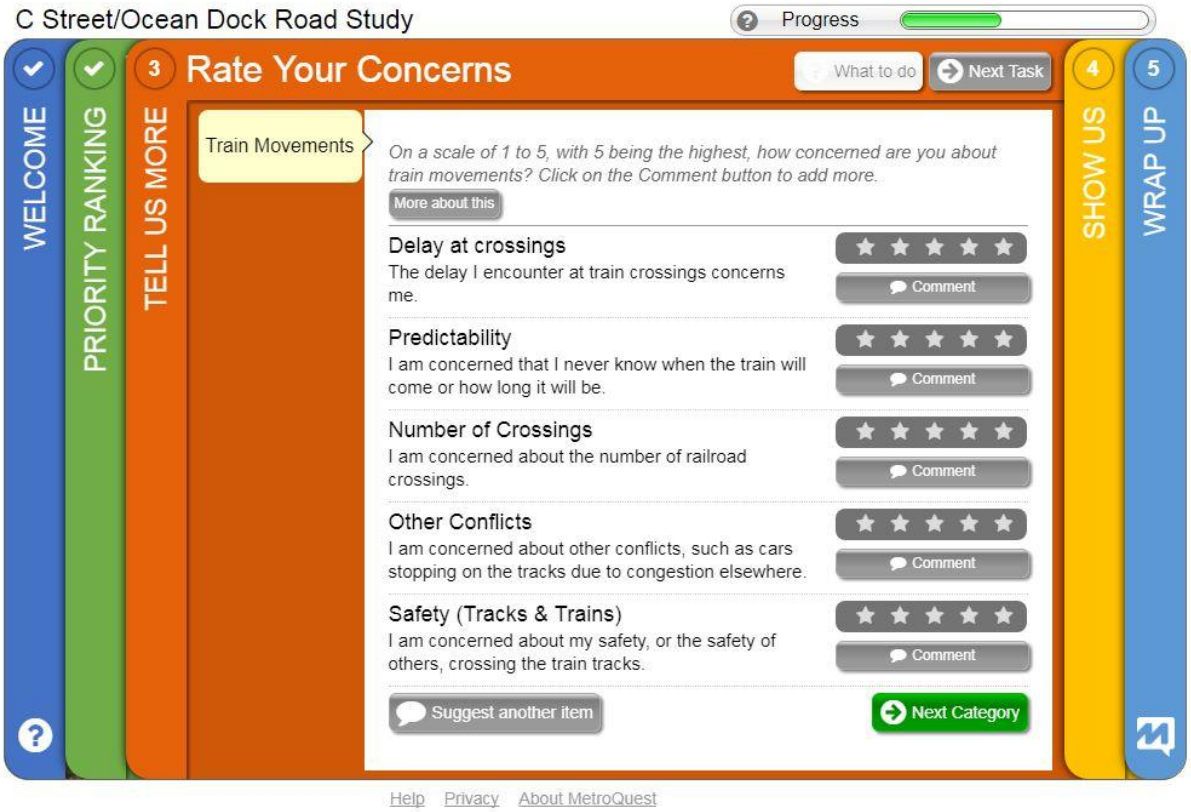
Appendix A: MetroQuest Survey

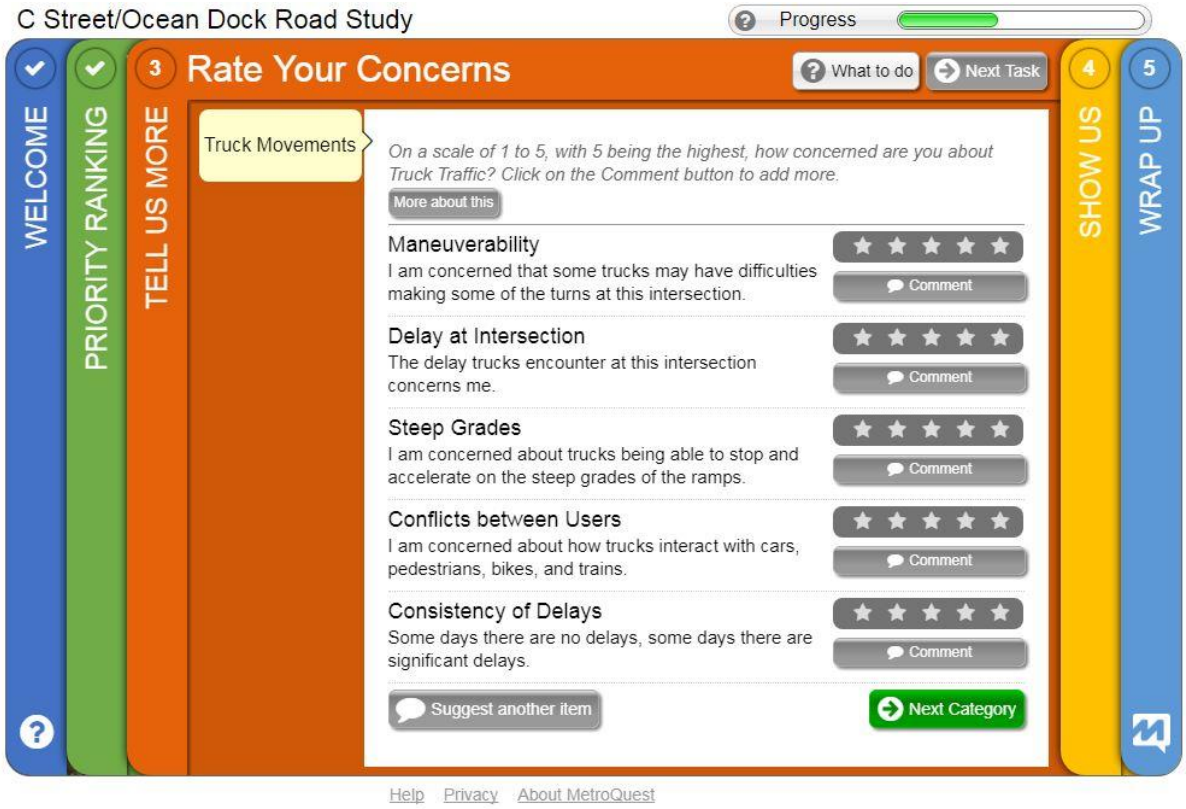
The following screen shots show the various screens of the online survey:

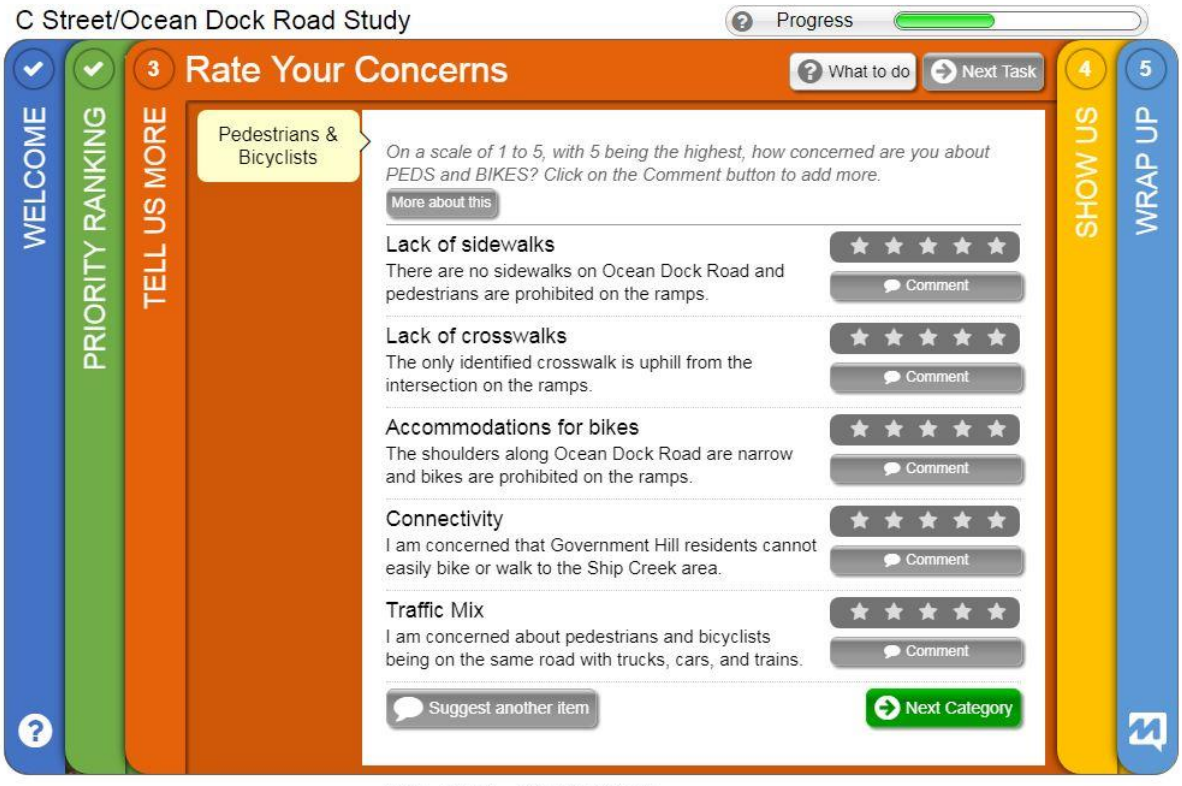


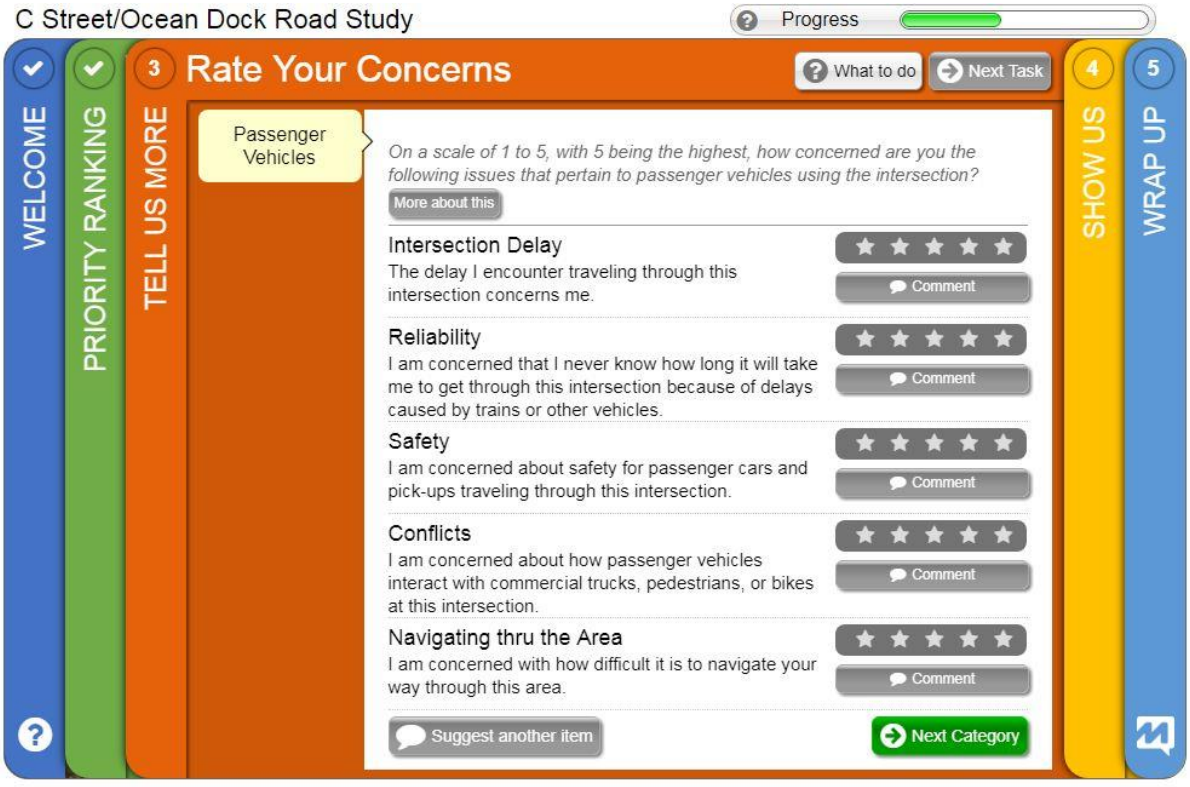


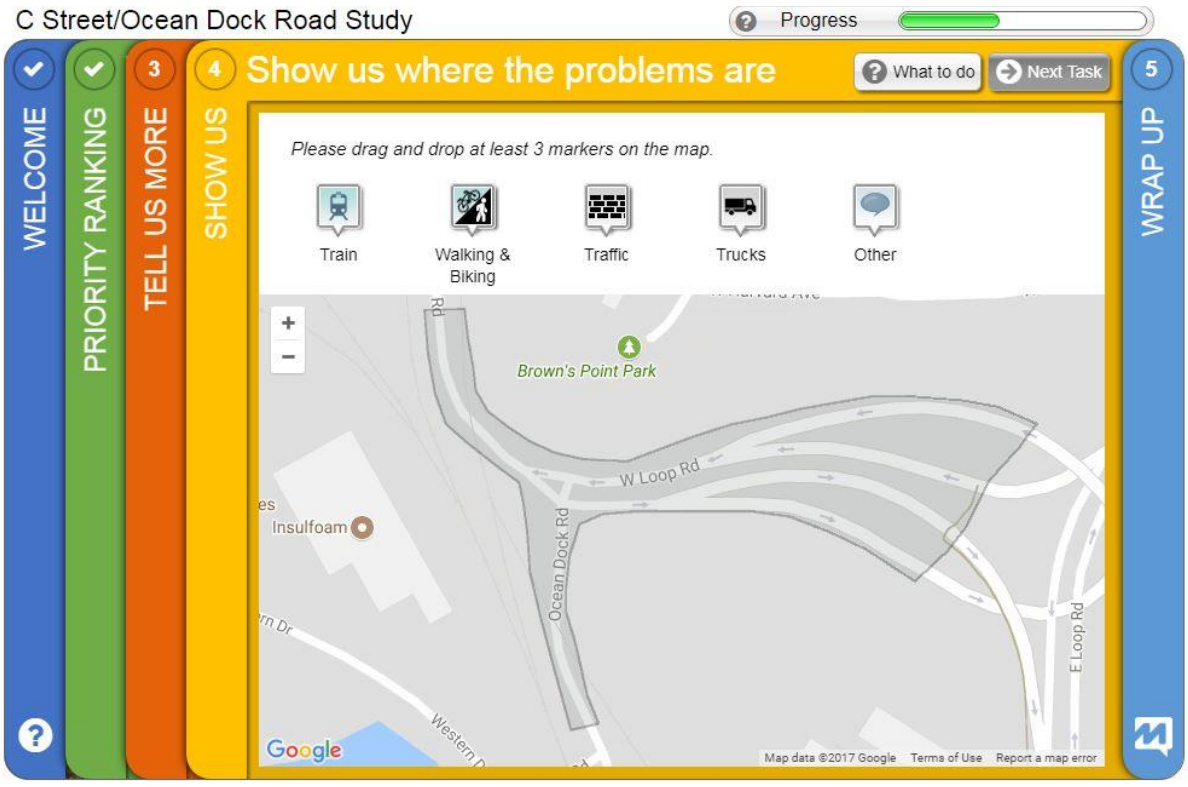

C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
Rate Your Concerns
What to do
Next Task
4
SHOW US
5
WRAP UP
Roadway Conditions
On a scale of 1 to 5, with 5 being the highest, how concerned are you about the ROADWAY CONDITIONS? Click on the Comment button to add more.
More about this
Drainage
I am concerned about the poor drainage which may lead to icy roads and/or puddles.
Comment
Pavement Conditions
I am concerned about broken pavement, rutting, potholes, and soft spots in the area.
Comment
Grades
I am concerned about the steep grade of the ramps.
Comment
Alignment/Curvature
I am concerned about the horizontal curves of the ramps which may be difficult to maneuver.
Comment
Sight Distance
I am concerned that tight horizontal curves and topography may limit the ability to see traffic.
Comment
Suggest another item
Next Category
Help
Privacy
About MetroQuest

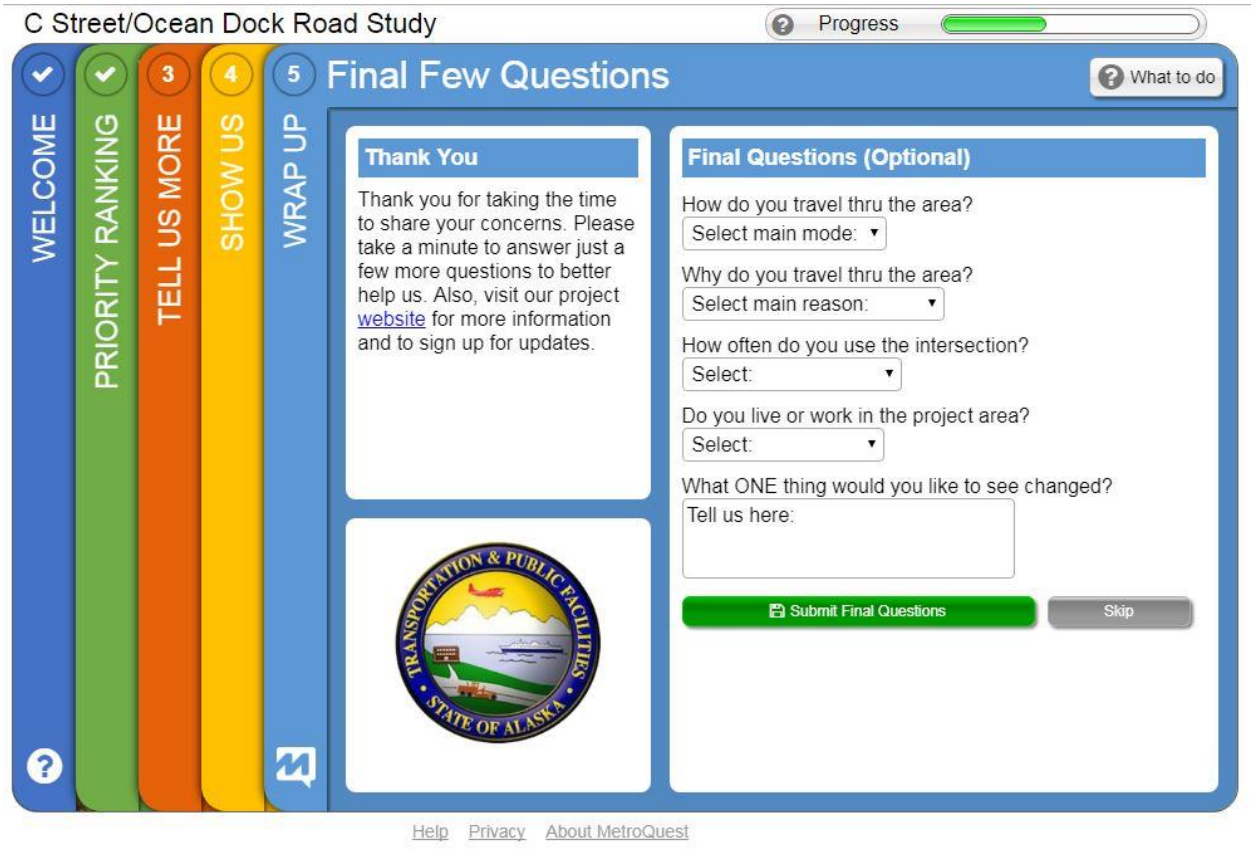

C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
Rate Your Concerns
What to do
Next Task
4
SHOW US
5
WRAP UP
Train Movements
On a scale of 1 to 5, with 5 being the highest, how concerned are you about train movements? Click on the Comment button to add more.
More about this
Delay at crossings
The delay I encounter at train crossings concerns me.
Comment
Predictability
I am concerned that I never know when the train will come or how long it will be.
Comment
Number of Crossings
I am concerned about the number of railroad crossings.
Comment
Other Conflicts
I am concerned about other conflicts, such as cars stopping on the tracks due to congestion elsewhere.
Comment
Safety (Tracks & Trains)
I am concerned about my safety, or the safety of others, crossing the train tracks.
Comment
Suggest another item
Next Category
Help
Privacy
About MetroQuest


C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
Rate Your Concerns
What to do
Next Task
4
SHOW US
5
WRAP UP
Truck Movements
On a scale of 1 to 5, with 5 being the highest, how concerned are you about Truck Traffic? Click on the Comment button to add more.
More about this
Maneuverability
I am concerned that some trucks may have difficulties making some of the turns at this intersection.
Comment
Delay at Intersection
The delay trucks encounter at this intersection concerns me.
Comment
Steep Grades
I am concerned about trucks being able to stop and accelerate on the steep grades of the ramps.
Comment
Conflicts between Users
I am concerned about how trucks interact with cars, pedestrians, bikes, and trains.
Comment
Consistency of Delays
Some days there are no delays, some days there are significant delays.
Comment
Suggest another item
Next Category
Help
Privacy
About MetroQuest


C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
Rate Your Concerns
What to do
Next Task
4
SHOW US
5
WRAP UP
Pedestrians & Bicyclists
On a scale of 1 to 5, with 5 being the highest, how concerned are you about PEDS and BIKES? Click on the Comment button to add more.
More about this
Lack of sidewalks
There are no sidewalks on Ocean Dock Road and pedestrians are prohibited on the ramps.
Comment
Lack of crosswalks
The only identified crosswalk is uphill from the intersection on the ramps.
Comment
Accommodations for bikes
The shoulders along Ocean Dock Road are narrow and bikes are prohibited on the ramps.
Comment
Connectivity
I am concerned that Government Hill residents cannot easily bike or walk to the Ship Creek area.
Comment
Traffic Mix
I am concerned about pedestrians and bicyclists being on the same road with trucks, cars, and trains.
Comment
Suggest another item
Next Category
Help
Privacy
About MetroQuest


C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
Rate Your Concerns
What to do
Next Task
4
SHOW US
5
WRAP UP
Passenger Vehicles
On a scale of 1 to 5, with 5 being the highest, how concerned are you the following issues that pertain to passenger vehicles using the intersection?
More about this
Intersection Delay
The delay I encounter traveling through this intersection concerns me.
Comment
Reliability
I am concerned that I never know how long it will take me to get through this intersection because of delays caused by trains or other vehicles.
Comment
Safety
I am concerned about safety for passenger cars and pick-ups traveling through this intersection.
Comment
Conflicts
I am concerned about how passenger vehicles interact with commercial trucks, pedestrians, or bikes at this intersection.
Comment
Navigating thru the Area
I am concerned with how difficult it is to navigate your way through this area.
Comment
Suggest another item
Next Category
Help
Privacy
About MetroQuest


C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
4
SHOW US
Show us where the problems are
What to do
Next Task
5
WRAP UP
Please drag and drop at least 3 markers on the map.
Train
Walking & Biking
Traffic
Trucks
Other
Brown's Point Park
W Loop Rd
Insulfoam
Ocean Dock Rd
E Loop Rd
Google
Map data ©2017 Google
Terms of Use
Report a map error
Help
Privacy
About MetroQuest


C Street/Ocean Dock Road Study
Progress
WELCOME
PRIORITY RANKING
3
TELL US MORE
4
SHOW US
5
WRAP UP
Final Few Questions
What to do
Thank You
Thank you for taking the time to share your concerns. Please take a minute to answer just a few more questions to better help us. Also, visit our project website for more information and to sign up for updates.
TRANSPORTATION & PUBLIC FACILITIES
STATE OF ALASKA
Final Questions (Optional)
How do you travel thru the area?
Select main mode:
Why do you travel thru the area?
Select main reason:
How often do you use the intersection?
Select:
Do you live or work in the project area?
Select:
What ONE thing would you like to see changed?
Tell us here:
Submit Final Questions
Skip
Help
Privacy
About MetroQuest

Appendix B: Agency Field Visit Notes

KINNEY ENGINEERING, LLC

SITE VISIT SUMMARY

Project:	AMATS: C Street at Ocean Dock Rd Access Ramps Reconnaissance Study Project No. CFHWY00159/0001572
Meeting:	Agency Field Visit
Date/Time:	March 06, 2017, 1:30 pm
Location:	C Street and Ocean Dock Road, Anchorage
Attendees:	Brian Lamson, Robert Halcomb, Jeanne Bowie, and John Pekar with Kinney Engineering Edith McKee, Jon Knowles, Larry Huling, Paul Janke, Aaron Jongenelen, Mike Roub, Ed Caress, Paul Janke, and Vernon Vreeland with ADOT&PF Rachel Maddy with the Alaska Railroad Aves Thompson, Jimmy Doyle, and Brad Brown from local trucking companies Steve Ribuffo with the Port of Anchorage

Attendees rode in vehicles around project area to discuss known issues.

Trucks

- Trucks driving down to the Ocean Dock intersection from the C Street ramp have difficulty seeing vehicles entering on the Government Hill ramp. The weaving distance is short.
- Trucks accelerating to leave the dock swing wide (south toward the Ocean Dock approach) to maintain their speed and have difficulty staying in lanes as designed.
- Trucks headed down hill to the Ocean Dock intersection are not able to see around the bin walls and they have trouble stopping when other vehicles are making the first left after Ocean Dock or if there is a queue of 4 vehicles at the Guard Shack.
- Trucks leaving the dock need to accelerate to climb the ramps and cannot see around the bin wall to the Ocean Dock intersection. There is little time to stop should another truck turn left off Ocean Dock Road toward the dock.
- Heavier vehicles aren't permitted to use the C Street bridge, and therefore must use Whitney Road.

Railroad

- Typically there are 5 switches per day in the winter and 20-30 in the summer at the crossings in the study area.
- High railroad train traffic can also take place when the railroad provides transport for military vehicles (Strikers, etc.)

Report

- There will be a study that will involve an Ingra extension around the same time as our study and the two studies should account for each other.
- This project can include recommendations for the Whitney intersection in the report as part of a future project, but cannot directly modify that intersection.
- Currently only the study is funded.
- A bike path would be a concern.
- Including the railroad checklist in the KE report is likely to make things go smoother once design begins.

Construction

- Construction traffic control should allow summer train traffic to continue.
- Best day for a lane closure would be Thursday.
- Night time is the best time for construction work.
- The best three days to work in a row are Thursday, Friday, and Saturday.
- Ships typically arrive Sundays and Tuesdays and traffic is heavy from 7 AM to 7 PM.

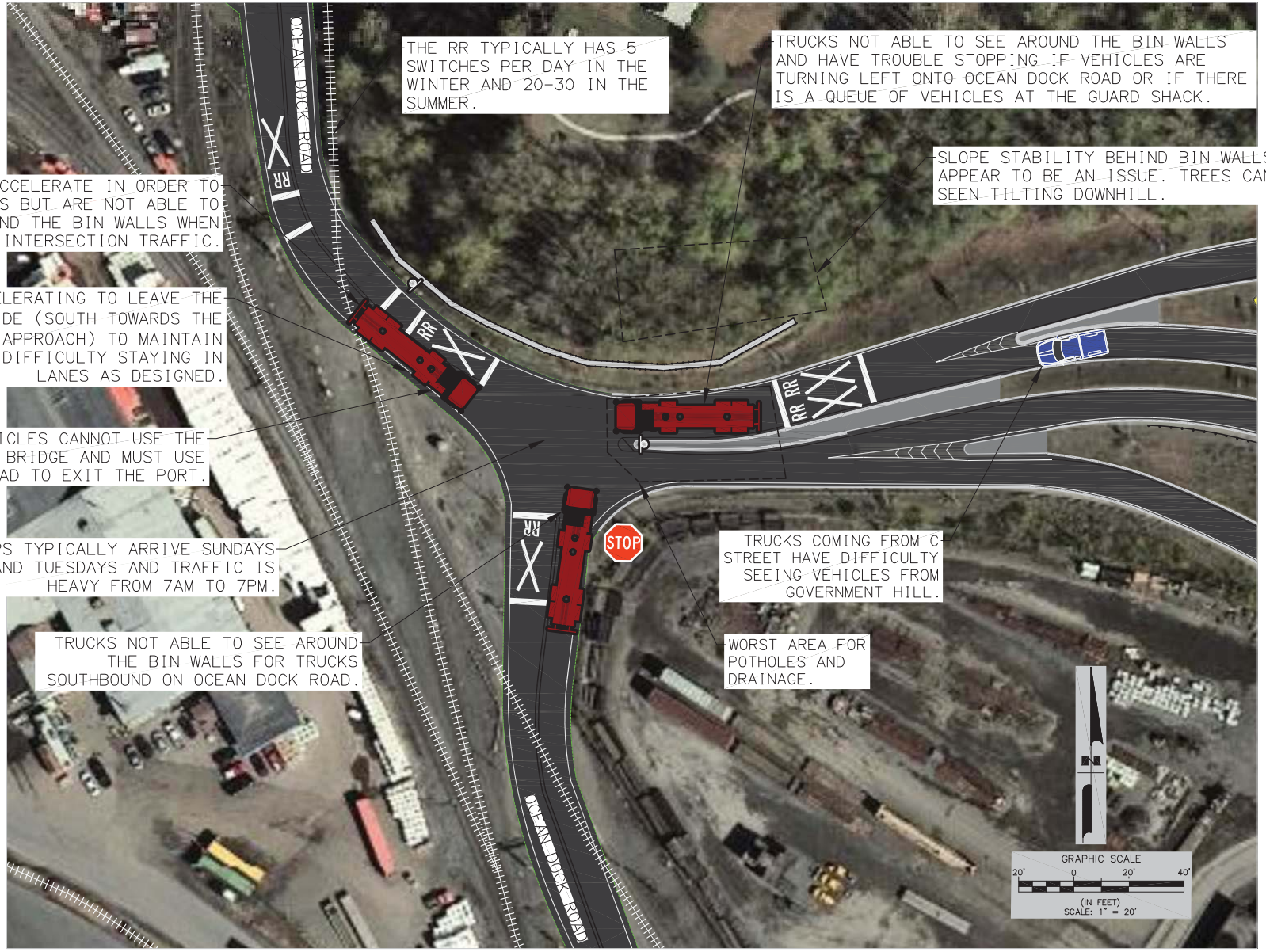
Drainage

- Drainage issues are mostly related to wintertime and the spring thaw period. Participants reported ponding is not an issue in the summertime.
- Railroad tracks also experience some damage due to heaving and other soils/water related concerns.
- The Ocean Dock intersection east to the split between the ramps is the worst area for potholes and drainage.
- The report could recommend video inspection of the existing storm drain as part of a future project.

AMATS: C STREET AT OCEAN DOCK ROAD ACCESS RAMPS RECONNAISSANCE STUDY

PROJECT NO. CFHWY00159/0001572

www.dot.alaska.gov/oceandockrampstudy



THE RR TYPICALLY HAS 5 SWITCHES PER DAY IN THE WINTER AND 20-30 IN THE SUMMER.

TRUCKS NOT ABLE TO SEE AROUND THE BIN WALLS AND HAVE TROUBLE STOPPING IF VEHICLES ARE TURNING LEFT ONTO OCEAN DOCK ROAD OR IF THERE IS A QUEUE OF VEHICLES AT THE GUARD SHACK.

SLOPE STABILITY BEHIND BIN WALLS APPEAR TO BE AN ISSUE. TREES CAN BE SEEN TILTING DOWNHILL.

TRUCKS MUST ACCELERATE IN ORDER TO CLIMB THE RAMPS BUT ARE NOT ABLE TO SEE AROUND THE BIN WALLS WHEN APPROACHING INTERSECTION TRAFFIC.

TRUCKS ACCELERATING TO LEAVE THE DOCK SWING WIDE (SOUTH TOWARDS THE OCEAN DOCK APPROACH) TO MAINTAIN SPEED AND HAVE DIFFICULTY STAYING IN LANES AS DESIGNED.

HEAVIER VEHICLES CANNOT USE THE C STREET BRIDGE AND MUST USE OCEAN DOCK ROAD TO EXIT THE PORT.

SHIPS TYPICALLY ARRIVE SUNDAYS AND TUESDAYS AND TRAFFIC IS HEAVY FROM 7AM TO 7PM.

TRUCKS NOT ABLE TO SEE AROUND THE BIN WALLS FOR TRUCKS SOUTHBOUND ON OCEAN DOCK ROAD.

TRUCKS COMING FROM C STREET HAVE DIFFICULTY SEEING VEHICLES FROM GOVERNMENT HILL.

WORST AREA FOR POTHOLES AND DRAINAGE.

Appendix C: Advisory Council Meeting Notes

KINNEY ENGINEERING, LLC

MEETING SUMMARY

Project:	AMATS: C Street at Ocean Dock Road Access Ramps Reconnaissance Study Project No. CFHWY00159/0001572
Meeting:	Advisory Committee Meeting
Date/Time:	March 30, 2017, 11:30 am
Location:	Alaska Department of Transportation–Central Region, 4111 Aviation Ave, Anchorage
Attendees:	Jeanne Bowie, Robert Halcomb, and Joann Mitchell with Kinney Engineering Edith McKee (EM) and James Starzec (JS) with ADOT&PF Sharon Walsh with Port of Anchorage (SW) Brian Lindamood with ARRC (BL) Carl Dale with JBER (CD) Aves Thompson with Alaska Trucking Association (AT) Melinda Gant with Government Hill Community Council (MG) Jeremy Miller with Carlile (JM) Brad Robertson with North Star Terminal & Stevedore Co., LLC (BR) Brad Brown with Matson (BB) Dave Smulick with Alaska Basic Industries (DS) Brady Borum and Thomas Iwinski with Delta Western Petroleum (BB/TI) Pat Hallett with Tesoro (PH) Michael Davidson with AFD (MD) Rick Steiding with APD (RS) Stephanie Mormilo with MOA Traffic (SM)
Handouts	Agenda Project Fact Sheet Recap of Agency Site Visit Summary of Engineering Analysis

The meeting opened by going around the room and doing self-introductions.

Jeanne Bowie, PE, PhD, PTOE gave an overview of the project. She reviewed the information on the project fact sheet, emphasizing that this is a reconnaissance study which will be used by the DOT&PF to plan for future projects. This project does not include the design and construction of any improvements. Jeanne reviewed the project schedule which has the study being completed in Fall 2017.

Jeanne then summarized the feedback the team has collected to date. On March 6, 2017 an agency field trip was held with representatives from the ARRC, DOT&PF, the Port, and the trucking industry. A handout was provided which outlined the problems identified during the field trip.

The project website (www.dot.alaska/oceandockrampstudy) was launched in February. The website includes project information and a link to a survey that is being used to gather information. Jeanne asked everyone to encourage their constituents to complete the survey. At this time, not many people from the trucking industry had completed the survey. The survey will close on May 14, 2017. We are unable to extend that date as our agreement with the survey provider was for a set amount of time.

The project was also featured at the Anchorage Transportation Fair in February.

Joann Mitchell and Jeanne then asked the committee to identify their concerns. The following comments were made (the initials identify who made the comment):

- The pavement surface and subsurface condition at the base of the ramps has been fixed multiple times but each year needs repairing. The rough pavement causes wear and tear on the trucks. This is the only way for freight to get out of the Port. (AT)
- It is difficult to see from any direction of travel. During the winter, truck drivers will utilize snow accumulation to help slow down if needed. Warning of train on the tracks farther back on the off ramp would be helpful to let trucks know sooner. It is difficult to see vehicles coming from Government Hill while merging onto Southbound C Street. (BB/TI)
- In the construction phase, the major concern would be access for emergency vehicles and egress routes in event of evacuation. The Port has limited access routes and Ocean Dock Road is the only one always open. If a primary route cannot be maintained during construction, then how will safety be mitigated? The rear access road is an option but with limited availability due to security concerns. (MD)
- Drainage issues continue to flow onto ARRC property. By far the biggest issue is the intersection of Whitney and Ocean Dock Roads. Surprising number of pedestrians in this area. (BL)
- Can concrete be used instead of asphalt? Heavy vehicles going around corners will push asphalt, creating ruts, but concrete will not move. (DS)
- Determine how many pedestrians and bicycles use this intersection and their routes. That way we can separate them from truck traffic and get them where they are trying to go safely. (SM)
- People travel by foot to the small boat launch from Government Hill. Port maintenance crews hand off road maintenance to city and state maintenance personnel around the intersection of Ocean Dock Rd and C Street ramps. The Port is constructing a new gate. Port's concerns are whatever their customers are concerned about. (SW)
- Superelevation at the bottom of ramp is very flat or opposing to trucks going around the curve. This is critical especially with fuel tanks because it moves the center of mass. 18-wheelers have a brake lag in addition to driver's reaction time and braking distance when reacting to changes in traffic. It would be nice to have superelevation that tapers towards the embankment on both the uphill and downhill grades. Trucks have a hard time merging onto southbound C Street. Water pooling at the bottom of the ramp appears to be less problematic then previous winter. Biggest issue with pedestrians is usually at Whitney Road. (BB)
- From a planning perspective, it is important to coordinate with other projects in the area. The Municipality has a pedestrian and bicycle project to connect the Coastal Trail to Ship Creek Trail so consideration should need to be given to that. Government Hill has no pedestrian access to the Port and the existing facilities direct pedestrians onto C Street bridge. Having additional pedestrian facilities from Government Hill down to the Port is necessary. With no existing bicycle and pedestrian facilities, the historical number of users will not be accurate enough to show what the usage would be if built. The facilities there now are woefully inadequate and the C Street pathway is not even maintainable being four feet wide. If the pedestrian facilities are not put in now they must be added later. Massive drainage issue on northbound on ramp as it goes underneath C Street. (JS)

- Minimize impact on military operations. Most Strikers use the back road off JBER. (CD)
- Trucks that turn left at the driveway just before the Port are in fear of being hit from behind due to the poor sight distance. Adding a turn lane would be nice. (BR)
- Drivers comment more about *almost* being hit. (JM)
- Having additional warning signals for when trains are crossing the roads farther back to give trucks more time to slow down would be helpful. (PH)
- Biggest complaint received are the speed of the trucks going through the intersection and vehicles running the stop sign. Not an issue when police are present. (RS)
- Safety for pedestrian and bicycles is a primary concern. People choose not to take the bridge because it only goes to 3rd Avenue. Many people want to go to Ship Creek and they will walk along the road if there is no better option. Government Hill Neighborhood Plan identified the desire to have a trail connection to downtown and Ship Creek. The cross walk on the ramps is scary for the pedestrians to use especially those with small kids. Noise concern during construction (MG)

The following concerns were raised about the construction phase:

- ✓ Construction timing is critical.
- ✓ C Street is the only access to Government Hill.
- ✓ Government Hill residents will be concerned about noise levels.
- ✓ Need to coordinate with Port Modernization project.
- ✓ Lots of traffic to Government Hill Elementary—approximately 70% of the students are coming from outside of the neighborhood.
- ✓ AT&T employees add to the traffic.

Jeanne Bowie gave an overview of the data collection that has been completed. (See handout).

Joann Mitchell discussed the project schedule:

Existing Conditions Report	mid-April
Draft Reconnaissance Report	Early June
Advisory Committee Meeting #2	mid-June
Open House	June
Finalize Reconnaissance Report*	Fall 2017

* If there are significant changes between the Draft and Final reports, we will reconvene the Advisory Committee to discuss the changes.

Ocean Dock Road & C Street Access Ramps Reconnaissance Engineering Study

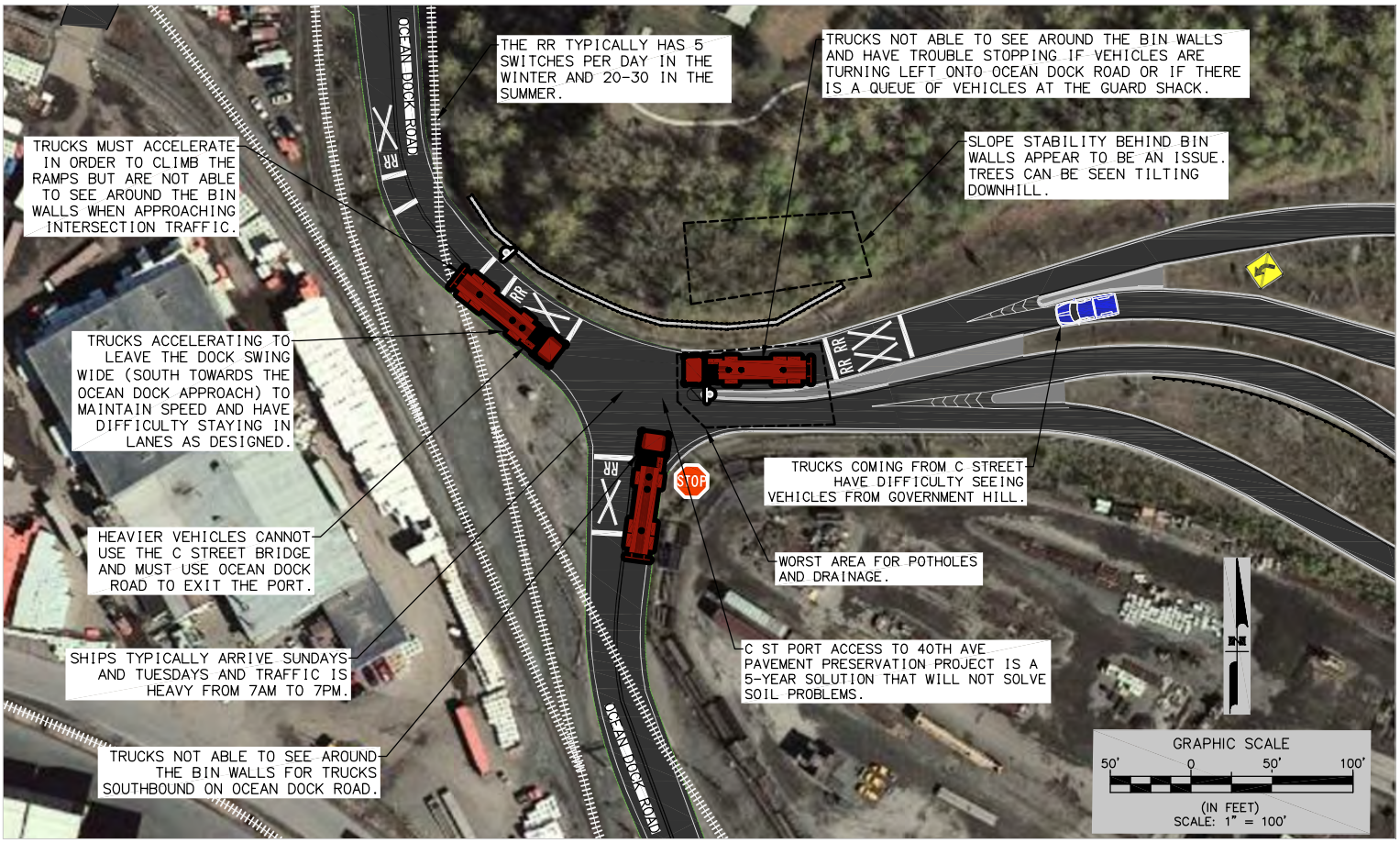
Advisory Committee, Meeting #1
March 30, 2017
DOT&PF, Main Conference Room

AGENDA

1. Introductions
2. Project Overview
3. What we've heard so far…
4. Opportunity to comment
5. Data collection summary
6. Next Steps

AMATS: C STREET AT OCEAN DOCK ROAD ACCESS RAMPS RECONNAISSANCE STUDY

PROJECT NO. CFHWY00159/0001572
www.dot.alaska.gov/oceandockrampstudy



OPERATIONS/PLANNING

- INCREASED TRAIN TRAFFIC CAN TAKE PLACE WHEN TRANSPORTING MILITARY VEHICLES.
- PROJECT STUDY OF INGRA EXTENSION SHOULD BE TAKEN INTO CONSIDERATION.
- MAY INCLUDE RECOMMENDATIONS FOR WHITNEY ROAD INTERSECTION BUT IS NOT PART OF THIS PROJECT.

CONSTRUCTION

- CONSTRUCTION TRAFFIC CONTROL SHOULD ALLOW TRAIN TRAFFIC TO CONTINUE.
- BEST DAY FOR LANE CLOSURE WOULD BE THURSDAY.
- NIGHT TIME WOULD BE BEST TIME FOR CONSTRUCTION WORK.
- THE BEST THREE DAYS TO WORK IN A ROW ARE THURSDAY, FRIDAY, AND SATURDAY.

DRAINAGE

- DRAINAGE ISSUES ARE MOSTLY RELATED TO WINTERTIME AND SPRING THAW PERIOD. PONDING IS NOT AN ISSUE DURING SUMMERTIME.
- RAILROAD TRACKS ALSO EXPERIENCE SOME DAMAGE DUE TO HEAVING AND OTHER SOIL/WATER RELATED CONCERNS.

Ocean Dock Road at C Street Ramps: Engineering Analysis

DATA COLLECTION: Counts of passenger vehicles, commercial trucks, buses, taxis, and pedestrians/bikes were collected on several different days:

- Cruise Ship Day: Monday, September 5, 2016 (Labor Day)
- Cargo Day: Tuesday, September 6, 2016
- Cargo Day: Tuesday, September 13, 2016
- Cargo Day: Tuesday, February 7, 2017 (No TOTE arrival)
- Non-Cargo Day: Wednesday, February 8, 2017
- Non-Cargo Day: Thursday, February 9, 2017
- Cargo Day: Tuesday, February 28, 2017

Traffic volumes are about 3 times higher on Cargo Days as compared to non-cargo days.

Pedestrian counts at the crosswalks across the C Street ramps will be done in the Spring.

SAFETY: Crash reports do not indicate that there is a safety problem, with only 4 reported crashes in a 10-year period. We have heard anecdotal reports of tractor-trailer trucks jackknifing while traveling between Ocean Dock Road and the C Street bridge. We have also heard anecdotal reports of near misses.

Measurements indicate that sight distance (the distance ahead that a driver can see and react to something in the road) is limited by the retaining wall on the inside of the curve on the north side of Ocean Dock Road.

OPERATIONS:

- Almost 50% of traffic is commercial vehicles (tractor-trailer trucks).
- Each mode alone operates well, but the interactions affect each other. For example, trucks and passenger vehicles experience significant delays while trains are crossing the roads. On the other hand, train operations are sometimes paused to allow traffic queues that have built up to clear.
- Tour buses and some commercial vehicles (such as those carrying hazardous materials) must stop at the train tracks, which adds delay, especially on days when cruise ships are in port.
- Left turning vehicles at nearby driveways can cause delays to following vehicles.

WALKING AND BICYCLING: Pedestrians or bicyclists were counted passing through the intersection on every day that was counted.

AMATS: C Street / Ocean Dock Road Access Ramps Reconnaissance Study

Project No. CFHWY00159/0001572

www.dot.alaska.gov/oceandockrampstudy

Project Scope

The Alaska Department of Transportation and Public Facilities (DOT&PF), in cooperation with the Federal Highway Administration (FHWA), is preparing a Reconnaissance Engineering Study of the intersection of the C Street/Ocean Dock Road Access Ramps. The purpose of the study is to improve safety, maintenance, and freight mobility. DOT&PF has hired Kinney Engineering to collect data, gather feedback from the public, analyze the intersection, and evaluate a range of potential improvements.

The project team is collecting data as well as public input on the issues related to the intersection. An Advisory Council is being formed that will be comprised of representatives of the trucking industry, the Port of Anchorage, Alaska Railroad, Government Hill community, as well as other user groups and affected interests.

What is a Reconnaissance Engineering Study?

A Reconnaissance Engineering Study describes the problems to be solved, identifies and analyzes alternative solutions, and provides comparisons of alternatives. The alternatives are not fully developed and are just broad-brushed lines on paper. A brief environmental analysis is usually done to look for environmental impacts and issues that would need to be addressed if the project advances.

The Reconnaissance Engineering Study is used by DOT&PF to help them plan future projects. It provides a rough idea of the magnitude of the project so funding can be secured. When project advances into the design phase, a complete design and analysis of all impacts (environmental, right-of-way, utilities, etc.) will be done.

Schedule

Data Gathering and Public Input	Winter 2017
DRAFT Reconnaissance Engineering Study	Late Spring 2017
Open House	Summer 2017
FINAL Reconnaissance Engineering Study	Fall 2017

Project Team

You can find more information and can also leave comments on the project website:

www.dot.alaska.gov/oceandockrampstudy

Please contact the project team if you have any questions, concerns, or comments.

Joann Mitchell, PE
Public Involvement Coordinator
Kinney Engineering
(907) 344-7590
joannmitchell@kinneyeng.com

Edith McKee, PE
Project Manager
DOT&PF
(907) 269-7885
edith.mckee@alaska.gov

Please provide your comments below:

OPTIONAL CONTACT INFORMATION

☐ I'm already on your mailing list. ☐ Please add my name (or email) to the project mailing list:
Name
Street Address or PO Box
City, State, Zip
Email

Leave this form at the meeting**,** or f**ax** it to 907-349-7493 or **mail** to
Kinney Engineering, 3909 Arctic Blvd, Suite 400, Anchorage, AK 99503.
You may also scan and **email** it to joannmitchell@kinneyeng.com

KINNEY ENGINEERING, LLC

MEETING SUMMARY

Project:	AMATS: C Street at Ocean Dock Road Access Ramps Reconnaissance Study Project No. CFHWY00159/0001572
Meeting:	Advisory Committee Meeting
Date/Time:	November 15, 2017, 9:30 am
Location:	Alaska Department of Transportation–Central Region, 4111 Aviation Ave, Anchorage
Attendees:	Jeanne Bowie, Shelley Giraldo, and Joann Mitchell, Kinney Engineering Edith McKee, ADOT&PF Brad Robertson, North Star Terminal & Stevedore Co., LLC Tom Trosvig, Matson

The meeting opened by going around the room and doing self-introductions.

Jeanne Bowie, PE, PhD, PTOE gave a Power Point presentation that summaried the concerns identified by the advisory committee, users, and the public; the results of the investigations into the issues; and an overview of the three alternatives that were developed to address the concerns.

The attendees expressed a preference for Alternative #3. They liked how it widened the intersection, improved sight distance, and maintained the flow of traffic. Brad Robertson with North Star Terminal particularly liked the left turn lane into their facility.

Concerns were expressed about Alternative #4. There was concern that trucks would have a hard time stopping at the bottom of the hill (the right turn slip lane option would eliminate this concern). The 90-degree left turn from Ocean Dock Road to the C Street on ramp is not as desirable. Jeanne explained that this option makes more sense if improvements are made to the Whitney Road/Post Road corridor such that the majority of truck traffic from the Port would head south to Whitney Road.

Attendees observed that while Alternative #2 addresses the drainage issues, it does not address the safety and operation issues of the intersection.

The Power Point presentation and the graphics will be distributed to the Advisory Committee. Comments will be accepted until December 20. At that point, DOT&PF will determine if the comments warrant further study or development of alternatives before the Draft Reconnaissance Study is finalized. (Comments should be submitted to JoannMitchell@KinneyEng.com).

Appendix D: Environmental Impacts Summary

Environmental Impacts Summary

Introduction

The C Street/Ocean Dock Road Access Ramps Reconnaissance Study is federally-funded by Anchorage Metropolitan Area Transportation Solutions (AMATS). The scope includes looking at reconstruction and redesign of the C Street Bridge/Port Exit (Ocean Dock Road) access ramps in both directions. The study will provide recommendations to improve safety and operation and present different design considerations for the intersection of the ramps and Ocean Dock Road. The study will present solutions to resolve the hydrology issues, and address the needs of the pedestrian/cyclist/transit users in the area. The study will also offer recommendations related to safety, maintenance, and freight mobility improvements. This project will likely have a significant amount of public and agency involvement. The study area examined for potential environmental effects is illustrated below. Because all alternatives are located in the same area, potential effects would be applicable to all alternatives. **Error! Reference source not found.** shows the project study area.

Figure D-1: Ocean Dock Road and East and West Loop Roads

Four alternatives have been identified. Alternative 1, the no build alternative,. Alternative 2, Alternative 3, and Alternative 4 are addressed below.

Alternative 1: No Build Alternative

Under the no-build alternative, no changes would be made. Poor drainage would continue to result in pavement damage, requiring frequent pavement repairs. While there have been few crashes in the study area and the crash rate would likely not increase, driver discomfort due to limited sight distance, steep grades, and poor drainage would continue to be a concern. Pedestrian and bicyclist discomfort would also not be addressed. Pedestrians would likely

continue to walk on and cross the ramps at random locations, creating hazardous and unpredictable situations for pedestrians and drivers alike. Without an alternative pathway to the narrow sidewalk on C Street Bridge, bicyclists would continue having difficulty navigating the area. Vehicle and train traffic would continue to be delayed because of the two skewed railroad at-grade crossings.

Alternative 2: Repair Damaged Pavement and Install Drainage Improvements

This alternative would replace the existing road structure while maintaining the existing road geometry. Damaged drainage structures would be replaced and fin drains would be installed to improve drainage in the area and reduce recurring pavement damage. Fin drains incorporate geotextiles and perforated pipes covered with a layer of gravel and could help lower the high ground water table around the study intersection. This alternative would not address sight distance issues or improve delay due to railroad crossings.

Alternative 3: Increase Radius of Horizontal Curve and Relocate Retaining Wall

Under this alternative, all current existing roadway and drainage structures would be replaced, and fin drains would be installed. Government Hill would be cut back and a new retaining wall would be built. The roadway would be widened to increase the inner radius of the horizontal curve at the study intersection to allow trucks leaving the Port of Anchorage (POA) to maintain speed prior to climbing the grade to reach the C Street bridge. A pathway would be included in the design. This alternative would improve sight distance, drainage and pavement deterioration issues, and would provide pedestrian and bicycle connectivity. However, delay due to railroad crossings would not be addressed.

Alternative 4: Total Realignment of the Roadway and Railroad Tracks

This alternative would involve completely redesigning and realigning both the roadway and the railroad tracks to reduce the number of grade crossings, especially skewed crossings. Ocean Dock Road would be straightened at the study intersection, and the east leg of the intersection (the C Street Ramps) would be extended westward. Stop control would be removed from the northbound leg of Ocean Dock and would be placed on the westbound leg of the intersection. Drainage and sight distance concerns would also be addressed, and a pathway would be constructed for pedestrians and bicyclists. This alternative would improve sight distance, mitigate drainage and pavement deterioration issues, provide pedestrian and bicycle connectivity, and reduce the number of at-grade railroad crossings.

ADEC Contaminated Sites

No active contaminated sites are present within the study area. A contaminated groundwater plume associated with nearby Whitney Road is south of the project area, and could encroach on the project area. The site (Alaska Department of Environmental Conservations (ADEC) file number 2100.38.447) is located at the Groundwater Area 6 in the Anchorage Terminal Reserve, north of Ship Creek along Whitney Road, underneath the C Street bridge. High levels of tetrachloroethylene and trichloroethylene are found throughout the plume. Another site, (ADEC file number 2100.38.033) known as the "Alaska Railroad Corporation Ship Creek Rail Yard Seep" is southeast of the project site and may also flow into the groundwater in the project area.

Other contaminated soil sites are present southeast of the project area. Should this project advance, further consultation with ADEC will be needed. The current ADEC contaminated site locations are illustrated in Figure D-2.

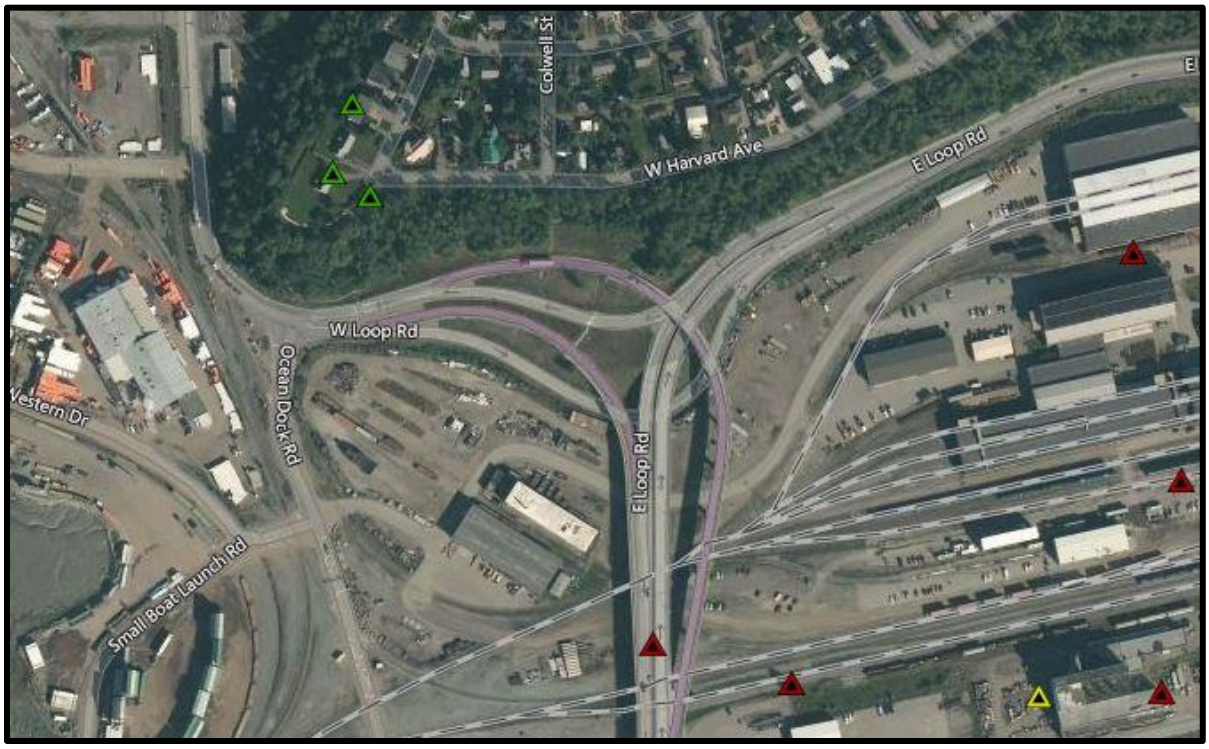


Figure D-2: Ocean Dock Road and East and West Loop Roads with DEC contaminated sites. Red triangle locations are active cleanup, green triangles are cleanup complete, and the yellow triangle indicates cleanup complete with institutional controls in place.

Wetlands and Waterbodies

No wetlands are present within the project area. The nearby waterbodies, Cook Inlet and Ship Creek, are outside the project area. Drainage upgrades would not change the volume of drainage leaving the area. No wetlands or water body permits are anticipated should this project advance beyond this Reconnaissance Study.

Right-of-Way

The Alternative 2, Repair Damaged Pavement and Install Drainage Improvements, and Alternative 4, Total Realignment of the Roadway and Railroad Tracks would be within existing easement. Alternative 3, Increase Radius of Horizontal Curve and Relocate Retaining Wall, would require additional easement for the Ocean Dock Road realignment, the proposed 10 foot retaining wall, and for a section of sidewalk connection to the pathway adjacent to the Northbound Off-Ramp.

Social/Cultural and Environmental Justice

The project area has no residents, but some users may live nearby. The surrounding area has a lower than state average prevalence of minority and low-income populations. The project will

improve pedestrian facilities, traffic flow, and safety. Environmental justice issues are not anticipated should either alternative advance beyond this Reconnaissance Study.

Historic

Two National Register of Historic Places (NRHP) sites are listed in the Alaska Heritage Resources Survey (AHRS) adjacent to the project area, The Government Hill Federal Housing Historic District, and Brown's Point Park Historic Site. Another building located south of the project study area, may be historic but has not been evaluated for the NRHP. DOT indicated by email that two bridges that cross Ship Creek to the south of the project study area have historical significance. Ship Creek is beyond the study area and unlikely to be involved should this project advance beyond this Reconnaissance Study.

Section 4(f) and Section 6(f)

Government Hill Federal Housing Historic District, and Brown's Point Park Historic Site both qualify as a Section 4(f) resource. The West Bluff / Government Hill Greenbelt, under lease from the ARR to the MOA, intended for recreational use, is also a likely 4(f) resource. Historic site limits are near the proposed retaining wall for Alternative 3, Increase Radius of Horizontal Curve and Relocate Retaining Wall. A Section 4(f) consultation for Government Hill Federal Housing Historic District, Brown's Point Park Historic Site, and the West Bluff / Government Hill Greenbelt is likely needed for the project to advance, as all are adjacent 4(f) resources. Brown's Point Park and the West Bluff / Government Hill Greenbelt are not a 6(f) resource.

The Ship Creek bridge is separated from the project area by two roads, a number of railroad tracks and buildings, so would not be considered an adjacent 4(f) resource.

Economic

Improving the pedestrian facilities, safety, maintenance and freight mobility would improve the level of service, but not likely affect the economics of the Port of Anchorage.

Land Use and Transportation Plans

This project is consistent with the Anchorage Bowl 2025 Long Range Transportation Plan with 2027 Revisions, and supports Goal 1: Safety and Health, Objectives "Promote a walkable city with safe winter walking conditions" and "Minimize conflicts between freight and passenger/pedestrian travel." This project also supports Goal 3: Economic Vitality, Objective "Optimize the transportation system to meet the needs of the Port of Anchorage, Ted Stevens Anchorage International Airport, the Alaska Railroad, and the military and business communities." This project also supports Goal 4: Optimize Community Connectivity, Objective "Enhance the physical connectivity between neighborhoods by increasing the number of roadway and pedestrian connections." One objective of this project is to provide additional pedestrian connectivity through the area and to enhance safety of both vehicular traffic to and from the Port of Anchorage, and pedestrian use of the area.

By improving pedestrian access, this project also supports the 1991 Ship Creek Land Use Plan, Goal 6 "To integrate the waterfront and Ship Creek into the fabric of the Municipality" Objective 2, "Provide a continuous pedestrian/bicycle facility along Ship Creek from the coast to Reeve

Boulevard with connections to nearby neighborhoods and the coastal trail. This should provide a link between the various development opportunities."

This project also supports the 2014 Ship Creek Framework Plan, Design Principles, "Connections- Strengthen connections between Ship Creek, Downtown, Government Hill and surrounding areas." And "Transportation: Improve vehicular connections to and through the site. Reduce traffic through the site and reduce conflict areas between trucks and pedestrians." This project is increasing pedestrian facilities and removing pedestrians from the roadway to reduce conflict between trucks and pedestrians.

Fish and Wildlife, Threatened and Endangered Species

No threatened or endangered species or habitat, and no essential fish habitat (EFH) are present in the project area. Ship Creek is nearby, an anadromous stream and EFH. Impacts to Ship Creek are not likely. If the project advances, an eagle's nest survey should be conducted to determine whether eagle's nests are present within a 660-foot radius of the project. Since no trees are in the direct project area, Government Hill would be a likely place to survey. More suitable eagle habitat is available outside the project area.

Invasive Species

University of Alaska Anchorage's AKEPIC Data Portal for invasive plant species shows a presence of the following invasive species in the project vicinity; bird vetch (*Vicia cracca*), smooth brome (*Bromus inermis*), yellow sweetclover (*Melilotus officinalis*), white sweetclover (*Melilotus albus*), butter and eggs (*Linaria vulgaris*), narrowleaf hawksbeard (*Crepis tectorum*). Standard measures to avoid the spread of invasive species during construction activities will be necessary should this project advance to construction.

Air Quality

The project is on the AMATS 2015-2018 Transportation Improvement Program which, according to state and federal regulations, received an Air Quality Conformity Determination.

Floodplains

The project area is not in a flood zone, Federal Emergency Management Agency map number 0200050732D, revised September 25, 2009. Nearby Ship Creek is within a 100-year flood zone.

Noise

The POA is a busy, noisy area with the port and railroad activity. Other than construction, an increase to noise in the area is not anticipated to be an issue, should this project advance beyond this Reconnaissance Study. No changes to the horizontal road alignments are anticipated, nor would the vertical alignment changes be substantial enough to require a Noise Analysis. This project would not increase activity in the POA.

Water Quality

The roads currently experience drainage issues, the drainage upgrades should reduce water and ice accumulation on the road surface. Installing curtain drains should trap more sediment before it enters the storm drain system to improve water quality. Ship Creek is listed on the Alaska Department of Environmental Conservation Impaired Waterbodies website

(http://dec.alaska.gov/water/wqsar/Docs/impairedwaters.pdf) as a Category 5 Section 303(d) listed waterbody for urban runoff containing petroleum hydrocarbons, oil and grease, and a Category 4a listed waterbody for urban runoff containing fecal coliform bacteria.

Permits

Municipality of Anchorage Noise Permit if night construction is planned.

ADEC Alaska Pollutant Discharge Elimination System Reporting for storm drain system upgrades.

Appendix E: Hydrologic and Hydraulic Considerations

This Appendix is available upon request.