

Appendix A4
Center City Connector Transportation
Analysis Update

Center City Connector Transportation Analysis Update

Introduction

This transportation update addresses changes to the Center City Connector (Project) schedule, changes from other ongoing projects affecting the circulation during construction and the year of opening. In addition, it addresses several comments received on the transportation analysis in the Environmental Assessment (EA) including: the configuration along Alaskan Way assumed for construction detours, assumptions for transit during construction of the Center City Connector, and consistency with the Waterfront Seattle Draft Environmental Impact Statement (EIS) transportation analyses.

Changes to the project schedule and schedules of neighboring projects are as follows:

- Construction of Project start date delayed from winter 2017 to spring/fall 2018
- Year of Project opening delayed from 2018 to 2020
- Change in schedules of Reasonably Foreseeable Future Action projects and identification of a few new projects

To respond to public comments and evaluate potential impacts from these changes, additional traffic analyses were performed to determine if the impacts from these changes, along with proposed mitigation measures would be greater in duration and intensity than those identified in the EA. The following documents this analysis. While new mitigation measures are added to address potential transportation impacts, the results are not substantially different than those recorded in the EA that was issued in May of 2016.

Project Schedule Changes

The EA evaluated a 12- to 24-month construction period beginning in winter 2016 and ending in fall 2018 with the project opening in mid-2019. The project schedule has shifted approximately 6 months. Table 1 summarizes the changes in analysis year and time periods. Construction is anticipated to begin in spring/summer 2017 and end in late 2019. Instead of beginning service in 2018, the Project’s year of opening would be delayed until 2020. As a result, the transportation model for the Center City Connector EA has been updated to reflect additional traffic and current understanding of the circulation. The design year of 2035 remains the same.

Table 1 Analysis Year and Time Periods

	EA Assumptions	Updated Assumptions
Existing Year	2014	2014
Construction period	2016 – 2018	mid 2017 – late 2019
Year of Opening	2018	2020
Design Year	2035	2035

Updated Traffic Analysis during Construction

This update focuses on the traffic impacts during the construction of the Pioneer Square portion of the Center City Connector. Building this segment would require detouring northbound traffic while maintaining the southbound traffic on First Avenue. Cross streets at intersections would remain open during weekdays. The proposed detour route for northbound traffic currently on First Avenue is Alaskan Way via either Railroad Way S or S King Street, returning to First Avenue at Marion Street. Northbound vehicles destined for Cherry Street eastbound and the I-5 northbound express lane on-ramp could access from Yesler Way and an eastbound left turn at First Avenue. The EA traffic analysis found that the proposed northbound detour around Pioneer Square during construction would result in traffic delays along Alaskan Way where some intersections would fail resulting in extended delays. There were no other areas during construction that resulted in failing intersections.

This analysis, as well as the EA analysis, assumes a primary traffic detour to Alaskan Way between S King Street and Marion Street, with some traffic detouring to Yesler Way. The updated model includes adding two more years of background growth in traffic volumes at 1 percent annual growth. Additionally, the analysis updated network assumptions with current knowledge of Alaskan Way travel configuration and status of the SR 99 tunnel based on current discussions with the Alaskan Way, Promenade, and Overlook Walk (AWPOW) project team (AWPOW, 2016¹). Table 2 shows the key change to the roadways in the traffic model in the vicinity of the Project construction from those found in the EA and the most current information from the Alaskan Way and SR 99 projects.

Table 2 Updates to Traffic Network during Construction

Element of Change	EA Construction Assumptions	Current Construction Assumptions *
Project Construction Period	2016 – 2018	Mid 2017 – Late 2019
Construction Year for Traffic Analysis	Early 2017 (prior to Alaskan Way Viaduct Demolition)	2019 (after Alaskan Way Viaduct Demolition)
Project Construction Duration	Up to 24 months	Up to 30 months
Alaskan Way Detour Roadway Configuration	Three lanes or five lanes, depending on Alaskan Way construction schedules	Three lanes: one lane in each direction and a turn lane
Year of SR 99 Tunnel Opening	Late 2017	2018
Alaskan Way Viaduct Demolition	Late 2017- Early 2018	2019
Downtown Seattle Transit Tunnel (DSTT)	DSTT open to buses	DSTT potentially closed to buses starting 2018. No additional bus trips from DSTT closure assumed near Pioneer Square construction zone detour route.
Background Growth in Traffic during Construction	3 percent (1 percent annually between 2014 and 2017)	5 percent (1 percent annually between 2014 and 2019)
Southwest Transit Pathway	Columbia Street transit lanes will be completed to form the new Southwest Transit Pathway.	Columbia Street transit lanes will be completed to form the new Southwest Transit Pathway.
*Some assumptions may have been based on schedules that may change yet again; however, they are adequate for purposes of determining whether there are significant impacts against the No Build Alternative that were not captured in the EA analysis.		

¹ SDOT 2016. Final Environmental Impact Statement (EIS) for the Alaskan Way, Promenade, and Overlook Walk issued on October 31, 2016.

During construction on Center City Connector in 2017, Alaskan Way would be a two- or three-lane² configuration (*Alaskan Way Promenade and Overlook Walk [AWPOW] Transportation Appendix (AWPOW, October 2016)*). The EA used the same assumption to reflect the most constrained transportation scenario.

The original analysis in the recorded in the EA found that if 100 percent of the detoured northbound traffic from First Avenue were to use the primary detour along Alaskan Way, the Alaskan Way/Marion Street intersection would be over capacity and operate at level of service (LOS) F, with over 180 seconds of delay per vehicle. Based on the original construction year (2017) analysis, the City of Seattle would have to divert **40 percent** of this northbound traffic to other detour routes in order to bring the Alaskan Way/Marion Street intersection back to LOS E. The most likely diversion would involve diverting traffic south of downtown Seattle to the Alaska Way (SR 99) Viaduct or, if opened, the SR 99 tunnel.

With 2 more years of background growth, **50 percent** of the northbound traffic would need to be diverted away from the Alaskan Way detour to return the Alaskan Way/Marion Street intersection back to LOS E. The updated traffic model reflects the average delay at the Alaskan Way/Marion Street intersection would increase from **170 to 187** seconds per vehicle during construction (see Attachment 1). To minimize the added delay, Seattle Department of Transportation (SDOT), in coordination with lead agencies on overlapping project actions (AWPOW, Coleman Dock, SR 99 Viaduct demolition, etc.), would initiate additional routing and signal changes. If 50 percent of northbound traffic were diverted away from First Avenue and Alaskan Way, additional benefits would include reducing a delay at the intersection of First Avenue and Columbia Street to below the no build condition.

The likely diversions would still rely on directing traffic to use the SR 99 tunnel, which is anticipated to be open to traffic in 2018. The potential increase in delay at Marion Street and the mitigation measure to divert traffic south of downtown would be temporary conditions occurring during the Pioneer Square Segment's 6- to 8-month construction period. To mitigate this impact, SDOT will monitor and adjust the traffic signal at Marion Street and Alaskan Way and adjacent signals that may be affected to meet LOS E.

Update to Year of Opening Traffic and Transit Analysis

A sensitivity analysis was completed to understand potential impacts on traffic and transit from a change in the Project's year of opening along with other changes that would influence the analysis of traffic conditions in 2020. The update to the year of opening is described as follows:

- 1) Revised 2020 Modeling Inputs and Assumptions
- 2) Revised 2020 Modeling Results

Revised 2020 Modeling Inputs and Assumptions

Table 3 reflects the conditions assumed in the EA versus those assumed in this sensitivity analysis.

² Three lanes assumes left-turn pocket for WSDOT ferries or turn pockets eastbound into Downtown Seattle.

Table 3 Changes in Assumptions for Year of Opening Traffic Analysis

Elements that have Changed	EA Assumptions: Year of Opening in 2018	Updated Assumptions: Year of Opening in 2020
Alaskan Way Configuration	Alaskan Way will be complete (two general-purpose lanes and one bus-only lane in each direction between Columbia and King Streets) by 2018.	Alaskan Way will be four lanes with short term reduction to three lanes (to be complete by 2021).
SR 99 (Viaduct vs. Tunnel)	SR 99 tunnel will open in 2017 and Alaskan Way Viaduct will be demolished in 2017, both prior to Center City Connector project opening in 2018.	SR 99 tunnel will open in 2018 and Alaskan Way Viaduct will be demolished in 2019, both prior to Center City Connector project opening in 2020.
Future Year Traffic Volumes	Based on 2018 year of opening travel demand forecast model from Puget Sound Regional Council.	Revised forecast model to account for reduced four-lane cross section of Alaskan Way and two additional years of background traffic growth.
Downtown Seattle Transit Tunnel (DSTT)	DSTT will operate with joint operation of buses and light rail.	DSTT will operate exclusively for light rail. Bus lines from DSTT will be rerouted to surface streets

Revised 2020 Bus Routes Assumptions

Additional model changes included relocating all DSTT bus routes to surface streets, with the exception of the routes truncated by ULINK or routes that will be modified by 2020 (i.e., King County Metro routes 66, 71, 72, 73, 74).

Routes that will become surface bus routes include 41, 101, 102, 150, 255, and 550. DSTT bus routes were assumed to use their emergency tunnel closure route path published online (Second or Fifth Avenue for southbound bus trips and Fourth Avenue for northbound bus trips). This results in a net increase of 32 southbound bus trips (26 bus trips on Second Avenue and 6 bus trips on Fifth Avenue) and 35 northbound bus trips (all on Fourth Avenue) from the original 2018 build bus volumes. During the PM peak period, buses travel in dedicated bus lanes on both Second and Fourth Avenues.

Updates to the Transportation Model Network

The new forecasts, a reduced cross section on Alaskan Way, and the DSTT bus routes rerouted to surface streets were input to Synchro to show 2020 build scenario results compared to the previous 2018 build scenario results (see Attachment 2: Synchro Summary 2020). Channelization on Alaskan Way is modeled to be consistent with the *Alaskan Way Promenade and Overlook Walk (AWPOW) Transportation* Final EIS Appendix (AWPOW, October 2016), which states:

In general, two lanes in each direction on Alaskan Way would be open during morning and afternoon peak traffic hours during construction, although one or more lanes could be temporarily closed at times to provide access for construction equipment and utility installations. Once Elliott Way is completed, two lanes of traffic in each direction would generally be open on the new roadway. However, temporary lane closures would allow access for construction equipment and activities such as utility installations.

Based on this direction, during the 2020 year of operation, the model provides two through lanes in each direction between S Main Street and Pine Street, and a northbound left-turn lane for holding ferry traffic between Yesler Way and Main Street.

Signal timing for the Central Business District was assumed to maintain the current 80-second cycle length, but signal phase splits and offsets were assumed to be optimized to respond to changing demand volumes.

Revised 2020 Modeling Results

Traffic Forecast Updates

This updated model revealed that a portion of traffic that would typically use Alaskan Way would divert to parallel north-south streets (First, Second, Fourth, and Fifth Avenues). The revised traffic forecasts for 2020 year of opening changed from the original 2018 year as follows:

- Alaskan Way southbound (between Columbia Street and Jackson Street) would see a reduction in volume of approximately 375 vehicles per hour (vph), or a 20 percent decrease from the original 2018 build forecast volume, with those trips diverting to:
 - First Avenue – 50 vph (10 percent increase from original 2018 year of opening)
 - Second Avenue – 175 vph (11 percent increase from original 2018 year of opening)
 - Fifth Avenue – 150 vph (14 percent increase from original 2018 year of opening)
- Alaskan Way northbound (between Jackson Street and Columbia Street) would see a reduction in volume of approximately 100 vph, or a 6 percent decrease from the original 2018 build forecasts, with those trips diverting to:
 - First Avenue – 50 vph (10 percent increase from original 2018 build)
 - Fourth Avenue – 50 vph (3 percent increase from original 2018 build)

Intersection LOS Updates

Intersection LOS and delay results for both the year of opening for 2018 and 2020 build scenarios are shown in Attachment 2, Synchro Summary 2020 Update 2016-10-25, and organized by the highest delay for 2018 build intersections. Table 4 provides these comparative changes in LOS with respect to the EA results for the first year of operation to 2020 for most affected intersections.

Table 4 Updates to Intersection Operations and Delay during Project Year of Opening

Intersection	Original EA Intersection LOS and Delay	Updates to the Intersection LOS and Delay
First Avenue/S Jackson Street	LOS C and delay of 33 seconds per vehicle (seconds/vehicle [sec/veh])	LOS E and delay of 73 sec/veh
Alaskan Way/Marion Street	LOS C and 26 sec/veh delay	LOS F and 84 sec/veh delay
First Avenue/Spring Street	LOS C and 30 sec/veh delay	LOS D and 39 sec/veh delay
Second Avenue/Seneca Street	LOS C and 28 sec/veh delay	LOS D and 35 sec/veh delay

The rest of the intersections in the study area would change in delay or improve by approximately 5 sec/veh but would mostly maintain the same LOS as recorded in the EA. Some intersections would see a decrease in delay from signal optimization or due to a reduction in east-west volumes resulting from vehicles diverting away from Alaskan Way (due to reduced number of lanes). These changes are

relatively minor because they are short-term (until Alaska Way full build-out is complete). The assumptions and analysis for 2035 Project horizon do not change.

Updates in Transit for Year of Opening

The additional bus trips on surface streets resulting from the DSTT closure to bus traffic would apply to both the no build and build scenarios in the year 2020. The bus travel times are not expected to vary between the no build and build scenarios for year of opening in 2018.

Aside from slight increases in delay at the Second Avenue and Seneca Street intersection, the changes in intersection delay are not expected to result in noticeable changes in delay on transit route operations along Second, Third, Fourth, and Fifth Avenues, primarily because the buses travel in dedicated transit lanes on Second and Fourth Avenues, which are not as affected by congestion in general-purpose lanes. Other bus routes are not planned to travel along roads where there are Project-affected intersections with this level of delay.

The Alaskan Way/Marion Street intersection degrading to LOS F may affect ease of access to the Washington State Ferries terminal at Coleman Dock. However, Coleman Dock is also programmed to be under renovation during the 2017 – 2020 period. The construction of the Coleman Dock may require additional detour planning. The delay is mostly attributable to construction along the Seattle Waterfront and an additional delay of under 1 minute is not uncommon during construction.

This minor increase in delay is expected to occur in a relatively short period of time, because the following year (2021), AWPOW would be completed and the additional transit and turn lanes would relieve some of the traffic maneuvers to and from the Coleman Dock and other east-west streets. Therefore, the 2035 analyses included in the EA presents the highest traffic volume and ultimate impacts once the major construction projects are complete. The year of opening does not indicate that there would be any new significant impacts on traffic movements or transit operations.

None of these changes would affect pedestrian and bicycle movements for the year of opening.

Finally, as noted in the EA avoidance and minimization measures, SDOT has anticipated overlaps between projects in downtown Seattle and is therefore committed to coordinating through a project coordination committee made up of construction project managers and agencies with jurisdiction over the projects (Washington State Department of Transportation, King County Metro, Sound Transit, Seattle Public Utilities, and SDOT) to manage construction schedules to minimize impacts on circulation and other impacts.

Additionally, SDOT will engage the Center City Dynamic Signal Timing Program (established to review dynamic signal timing patterns to respond in real-time to changing traffic demands) to monitor and adjust the traffic signal at Marion Street and Alaskan Way and adjacent signals that may be affected to meet LOS E.

Attachment 1
Construction Synchro Summary
2016-10-16

Center City Connector Streetcar Project

Intersection LOS Results

Construction Analysis - Segment 1 - Zones A & B Detour

					Alaskan Way 2-3 lanes Under Viaduct														
					Alaskan Way/Marion St Option 1														
					2014 Existing			2019 No Build			2019 Construction (100% of 1st Ave Northbound Trips use Detour)			2019 Construction (60% of 1st Ave Northbound Trips use Detour)			2019 Construction (50% of 1st Ave Northbound Trips use Detour)		
ID#	Synchro ID	Major St	Cross St	Traffic Control	LOS	Delay	LOS	Delay	Delay Change	LOS	Delay	Delay Change	LOS	Delay	Delay Change	LOS	Delay	Delay Change	
	132	Alaskan Way	Spring St	Signal	B	10	A	8	-3	A	8	1	A	6	-1	A	6	-1	
51	66	Alaskan Way	Madison St	Signal	C	26	B	15	-12	B	17	2	B	16	7	B	16	2	
66	70	Alaskan Way	Marion St	Signal	B	20	C	22	2	F	187	165	F	87	67	E	63	41	
	73	Alaskan Way	Columbia St	Signal	A	10	B	12	2	B	14	2	B	13	7	B	13	2	
59	72	Alaskan Way	Yesler Way	Signal	B	18	C	24	6	C	26	2	C	24	12	C	24	1	
	473	Alaskan Way	Washington St	Signal	C	16	A	5	-11	A	5	0	A	5	0	A	6	0	
	74	Alaskan Way	Main St	Signal	A	1	A	5	4	C	23	18	A	7	-32	A	6	1	
	1514	Alaskan Way	Jackson St	Signal	A	8	B	12	4	C	22	9	B	16	-1	B	16	4	
63	1524	Alaskan Way	S King St	Signal	B	14	A	7	-7	B	15	8	B	14	-1	B	12	5	
16	1426	1st Ave	Marion St	Signal	A	9	A	9	0	C	21	12	B	17	-3	B	17	8	
17	4	1st Ave	Columbia St	Signal	F	94	F	110	16	F	116	6	F	106	-3	F	103	-7	
18	3	1st Ave	Cherry St	Signal	A	6	A	6	0	A	5	-1	A	5	1	A	5	-1	
19	2	1st Ave	Yesler Way	Signal	C	31	C	34	3	C	22	-12	C	21	-1	C	22	-13	
20	1505	1st Ave	Washington St	Signal	A	8	A	8	0	B	12	4	A	9	-2	A	9	1	
21	15	1st Ave	Main St	Signal	B	12	B	12	0	B	17	5	B	14	-2	B	14	1	
22	1515	1st Ave	Jackson St	Signal	C	22	C	25	3	C	22	-3	C	22	0	C	21	-3	
64	14	1st Ave S	S King St	Signal	B	12	A	9	-2	B	13	3	B	12	1	B	12	2	
65	13	1st Ave S	Railroad Way S	Signal	B	18	B	16	-2	C	29	13	C	20	-6	B	20	4	

Average Delay (1st Ave and Alaskan Way) = 19 19 32 13 24 3 23 4
 % Increase from No Build = 68% 14% 21%
 Average Delay (Alaskan Way) = 14 13 35 22 23 7 20 7
 % Increase from No Build = 169% 44% 54%

LOS D	0	0	0	0	0
LOS E	0	0	0	0	1
LOS F	1	1	2	2	1
LOS D, E, F	1	1	2	2	2

Attachment 2
Synchro Summary 2020 Update
2016-10-25

ID#	Major St	Cross St	Traffic Control	2018 Build		2020 Build Year of Opening		
				LOS	Delay	LOS	Delay	Delay Change
				31	Westlake Ave	Republican St	Signal	F
63	Alaskan Way	S King St	Signal	D	49	D	53	3
55	2nd Ave	Columbia St	Signal	C	34	C	24	-9
22	1st Ave	Jackson St	Signal	C	33	E	73	40
14	1st Ave	Spring St	Signal	C	30	D	39	9
19	1st Ave	Yesler Way	Signal	C	29	C	34	5
45	2nd Ave	Seneca St	Signal	C	28	D	35	8
66	Alaskan Way	Marion St	Signal	C	26	F	84	58
44	5th Ave	University St	Signal	C	25	C	26	2
60	2nd Ave	James St	Signal	C	24	C	25	1
9	1st Ave	Pine St	Signal	C	22	C	25	3
49	4th Ave	Spring St	Signal	C	22	C	21	-1
7	2nd Ave	Stewart St	Signal	C	22	C	22	1
2	Westlake Ave	Stewart St	Signal	C	21	C	21	0
40	1st Ave	Lenora St	Signal	C	21	B	20	-2
62	5th Ave	James St	Signal	C	21	B	16	-5
43	4th Ave	University St	Signal	C	20	C	21	0
58	5th Ave	Cherry St	Signal	B	20	B	14	-6
15	1st Ave	Madison St	Signal	B	20	B	15	-5
10	1st Ave	Pike St	Signal	B	20	C	22	2
65	1st Ave S	Railroad Way S	Signal	B	20	C	23	4
48	2nd Ave	Spring St	Signal	B	20	B	17	-3
12	1st Ave	University St	Signal	B	19	B	20	1
64	1st Ave S	S King St	Signal	B	19	B	19	0
17	1st Ave	Columbia St	Signal	B	18	B	15	-3
3	5th Ave	Stewart St	Signal	B	18	C	22	4
25	4th Ave	Jackson St	Signal	B	18	B	19	1
59	Alaskan Way	Yesler Way	Signal	B	18	C	23	5
24	2nd Ave Ext	Jackson St	Signal	B	17	B	14	-3
50	5th Ave	Spring St	Signal	B	17	B	17	0
38	4th Ave	Pike St	Signal	B	17	C	23	6
32	2nd Ave	Pine St	Signal	B	16	B	16	0
42	2nd Ave	University St	Signal	B	16	B	15	-1
11	1st Ave	Union St	Signal	B	16	B	13	-3
5	4th Ave	Stewart St	Signal	B	15	B	11	-4
57	5th Ave	Columbia St	Signal	B	15	B	12	-4
8	1st Ave	Stewart St	Signal	B	15	A	10	-5
54	5th Ave	Madison St	Signal	B	14	C	21	7
26	5th Ave	Jackson St	Signal	B	14	B	10	-4
27	6th Ave	Jackson St	Signal	B	14	B	13	-1
33	3rd Ave	Pine St	Signal	B	14	A	9	-5
30	8th Ave	Jackson St	Signal	B	14	B	14	0
36	2nd Ave	Pike St	Signal	B	14	B	12	-2
16	1st Ave	Marion St	Signal	B	14	B	14	1
39	5th Ave	Pike St	Signal	B	13	B	13	0
35	5th Ave	Pine St	Signal	B	13	B	11	-2
4	5th Ave	Olive Way	Signal	B	13	B	13	0
23	2nd Ave	Jackson St	Signal	B	13	B	13	0
13	1st Ave	Seneca St	Signal	B	12	A	9	-4
52	2nd Ave	Madison St	Signal	B	11	B	12	0
47	5th Ave	Seneca St	Signal	B	11	B	11	0
61	4th Ave	James St	Signal	B	11	B	15	4
53	4th Ave	Madison St	Signal	B	11	A	8	-3
51	Alaskan Way	Madison St	Signal	B	10	A	9	-2
46	4th Ave	Seneca St	Signal	B	10	B	10	0
41	1st Ave	Virginia St	Signal	B	10	A	10	0
56	4th Ave	Columbia St	Signal	A	10	A	9	-1
29	7th Ave	Jackson St	Signal	A	10	A	9	-1
37	3rd Ave	Pike St	Signal	A	10	A	8	-2
1	Westlake Ave	6th Ave	Signal	A	9	A	9	-1
21	1st Ave	Main St	Signal	A	8	A	8	1
20	1st Ave	Washington St	Signal	A	7	A	8	0
18	1st Ave	Cherry St	Signal	A	7	A	6	-1
28	Maynard Ave	Jackson St	Signal	A	7	A	9	2
34	4th Ave	Pine St	Signal	A	5	A	6	1
6	3rd Ave	Stewart St	Signal	A	4	A	6	2