RAILPROS

Finalized

Interconnected Crossing Review Report

DOT #085699A

Railroad Interconnected Traffic Signals at:

5th Street NW at Stewart Avenue and

5th Street NW at 2nd Avenue NW

Puyallup, WA

BNSF

Seattle Subdivision

MP 32.045

23 U.S.C. § 409 Document

Prepared For: BNSF RAILWAY

July 23, 2021

Table of Contents

Certification 2

BNSF Contact Information 2

Executive Summary 3

Evaluation 5

Continued Joint Agency Coordination 14

Conclusion 14

Appendices

A – Existing Photos (6.23.20)

B – Diagnostic Meeting Minutes (dated 6.24.20)

C – Agency Provided Preemption Calculations

D – BNSF Highway Rail Grade Crossing Traffic Signal Preemption Request Forms

E – Agency Design Plans

F – Reference Standards and Guidelines

Certification

I, Andrew Maximous, certify that this report was prepared under my responsible charge.

Sincerely,

Andrew Maximous, PE
RailPros Inc.
213-929-1111
andrew.maximous@railpros.com

BNSF Contact Information

In case of crossing related emergency, call the BNSF Hotline number posted on the Emergency Notification System (ENS) sign at the crossing: 800-832-5452.

In case of any proposed physical changes, operational changes, or traffic control work at/near the grade crossing, contact Stephen Semenick at BNSF 206-625-6152.

Appendix C

Agency Provided Preemption Calculations

Version 07/12/2017

DOT# 085699A - FORM 1

RESET

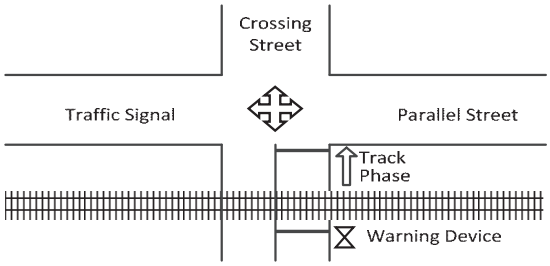
Texas Department of Transportation

Form 2304
(Rev. 7/17)

GUIDE FOR DETERMINING TIME REQUIREMENTS FOR TRAFFIC SIGNAL PREEMPTION AT HIGHWAY-RAIL GRADE CROSSINGS

City	WA, Puyallup	CSJ	
County	Pierce	Completed by	Benesch - Fort Worth
District		District Approval	
		Date	07/16/2021

Show North Arrow



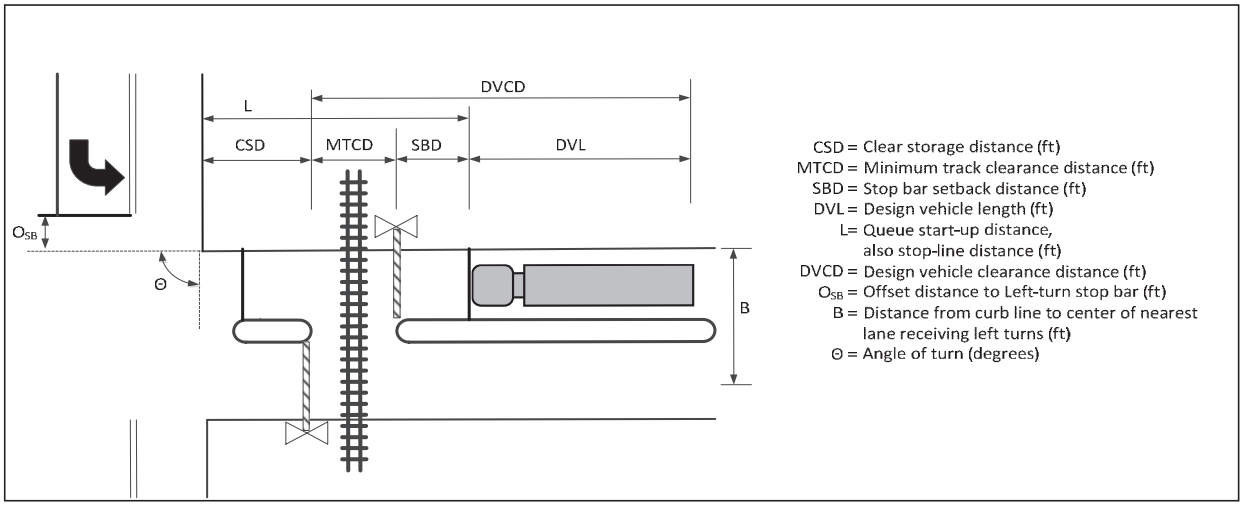
Parallel Street Name: W Stewart Avenue

Crossing Street Name: 5th Street NW

Railroad	BNSF Railway	Railroad Contact	Stephen Semenick
Crossing DOT#	085699A	Phone	206-625-6152

NOTE: After approval by the District, a copy of this form, along with the traffic signal design sheets and the phasing diagrams for normal and preempted operation, shall be placed in the traffic signal cabinet. See Section 7 for traffic signal timings.

SECTION 1: GEOMETRY DATA & DEFAULTS



CSD = Clear storage distance (ft)
MTCD = Minimum track clearance distance (ft)
SBD = Stop bar setback distance (ft)
DVL = Design vehicle length (ft)
L= Queue start-up distance, also stop-line distance (ft)
DVCD = Design vehicle clearance distance (ft)
O_{SB} = Offset distance to Left-turn stop bar (ft)
B = Distance from curb line to center of nearest lane receiving left turns (ft)
Θ = Angle of turn (degrees)

GEOMETRIC DATA FOR CROSSING

			Remarks
1.	Clear storage distance (CSD, feet)	1. 112	
2.	Minimum track clearance distance (MTCD, feet)	2. 52	
3.	Stop bar setback distance (SBD, feet)	3. 8	"0" if no stop bar present
4.	Width of receiving approach (B, feet)	4. 32	
5.	Offset distance of left turn stop bar (O_{SB}, feet)	5. 20	
6.	Approach grade. % (0 if approach is on downgrade)	6. 2.5	
7.	Angle of turn at Intersection (Θ, degrees)	7. 112	

DESIGN VEHICLE DATA

8. Select Design Vehicle

☐ School Bus ☐ Intermediate Truck ☑ Interstate Semi-Truck ☐ Other

9.	Default design vehicle length (feet)	9. 75	Based on selected Design Vehicle
a.	Additional vehicle length, if needed (feet)	9a. 0	
10.	Total design vehicle length (DVL, feet)	10. 75	
11.	Centerline turning radius of design vehicle (R, feet)	11. 41	Based on selected Design Vehicle
12.	Passenger car vehicle length (LV, feet)	12. 19	Default value

SECTION 2: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

				Remarks
13.	Preempt delay time (seconds)	13.	0	
14.	Controller response time to preempt (seconds)	14.	0.0	Manufacturer:
				Firmware Version:
15.	Preempt verification and response time (seconds): add lines 13 and 14	15.	0.0	

Worst-case conflicting vehicle time

				Remarks
16.	Minimum green time during right-of-way transfer (seconds)	16.	2	Minimum green time reduced
17.	Other green time during right-of-way transfer (seconds)	17.	0	for raiload limitations
18.	Yellow change time (seconds)	18.	3.6	
19.	Red clearance time (seconds)	19.	2.0	
20.	Worst-case conflicting vehicle time (seconds): add lines 16 through 19	20.	7.6	

Worst-case conflicting pedestrian time

				Remarks
21.	Minimum walk time during right-of-way transfer (seconds)	21.	0	* Advance Pedestrian Preemption Time *
22.	Pedestrian clearance time during right-of-way transfer (seconds)	22.	0	West Crosswalk = 52 ft PC = (52 ft / 3.5 fps) - 3.6 s = 11.26 sec
23.	Vehicle yellow change time, if not included on line 22 (seconds)	23.	0.0	(round up) ~ 12 sec
24.	Vehicle red clearance time, if not included on line 22 (seconds)	24.	0.0	
25.	Worst-case conflicting pedestrian time (seconds): add lines 21 through 24	25.	0.0	

Worst-case conflicting vehicle or conflicting pedestrian time

26.	Worst-case conflicting vehicle or conflicting pedestrian time (seconds): maximum of lines 20 and 25	26.	7.6
27.	**Right-of-way transfer time (seconds): add lines 15 and 26**	27.	7.6

SECTION 3: QUEUE CLEARANCE TIME CALCULATION

				Remarks
28.	Are there left-turns towards the tracks? ☐ Yes ☑ No			
29.	Distance traveled by truck during left-turn (LTL, feet):	29.	0	LTL = ∏RΘ/180
30.	Travel speed of left-turning truck (S_{LTT}, mph):	30.	10	Default value
31.	Distance required to clear left-turning truck from travel lanes on track clearance approach (feet):	31.	0	Equation: (line 4 + line 5 + line 12 - line 11) + line 29 + line 10
32.	Additional time required to clear left-turning truck from travel lanes on track clearance approach (seconds):	32.	0.0	Equation: [(line 31 * 3600) / (line 30 * 5280) - line 18 - line 19]
33.	Worst-case Left Turning Truck time (seconds): if Line 28 = 'Yes', use line 32; otherwise Use 0	33.	0.0	
34.	Queue start-up distance, L (feet): add lines 1 through 3	34.	172	
35.	Time required for design vehicle to start moving (seconds): calculate as 2+(L÷20)	35.	10.6	
36.	Design vehicle clearance distance, DVCD (feet): add lines 2, 3 and 10	36.	135	
37.	Time for design vehicle to accelerate through the DVCD (seconds), level terrain	37.	15.7	
38.	Factor to account for slower acceleration on uphill grade	38.	1.17	
39.	Time for design vehcle to accelerate through DVCD (seconds), adjusted for grade: multiply lines 37 and 38	39.	18.3	
40.	**Queue clearance time (seconds): add lines 33, 35 and 39**	40.	28.9	

SECTION 4: MAXIMUM PREEMPTION TIME CALCULATION

				Remarks
41.	Right-of-way transfer time (seconds): line 27	41.	7.6	
42.	Queue clearance time (seconds): line 40	42.	28.9	
43.	Desired minimum separation time (seconds)	43.	4.0	Typical Value
44.	Maximum preemption time for Queue Clearance (seconds): add lines 41 through 43	44.	40.5	

SECTION 5: SUFFICIENT WARNING TIME CHECK

			Remarks
45.	Required minimum time, MT (seconds): per regulations	20	
46.	Clearance time, CT (seconds): (line 2 -35) / 10 (rounded up to nearest second)	2	
47.	Total minimum warning time, MWT, needed (seconds): add lines 45 and 46 (excludes buffer time and equipment response time)	22	
48.	Required advance preemption time (APT) from railroad (seconds): subtract line 47 from line 44, round up to nearest full second, enter 0 if less than 0	19 *	
49.	APT currently provided by railroad (seconds): Enter "0" if new crossing or signal	0	

If the required advance preemption time (line 48) is greater than the amount of advance preemption time currently provided by the railroad (line 49), additional warning time must be requested from the railroad. Alternatively, the maximum preemption time (line 48) may be decreased after performing an engineering study to investigate the possibility of reducing the values on lines 13, 16, 17, 21, 22 and 43.

Remarks:

* Advance Pedestrian Preemption Time and Advance Vehicle Preemption Time *

Advance vehicle preemption and advance pedestrian preemption were calculated on two separate forms for northbound queues from 5th Street NW at West Stewart Avenue (Form 1) and southbound queue from the proposed Puyallup Station Parking Pedestrian Crosswalk Signal at 2nd Avenue (Form 2). It was determined that the worst case calculated advance vehicle preemption time occurred from the intersection of 5th Street NW at West Stewart Avenue and the worst case calculated advance pedestrian preemption time occurred from the intersection of 5th Street NW at 2nd Avenue NW. Below are the final preemption times requested:

* Input #1 - Advance Pedestrian Preemption Time for pedestrian clearance on line 22 Remarks of Form 2 = 14 seconds
* Input #2 - Advance Vehicle Preemption Time is shown on line 48 of Form 1 = 19 seconds

SECTION 6: TRACK CLEARANCE GREEN TIME CALCULATION (IF NO GATE DOWN CIRCUIT PROVIDED)

Preempt Trap Check

			Remarks
50.	Warning Time Variability (Select One) ☐ Consistent Warning Times ☐ Low Warning Time Variability ☑ High Warning Time Variability		
51.	APT required or provided (seconds): maximum of Line 48 or Line 49	19	
52.	Multiplier for maximum APT due to train handling	1.60	
53.	Maximum APT (seconds): multiply line 51 and 52	30.4	
54.	Minimum duration for the track clearance green interval (seconds)	15	
55.	Track Clearance Green Time to avoid Preempt Trap (seconds): add lines 53 and 54	45.4	

Clearing of Clear Storage Distance

56.	Time waiting on left-turn truck (seconds): line 33	0.0	
57.	Time required for design vehicle to start moving (seconds): line 35	10.6	
58.	Design vehicle clearance distance (DVCD, feet): line 36	135	

If CSD ≤ DVL, you must clear the design vehicle through the entire CSD during the traffic clearance phase; however, if CSD > DVL, you should consider providing enough time to clear the design vehicle from the crossing.

Is the clear storage distance (CSD) less than or equal to the design vehicle length (DVL)?

☑ YES. The design vehicle MUST clear through the entire CSD. (CSD will be entered in Line 59).
☐ NO. The design vehicle may clear through a portion of the CSD.

Do you want to clear the design vehicle through the entire CSD?

☑ YES. Clear the entire CSD. (CSD will be entered in Line 59).
☐ NO. Clear the crossing ONLY. (DVL will be entered in Line 59).

				Remarks
59.	Portion of CSD to clear during track clearance phase (feet)	112		
60.	Design vehicle relocation distance (DVRD, feet): add lines 58 and 59	247		
61.	Time required to accelerate design vehicle through DVRD (seconds), level terrain:		21.8	
62.	Factor to account for slower acceleration on uphill grade		1.19	
63.	Time required to accelerate design vehicle through DVRD (seconds), adjusted for grade: multiply lines 61 and 62		25.8	
64.	Time to clear portion of clear storage distance (seconds): add lines 56, 57 and 63			36.4
65.	**Track clearance green interval (seconds): maximum of lines 55 or 64, round up to nearest full second**			46

Maximum Duration of Track Clearance Green after gates are down (in absence of a gate down circuit)

66.	Total time to complete track clearance green (seconds): line 27 + line 65		53.6
67.	Total time before gates are down (seconds): subtract 5 seconds from line 44 (per AREMA Manual)		35.5
68.	**Maximum Duration of Track Clearance Green after gates are down (seconds): Line 66 - Line 67**		19

SECTION 7: SUMMARY OF CONTROLLER PREEMPTION SETTINGS

			Remarks
69.	Duration Time (seconds)	0	From Line 18
70.	Preempt Delay Time (seconds)	0	From Line 19

Right of Way Transfer Phase

			Remarks
71.	Minimum Green Interval (seconds)	2	From Line 65
72.	Pedestrian Walk Interval (seconds)	0	From Line 40
73.	Pedestrian Clearance Interval (Flashing "DON'T WALK", seconds)	0	From Line 18
74.	Yellow Change Interval (seconds)	3.6	From Line 19
75.	All Red Vehicle Clearance (seconds)	2.0	Default Value

Track Clearance Phase

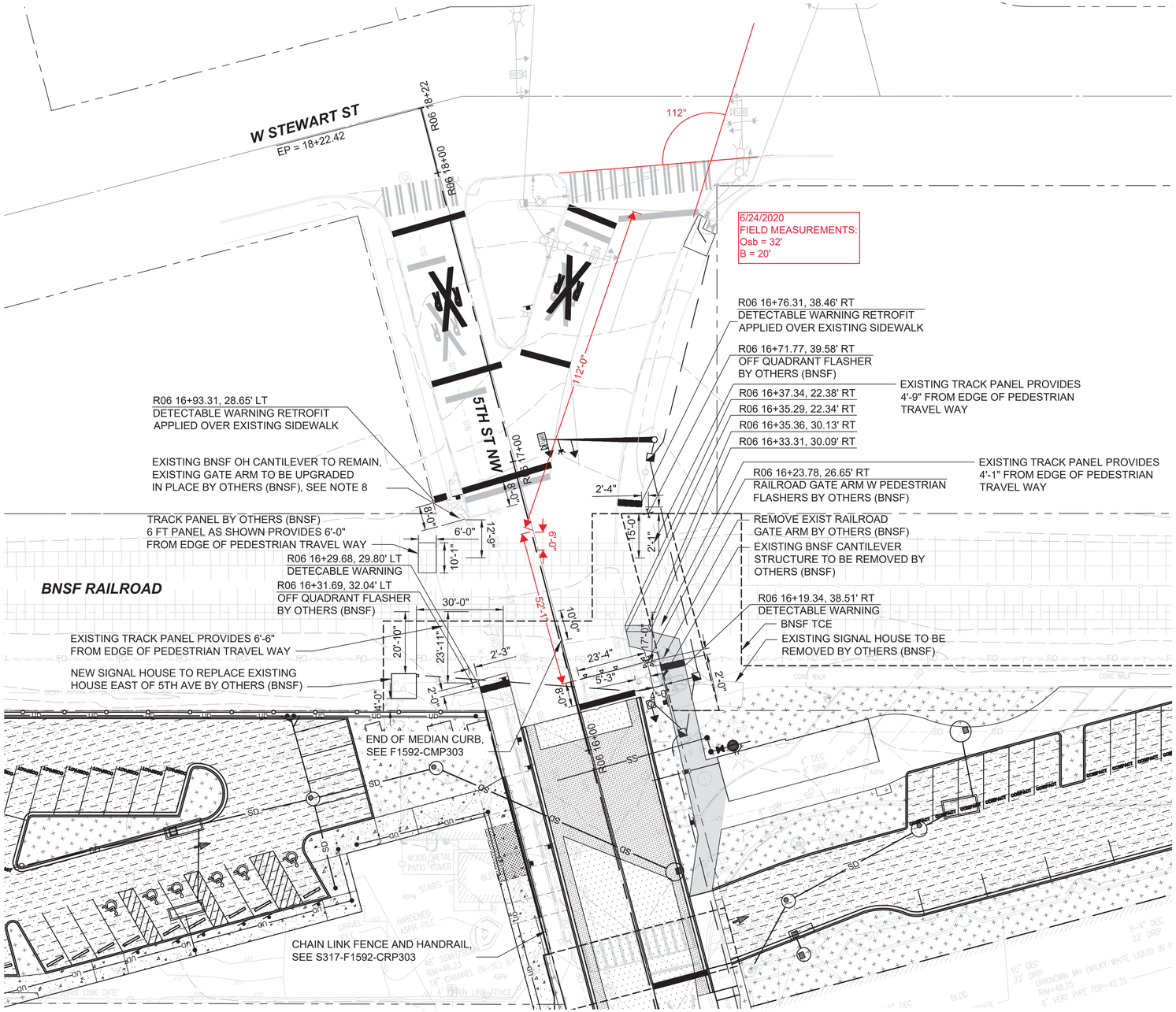
			Remarks
76.	Green Interval (seconds) (in the absence of gate down circuit)	46	From Line 18
77.	Green Interval (seconds) with gate down circuit	29	From Line 19
78.	Yellow Change Interval (seconds)	3.6	From Line 18
79.	All Red Vehicle Clearance (seconds)	2.0	From Line 19

Exit Phase

			Remarks
80.	Dwell/Cycle Minimum Green Time (seconds)	0	Default Value
81.	Yellow Change Interval (seconds)	3.6	From Line 18
82.	All Red Vehicle Clearance (seconds)	2.0	From Line 19

Remarks:

Xrefs:
GB-SEAL-JGM40855
xS317-F1592-CDP100
xS317-F1592-VRX100
xS317-F1592-CSP100
xS317-F1592-CPP100
xGB-TB22x34
xS317-F1592-CMP100
xS317-F1592-CLP100
xS317-F1592-RPP100
xS317-F1592-TSP100
xS317-F1592-UCP100



5TH ST RAILROAD CROSSING ENLARGEMENT

SCALE: 1" = 20'

1 F1592-CGP303

NOTES:

1. FOR HORIZONTAL CONTROL OF PAVEMENT, CURBS AND SIDEWALKS, SEE DRAWINGS F1592-CRP301 THROUGH F1592-CRP308.
2. FOR PAVEMENT MARKINGS AND SIGNAGE, SEE DRAWINGS F1592-CMP301 THROUGH F1592-CMP308, F1592-CMS301, AND F1592-CMS302.
3. FOR TRAFFIC SIGNAL AND ASSOCIATED EQUIPMENT INSTALLATION, SEE DRAWINGS F1592-TSP301 THROUGH F1592-TSP308.
4. FOR CURB RETURN GRADING ENLARGEMENTS, SEE DRAWINGS F1592-CPD031 THROUGH F1592-CPD038, AND F1592-CPD131 THROUGH F1592 CPD138.
5. CONTACT BNSF PRIOR TO ANY WORK WITHIN BNSF RIGHT-OF-WAY OR ANY WORK AFFECTING GRADE CROSSING OPERATIONS.
6. CONTACT BNSF VIA 1-800-533-2891 TO LOCATE ALL UTILITY LOCATIONS PRIOR TO ANY DIGGING WORK.
7. 5TH ST DOT #085699A, SEATTLE SUBDIVISION
   7TH ST DOT #085700S, SEATTLE SUBDIVISION
8. SOUND TRANSIT TO COORDINATE WITH THE CITY ON RELOCATION OF CURB TO PROVIDE STANDARD MUTCD AND BNSF OFFSETS FOR RR GATE AND RR CANTILEVER CLEARANCE. IF THE CURB RELOCATION IS NOT ACCEPTED BY THE CITY, BNSF SHALL RELOCATE BOTH THE RR GATE AND RR CANTILEVER TO MEET THESE STANDARDS AT THE AGENCY'S EXPENSE.

N

20 10 0 20 40
SCALE IN FEET

07/13/21 | 6:00 PM | BRENTP
Z:\1900001-1900999\1900096 ST PUYALLUP DB GARAGE\CADD\DESIGN\S317-F1592-CPD138.DWG

NOT FOR CONSTRUCTION

100% SUBMITTAL

No.	DATE	DSN	CHK	APP	REVISION
A	06/03/21	BSP	JGM	JGM	REVISIONS FOR CITY PERMIT E-21-0022

DESIGNED BY: B. PILON
DRAWN BY: M. VU
CHECKED BY: J. MATTHEWS
APPROVED BY: J. MATTHEWS

JUSTIN G. MATTHEWS STATE OF WASHINGTON 40855 REGISTERED PROFESSIONAL ENGINEER

kpff

HENSEL PHELPS Plan. Build. Manage.
kpff

LINE IS 1" AT FULL SCALE

SUBMITTED BY: SARA ROBERTS
DATE: XX/XX/XXXX
REVIEWED BY: GREG SHIMIZU
DATE: XX/XX/XXXX

PACKAGE # DP-3 PUBLIC RIGHT-OF-WAY STREET IMPROVEMENTS

SOUNDTRANSIT

SCALE: 1" = 20'
FILENAME: S317-F1592-CPD138
CONTRACT No.: RTA/CN 0612-18
SUBMITTAL DATE: 12/10/2020

PUYALLUP STATION PARKING
CONTRACT RTA/CN 0612-18
PUYALLUP STATION PARKING AND ACCESS IMPROVEMENTS
RAILROAD CROSSING ENLARGEMENT

DRAWING No.: F1592-CPD138
FACILITY ID: F1592
SHEET No.: REV: A

Version 07/12/2017

DOT# 085699A - FORM 2

RESET

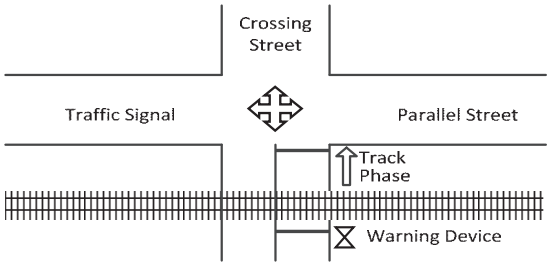
Texas Department of Transportation

Form 2304
(Rev. 7/17)

GUIDE FOR DETERMINING TIME REQUIREMENTS FOR TRAFFIC SIGNAL PREEMPTION AT HIGHWAY-RAIL GRADE CROSSINGS

City	WA, Puyallup	CSJ	
County	Pierce	Date	07/16/2021
District		Completed by	Benesch - Fort Worth
		District Approval	

Show North Arrow



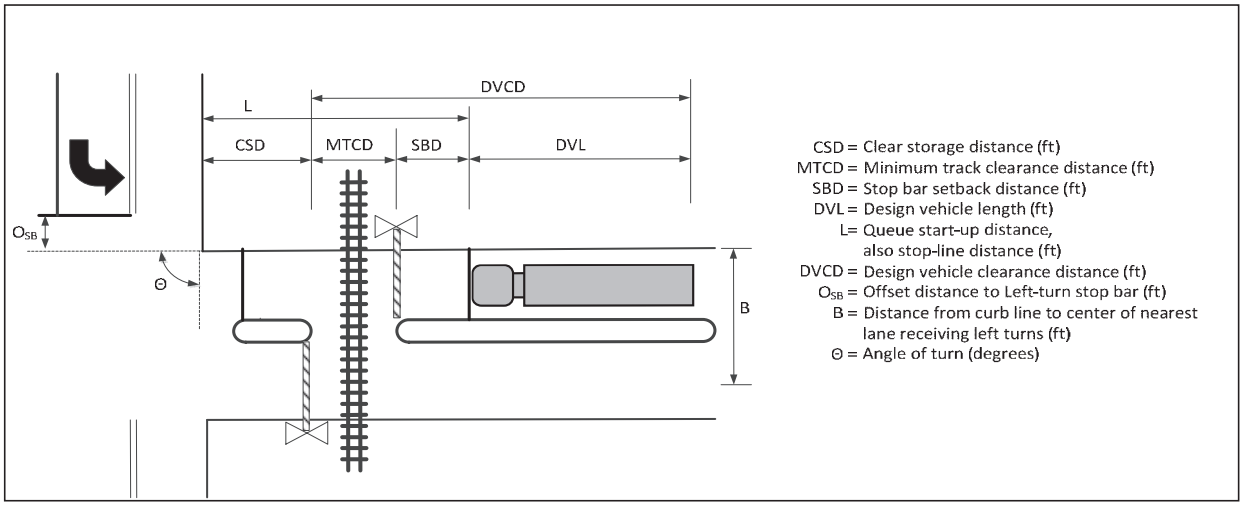
Parallel Street Name: 2nd Ave NW / Ped Crosswalk

Crossing Street Name: 5th Street NW

Railroad	BNSF Railway	Railroad Contact	Stephen Semenick
Crossing DOT#	085699A	Phone	206-625-6152

NOTE: After approval by the District, a copy of this form, along with the traffic signal design sheets and the phasing diagrams for normal and preempted operation, shall be placed in the traffic signal cabinet. See Section 7 for traffic signal timings.

SECTION 1: GEOMETRY DATA & DEFAULTS



GEOMETRIC DATA FOR CROSSING

			Remarks
1.	Clear storage distance (CSD, feet)	1. 209	
2.	Minimum track clearance distance (MTCD, feet)	2. 52	
3.	Stop bar setback distance (SBD, feet)	3. 8	"0" if no stop bar present
4.	Width of receiving approach (B, feet)	4. 0	N/A
5.	Offset distance of left turn stop bar (O_{SB}, feet)	5. 0	N/A
6.	Approach grade. % (0 if approach is on downgrade)	6. 3.5	
7.	Angle of turn at Intersection (Θ, degrees)	7. 90	

DESIGN VEHICLE DATA

8. Select Design Vehicle

☐ School Bus ☐ Intermediate Truck ☑ Interstate Semi-Truck ☐ Other

9.	Default design vehicle length (feet)	9. 75	Based on selected Design Vehicle
a.	Additional vehicle length, if needed (feet)	9a. 0	
10.	Total design vehicle length (DVL, feet)	10. 75	
11.	Centerline turning radius of design vehicle (R, feet)	11. 41	Based on selected Design Vehicle
12.	Passenger car vehicle length (LV, feet)	12. 19	Default value

SECTION 2: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

				Remarks
13.	Preempt delay time (seconds)	13.	0	
14.	Controller response time to preempt (seconds)	14.	0.0	Manufacturer:
				Firmware Version:
15.	Preempt verification and response time (seconds): add lines 13 and 14	15.	0.0	

Worst-case conflicting vehicle time

				Remarks
16.	Minimum green time during right-of-way transfer (seconds)	16.	0	
17.	Other green time during right-of-way transfer (seconds)	17.	0	
18.	Yellow change time (seconds)	18.	0.0	
19.	Red clearance time (seconds)	19.	0.0	
20.	Worst-case conflicting vehicle time (seconds): add lines 16 through 19	20.	0.0	

Worst-case conflicting pedestrian time

				Remarks
21.	Minimum walk time during right-of-way transfer (seconds)	21.	0	* Advance Pedestrian Preemption Time *
22.	Pedestrian clearance time during right-of-way transfer (seconds)	22.	0	Ped crosswalk = 49 ft PC = (49 ft / 3.5 fps) = 14 sec
23.	Vehicle yellow change time, if not included on line 22 (seconds)	23.	0.0	
24.	Vehicle red clearance time, if not included on line 22 (seconds)	24.	0.0	
25.	Worst-case conflicting pedestrian time (seconds): add lines 21 through 24	25.	0.0	

Worst-case conflicting vehicle or conflicting pedestrian time

26.	Worst-case conflicting vehicle or conflicting pedestrian time (seconds): maximum of lines 20 and 25	26.	0.0
27.	**Right-of-way transfer time (seconds): add lines 15 and 26**	27.	0.0

SECTION 3: QUEUE CLEARANCE TIME CALCULATION

				Remarks
28.	Are there left-turns towards the tracks? ☐ Yes ☑ No			
29.	Distance traveled by truck during left-turn (LTL, feet):	29.	0	LTL = ∏RΘ/180
30.	Travel speed of left-turning truck (S_{LTT}, mph):	30.	10	Default value
31.	Distance required to clear left-turning truck from travel lanes on track clearance approach (feet):	31.	0	Equation: (line 4 + line 5 + line 12 - line 11) + line 29 + line 10
32.	Additional time required to clear left-turning truck from travel lanes on track clearance approach (seconds):	32.	0.0	Equation: [(line 31 * 3600) / (line 30 * 5280) - line 18 - line 19]
33.	Worst-case Left Turning Truck time (seconds): if Line 28 = 'Yes', use line 32; otherwise Use 0	33.	0.0	
34.	Queue start-up distance, L (feet): add lines 1 through 3	34.	269	
35.	Time required for design vehicle to start moving (seconds): calculate as 2+(L÷20)	35.	15.5	
36.	Design vehicle clearance distance, DVCD (feet): add lines 2, 3 and 10	36.	135	
37.	Time for design vehicle to accelerate through the DVCD (seconds), level terrain	37.	15.7	
38.	Factor to account for slower acceleration on uphill grade	38.	1.27	
39.	Time for design vehcle to accelerate through DVCD (seconds), adjusted for grade: multiply lines 37 and 38	39.	19.9	
40.	**Queue clearance time (seconds): add lines 33, 35 and 39**	40.	35.4	

SECTION 4: MAXIMUM PREEMPTION TIME CALCULATION

				Remarks
41.	Right-of-way transfer time (seconds): line 27	41.	0.0	
42.	Queue clearance time (seconds): line 40	42.	35.4	
43.	Desired minimum separation time (seconds)	43.	4.0	Typical Value
44.	Maximum preemption time for Queue Clearance (seconds): add lines 41 through 43	44.	39.4	

SECTION 5: SUFFICIENT WARNING TIME CHECK

			Remarks
45.	Required minimum time, MT (seconds): per regulations	20	
46.	Clearance time, CT (seconds): (line 2 -35) / 10 (rounded up to nearest second)	2	
47.	Total minimum warning time, MWT, needed (seconds): add lines 45 and 46 (excludes buffer time and equipment response time)	22	
48.	Required advance preemption time (APT) from railroad (seconds): subtract line 47 from line 44, round up to nearest full second, enter 0 if less than 0	18 *	
49.	APT currently provided by railroad (seconds): Enter "0" if new crossing or signal	0	

If the required advance preemption time (line 48) is greater than the amount of advance preemption time currently provided by the railroad (line 49), additional warning time must be requested from the railroad. Alternatively, the maximum preemption time (line 48) may be decreased after performing an engineering study to investigate the possibility of reducing the values on lines 13, 16, 17, 21, 22 and 43.

Remarks:

* Advance Pedestrian Preemption Time and Advance Vehicle Preemption Time *

Advance vehicle preemption and advance pedestrian preemption were calculated on two separate forms for northbound queues from 5th Street NW at West Stewart Avenue (Form 1) and southbound queue from the proposed Puyallup Station Parking Pedestrian Crosswalk Signal at 2nd Avenue (Form 2). It was determined that the worst case calculated advance vehicle preemption time occurred from the intersection of 5th Street NW at West Stewart Avenue and the worst case calculated advance pedestrian preemption time occurred from the intersection of 5th Street NW at 2nd Avenue NW. Below are the final preemption times requested:

* Input #1 - Advance Pedestrian Preemption Time for pedestrian clearance on line 22 Remarks of Form 2 = 14 seconds
* Input #2 - Advance Vehicle Preemption Time is shown on line 48 of Form 1 = 19 seconds

SECTION 6: TRACK CLEARANCE GREEN TIME CALCULATION (IF NO GATE DOWN CIRCUIT PROVIDED)

Preempt Trap Check

			Remarks
50.	Warning Time Variability (Select One) ☐ Consistent Warning Times ☐ Low Warning Time Variability ☑ High Warning Time Variability		
51.	APT required or provided (seconds): maximum of Line 48 or Line 49	18	
52.	Multiplier for maximum APT due to train handling	1.60	
53.	Maximum APT (seconds): multiply line 51 and 52	28.8	
54.	Minimum duration for the track clearance green interval (seconds)	15	
55.	Track Clearance Green Time to avoid Preempt Trap (seconds): add lines 53 and 54	43.8	

Clearing of Clear Storage Distance

56.	Time waiting on left-turn truck (seconds): line 33	0.0	
57.	Time required for design vehicle to start moving (seconds): line 35	15.5	
58.	Design vehicle clearance distance (DVCD, feet): line 36	135	

If CSD ≤ DVL, you must clear the design vehicle through the entire CSD during the traffic clearance phase; however, if CSD > DVL, you should consider providing enough time to clear the design vehicle from the crossing.

Is the clear storage distance (CSD) less than or equal to the design vehicle length (DVL)?

☑ YES. The design vehicle MUST clear through the entire CSD. (CSD will be entered in Line 59).
☐ NO. The design vehicle may clear through a portion of the CSD.

Do you want to clear the design vehicle through the entire CSD?

☑ YES. Clear the entire CSD. (CSD will be entered in Line 59).
☐ NO. Clear the crossing ONLY. (DVL will be entered in Line 59).

				Remarks
59.	Portion of CSD to clear during track clearance phase (feet)	209		
60.	Design vehicle relocation distance (DVRD, feet): add lines 58 and 59	344		
61.	Time required to accelerate design vehicle through DVRD (seconds), level terrain:		26.0	
62.	Factor to account for slower acceleration on uphill grade		1.33	
63.	Time required to accelerate design vehicle through DVRD (seconds), adjusted for grade: multiply lines 61 and 62		34.5	
64.	Time to clear portion of clear storage distance (seconds): add lines 56, 57 and 63		50.0	
65.	**Track clearance green interval (seconds): maximum of lines 55 or 64, round up to nearest full second**		50	

Maximum Duration of Track Clearance Green after gates are down (in absence of a gate down circuit)

66.	Total time to complete track clearance green (seconds): line 27 + line 65	50.0	
67.	Total time before gates are down (seconds): subtract 5 seconds from line 44 (per AREMA Manual)	34.4	
68.	**Maximum Duration of Track Clearance Green after gates are down (seconds): Line 66 - Line 67**	16	

SECTION 7: SUMMARY OF CONTROLLER PREEMPTION SETTINGS

			Remarks
69.	Duration Time (seconds)	0	From Line 18
70.	Preempt Delay Time (seconds)	0	From Line 19

Right of Way Transfer Phase

			Remarks
71.	Minimum Green Interval (seconds)	0	From Line 65
72.	Pedestrian Walk Interval (seconds)	0	From Line 40
73.	Pedestrian Clearance Interval (Flashing "DON'T WALK", seconds)	0	From Line 18
74.	Yellow Change Interval (seconds)	0.0	From Line 19
75.	All Red Vehicle Clearance (seconds)	0.0	Default Value

Track Clearance Phase

			Remarks
76.	Green Interval (seconds) (in the absence of gate down circuit)	50	From Line 18
77.	Green Interval (seconds) with gate down circuit	35	From Line 19
78.	Yellow Change Interval (seconds)	0.0	From Line 18
79.	All Red Vehicle Clearance (seconds)	0.0	From Line 19

Exit Phase

			Remarks
80.	Dwell/Cycle Minimum Green Time (seconds)	0	Default Value
81.	Yellow Change Interval (seconds)	0.0	From Line 18
82.	All Red Vehicle Clearance (seconds)	0.0	From Line 19

Remarks: