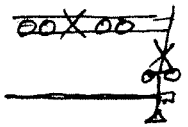
TYPE 8A



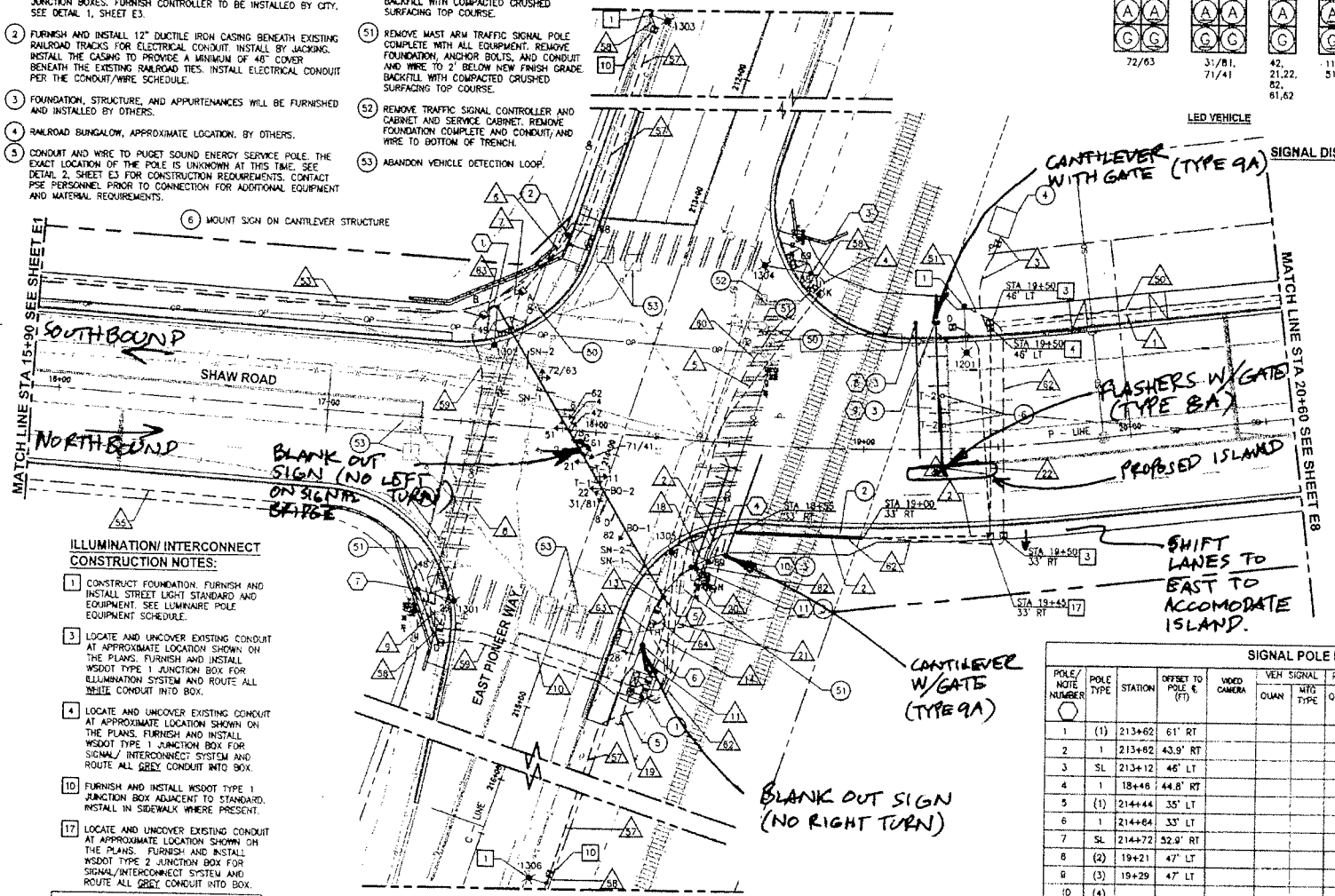
TYPE 9A

TRAFFIC SIGNAL CONSTRUCTION NOTES:

1. CONSTRUCT CEMENT CONCRETE FOUNDATION FOR SERVICE CABINET AND CONTROLLER CABINET. FURNISH AND INSTALL CABINETS AND JUNCTION BOXES. FURNISH CONTROLLER TO BE INSTALLED BY CITY. SEE DETAIL 1, SHEET E3.
2. FURNISH AND INSTALL 12" DUCTILE IRON CASING BENEATH EXISTING RAILROAD TRACKS FOR ELECTRICAL CONDUIT. INSTALL BY JACKING. INSTALL THE CASING TO PROVIDE A MINIMUM OF 48" COVER BENEATH THE EXISTING RAILROAD TIES. INSTALL ELECTRICAL CONDUIT PER THE CONDUIT/WIRE SCHEDULE.
3. FOUNDATION, STRUCTURE, AND APPURTENANCES WILL BE FURNISHED AND INSTALLED BY OTHERS.
4. RAILROAD BUNGALOW, APPROXIMATE LOCATION. BY OTHERS.
5. CONDUIT AND WIRE TO PUGET SOUND ENERGY SERVICE POLE. THE EXACT LOCATION OF THE POLE IS UNKNOWN AT THIS TIME. SEE DETAIL 2, SHEET E3 FOR CONSTRUCTION REQUIREMENTS. CONTACT PSE PERSONNEL PRIOR TO CONNECTION FOR ADDITIONAL EQUIPMENT AND MATERIAL REQUIREMENTS.
6. MOUNT SIGN ON CANTILEVER STRUCTURE

TRAFFIC SIGNAL REMOVAL NOTES:

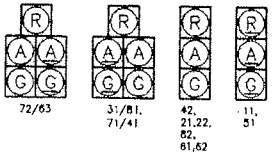
50. REMOVE JUNCTION BOX. REMOVE CONDUIT AND WIRE TO THE BOTTOM OF THE TRENCH. BACKFILL WITH COMPACTED CRUSHED SURFACING TOP COURSE.
51. REMOVE MAST ARM TRAFFIC SIGNAL POLE COMPLETE WITH ALL EQUIPMENT. REMOVE FOUNDATION, ANCHOR BOLTS, AND CONDUIT AND WIRE TO 2' BELOW NEW FINISH GRADE. BACKFILL WITH COMPACTED CRUSHED SURFACING TOP COURSE.
52. REMOVE TRAFFIC SIGNAL CONTROLLER AND CABINET AND SERVICE CABINET. REMOVE FOUNDATION COMPLETE AND CONDUIT AND WIRE TO BOTTOM OF TRENCH.
53. ABANDON VEHICLE DETECTION LOOP.



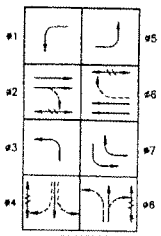
ILLUMINATION/ INTERCONNECT CONSTRUCTION NOTES:

1. CONSTRUCT FOUNDATION. FURNISH AND INSTALL STREET LIGHT STANDARD AND EQUIPMENT. SEE LUMINAIRE POLE EQUIPMENT SCHEDULE.
3. LOCATE AND UNCOVER EXISTING CONDUIT AT APPROXIMATE LOCATION SHOWN ON THE PLANS. FURNISH AND INSTALL WSDOT TYPE 1 JUNCTION BOX FOR ILLUMINATION SYSTEM AND ROUTE ALL WHITE CONDUIT INTO BOX.
4. LOCATE AND UNCOVER EXISTING CONDUIT AT APPROXIMATE LOCATION SHOWN ON THE PLANS. FURNISH AND INSTALL WSDOT TYPE 1 JUNCTION BOX FOR SIGNAL/ INTERCONNECT SYSTEM AND ROUTE ALL GREY CONDUIT INTO BOX.
10. FURNISH AND INSTALL WSDOT TYPE 1 JUNCTION BOX ADJACENT TO STANDARD. INSTALL IN SIDEWALK WHERE PRESENT.
17. LOCATE AND UNCOVER EXISTING CONDUIT AT APPROXIMATE LOCATION SHOWN ON THE PLANS. FURNISH AND INSTALL WSDOT TYPE 2 JUNCTION BOX FOR SIGNAL/INTERCONNECT SYSTEM AND ROUTE ALL GREY CONDUIT INTO BOX.

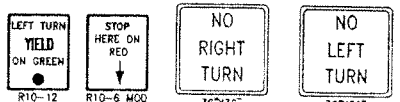
1. SEE SHEET E3 AND E16 FOR CONDUIT/WIRE RUNS XX
2. SEE SHEET E16 FOR LUMINAIRE POLE EQUIPMENT SCHEDULE



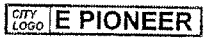
SIGNAL DISPLAYS



PHASE DIAGRAM



SN-1



SN-2

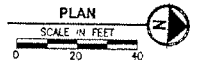
LED ILLUMINATED STREET NAME

MONOTUBE MOUNTED SIGNS

SIGNAL POLE EQUIPMENT SCHEDULE

POLE/ NOTE NUMBER	POLE TYPE	STATION	OFFSET TO POLE ℄ (FT)	VIDEO CAMERA	VEH SIGNAL QUAN	VEH SIGNAL MTG TYPE	PED SIGNAL QUAN	PED SIGNAL MTG TYPE	PPB W/ SIGNS QUAN	PPB W/ SIGNS MTG TYPE	EVP DET	EQUIP LIGHT	SIGNS STREET	SIGNS TRAFFIC	LUMINAIRE HPS M-C-111	NOTES
1	(1)	213+62	61' RT												250W	(6)
2	1	213+62	43.9' RT				1	E	1	PPB-M						
3	SL	213+12	46' LT				2	E	2	PPB-MR					250W	
4	1	18+46	44.8' RT				1	E	1	PPB-M						
5	(1)	214+44	35' LT												250W (7)	(5)
6	1	214+64	33' LT				1	E	1	PPB-M						
7	SL	214+72	52.9' RT				2	E	2	PPB-M					250W	
8	(2)	19+21	47' LT													(5)
9	(3)	19+29	47' LT													(5)
10	(4)															(5)
11	(3)															(5)

(1) MONOTUBE SUPPORT POST WITH LUMINAIRE
(2) RAILROAD CROSSING GATE MECHANISM WITH 60' GATE AND FLASHERS
(3) RAILROAD CROSSING WARNING MECHANISM WITH 40' CANTILEVER AND FLASHERS
(4) RAILROAD CROSSING GATE MECHANISM WITH 40' GATE AND FLASHERS
(5) TO BE FURNISHED AND INSTALLED BY OTHERS
(6) SEE DETAIL 1, SHEET E7 FOR EQUIPMENT ON MONOTUBE STRUCTURE
(7) INSTALL PHOTOCELL ON LUMINAIRE



75 % REVIEW SUBMITTAL
NOT FOR CONSTRUCTION

REVISIONS	DATE	BY

DESIGNED B. FRANKLIN
DRAWN V. RUBASHKA
CHECKED
APPROVED

ONE INCH AT FULL SCALE. IF NOT, SCALE ACCORDINGLY
FILE NAME SU1595C48P02T16-E2
JOB NO. 214-1595-048 (02/16)
DATE AUGUST 2007

Parametrix
ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

PROJECT NAME
CITY OF PUYALLUP
SHAW ROAD EXTENSION PS&E
PHASE 2
PUYALLUP, WASHINGTON

SHAW ROAD AND PIONEER WAY SIGNAL PLAN

DRAWING NO. OF XX
E2

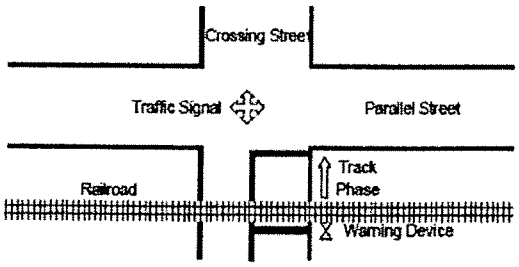
WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

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

City PUYALLUP, WA
County PIERCE
District

Date 2/4/08
Completed by J. PRZYCHODZEN, PE / B. COLE
District Approval

Show North Arrow



Parallel Street Name: EAST PIONEER WAY
Crossing Street Name: SHAW ROAD

Railroad MEEKER SOUTHERN
Crossing DOT#

Railroad Contact BYRON COLE
Phone 206-947-2120

SECTION 1: RIGHT-OF-WAY TRANSFER TIME CALCULATION

Preempt verification and response time

			Remarks
1. Preempt delay time (seconds)	1.	0.5 s	CITY CONTROLLER
2. Controller response time to preempt (seconds)	2.	0.5 s	Controller type: NEMA
3. Preempt verification and response time (seconds): add lines 1 and 2	3.	1 s	

Worst-case conflicting vehicle time

			Remarks
4. Worst-case conflicting vehicle phase number	4.	8	
5. Minimum green time during right-of-way transfer (seconds)	5.	5 s	
6. Other green time during right-of-way transfer (seconds)	6.	0	
7. Yellow change time (seconds)	7.	4	
8. Red clearance time (seconds)	8.	1	
9. Worst-case conflicting vehicle time (seconds): add lines 5 through 8	9.	10	

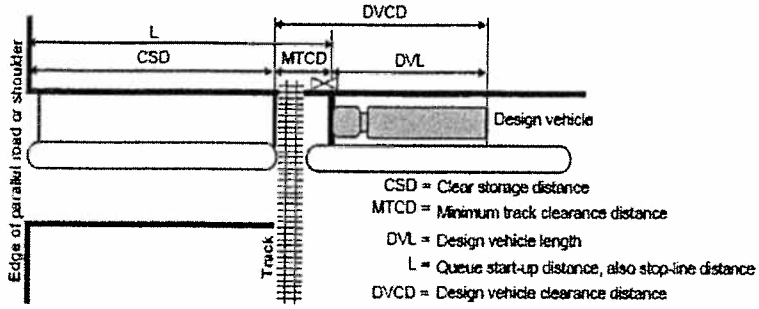
Worst-case conflicting pedestrian time

			Remarks
10. Worst-case conflicting pedestrian phase number	10.	4	
11. Minimum walk time during right-of-way transfer (seconds)	11.	0 s	
12. Pedestrian clearance time during right-of-way transfer (seconds)	12.	23	
13. Vehicle yellow change time, if not included on line 12 (seconds)	13.	4	
14. Vehicle red clearance time, if not included on line 12 (seconds)	14.	1	
15. Worst-case conflicting pedestrian time (seconds): add lines 11 through 14	15.	28 s	

Worst-case conflicting vehicle or pedestrian time

16. Worst-case conflicting vehicle or pedestrian time (seconds): maximum of lines 9 and 15	16.	28 s
17. Right-of-way transfer time (seconds): add lines 3 and 16	17.	29 s

SECTION 2: QUEUE CLEARANCE TIME CALCULATION



			Remarks
18. Clear storage distance (CSD, feet)	18.	0 s	
19. Minimum track clearance distance (MTCD, feet)	19.	40 s	
20. Design vehicle length (DVL, feet)	20.	50 s	Design vehicle type: WB 50

21. Queue start-up distance, L (feet): add lines 18 and 19 ..... 21. 40 s

22. Time required for design vehicle to start moving (seconds): calculate as 2+(L÷20) ..... 22. 4 s — Remarks

23. Design vehicle clearance distance, DVCD (feet): add lines 19 and 20 ..... 23. 90 s

24. Time for design vehicle to accelerate through the DVCD (seconds) ..... 24. 13 s — Read from Figure 2 in Instructions.

25. **Queue clearance time (seconds): add lines 22 and 24** ..... 25. 17 s

SECTION 3: MAXIMUM PREEMPTION TIME CALCULATION

			Remarks
26. Right-of-way transfer time (seconds): line 17	26.	29	
27. Queue clearance time (seconds): line 25	27.	17	
28. Desired minimum separation time (seconds)	28.	4.0	

29. **Maximum preemption time (seconds): add lines 26 through 28** ..... 29. 50 s

SECTION 4: SUFFICIENT WARNING TIME CHECK

			Remarks
30. Required minimum time, MT (seconds): per regulations	30.	20	
31. Clearance time, CT (seconds): get from railroad	31.	5	
32. Minimum warning time, MWT (seconds): add lines 30 and 31	32.	25	Excludes buffer time (BT)
33. Advance preemption time, APT, if provided (seconds): get from railroad	33.		

34. Warning time provided by the railroad (seconds): add lines 32 and 33 ..... 34. 25

35. **Additional warning time required from railroad (seconds): subtract line 34 from line 29, round up to nearest full second, enter 0 if less than 0** 35. 19

If the additional warning time required (line 35) is greater than zero, additional warning time has to be requested from the railroad. Alternatively, the maximum preemption time (line 29) may be decreased after performing an engineering study to investigate the possibility of reducing the values on lines 1, 5, 6, 7, 8, 11, 12, 13 and 14.

Remarks: INSULATED JOINTS AT 440' EITHER SIDE OF CROSSING. MAY BE ADJUSTED TO PREVENT EXCESSIVE DETECTION TIME. FINAL TIMING TO BE ADJUSTED IN THE FIELD.

SECTION 5: TRACK CLEARANCE GREEN TIME CALCULATION (OPTIONAL)

Preempt Trap Check

36. Advance preemption time (APT) provided (seconds): ..... 36. [ ] Line 33 only valid if line 35 is zero.

37. Multiplier for maximum APT due to train handling ..... 37. [ ] See Instructions for details.

38. Maximum APT (seconds): multiply line 36 and 37 ..... 38. [ ]

39. Minimum duration for the track clearance green interval (seconds) ..... 39. [15.0]

Remarks: For zero advance preemption time

40. Gates down after start of preemption (seconds): add lines 38 and 39 ..... 40. [ ]

41. Preempt verification and response time (seconds): line 3 ..... 41. [ ]

42. Best-case conflicting vehicle or pedestrian time (seconds): usually 0..... 42. [ ]

Remarks

43. Minimum right-of-way transfer time (seconds): add lines 41 and 42 ..... 43. [ ]

44. Minimum track clearance green time (seconds): subtract line 43 from line 40 ..... 44. [ ]

Clearing of Clear Storage Distance

45. Time required for design vehicle to start moving (seconds), line 22 ..... 45. [ ]

46. Design vehicle clearance distance (DVCD, feet), line 23 ..... 46. [ ]

47. Portion of CSD to clear during track clearance phase (feet) ... 47. [ ]

Remarks: CSD* in Figure 3 in Instructions.

48. Design vehicle relocation distance (DVRD, feet): add lines 46 and 47 ..... 48. [ ]

49. Time required for design vehicle to accelerate through DVRD (seconds) ..... 49. [ ] Read from Figure 2 in Instructions.

50. Time to clear portion of clear storage distance (seconds): add lines 45 and 49 ..... 50. [ ]

51. Track clearance green interval (seconds): maximum of lines 44 and 50, round up to nearest full second ..... 51. [ ]

SECTION 6: VEHICLE-GATE INTERACTION CHECK (OPTIONAL)

52. Right-of-way transfer time (seconds): line 17 ..... 52. [ ]

53. Time required for design vehicle to start moving (seconds), line 22 ..... 53. [ ]

54. Time required for design vehicle to accelerate through DVL (on line 20, seconds) ..... 54. [ ] Read from Table 3 in Instructions.

55. Time required for design vehicle to clear descending gate (seconds): add lines 52 though 54 ..... 55. [ ]

Remarks

56. Duration of flashing lights before gate descent start (seconds): get from railroad ..... 56. [ ]

Remarks

57. Full gate descent time (seconds): get from railroad ..... 57. [ ]

58. Proportion of non-interaction gate descent time ..... 58. [ ] Read from Figure 5 in Instructions.

59. Non-interaction gate descent time (seconds): multiply lines 57 and 58 ..... 59. [ ]

60. Time available for design vehicle to clear descending gate (seconds): add lines 56 and 59 ..... 60. [ ]

61. Advance preemption time (APT) required to avoid design vehicle-gate interaction (seconds): subtract line 60 from line 55, round up to nearest full second, enter 0 if less than 0 ..... 61. [ ]