WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

City of Puyallup Petitioner, vs. **Meeker Southern Railroad** Respondent	)	DOCKET NO. **TR- 070591** Revised PETITION TO CONSTRUCT OR RECONSTRUCT A HIGHWAY-RAIL GRADE CROSSING

The Petitioner asks the Washington Utilities and Transportation Commission to approve construction or reconstruction of a highway-rail grade crossing.

X Construction **☐ Reconstruction**

Section 1 – Petitioner's Information

City of Puyallup

Petitioner

1100 39th Avenue SE

Street Address

Puyallup, WA 98374

City, State and Zip Code

Same.

Mailing Address, if different than the street address

Tom Heinecke

Contact Person Name

(253) 841-5505, TomH@ci.puyallup.wa.us

Contact Phone Number and E-mail Address

Section 2 – Respondent's Information

Meeker Southern Railroad

Respondent

4725 Ballard Avenue NW

Street Address

Seattle, WA 98107

City, State and Zip Code

Same

Mailing Address, if different than the street address

Bryon Cole

Contact Person Name

206-782-1447; byroncole@comcast.net

Contact Phone Number and E-mail Address

Section 3 – Proposed Crossing Location

1. Existing highway/roadway **Shaw Road**

2. Existing railroad **Meeker Southern Railroad (Shortline)**

3. Location of proposed crossing:
   Located in the____ 1/4 of the **SE** 1/4 of Sec. **26** , Twp.**21N** , Range **R4E** W.M.

4. GPS location, if known NA

5. Railroad mile post (nearest tenth) **32.67**

6. City **Puyallup** County **Pierce**

Section 4 – Proposed Crossing Information

1. Railroad company **Meeker Southern Railroad**

2. Type of railroad at crossing x Common Carrier ☐ Logging ☐ Industrial

   ☐ Passenger ☐ Excursion

3. Type of tracks at crossing x Main Line x Siding or Spur

4. Number of tracks at crossing **2**

5. Average daily train traffic, freight 4

   Authorized freight train speed **10** Operated freight train speed **10**

6. Average daily train traffic, passenger **0**

   Authorized passenger train speed **NA** Operated passenger train speed **NA**

7. Will the proposed crossing eliminate the need for one or more existing crossings?
   Yes **X** No ____

8. If so, state the distance and direction from the proposed crossing.
   This crossing allows the removal of 4 existing farm access crossings within ¼ mile of the new crossing.

9. Does the petitioner propose to close any existing crossings?
   Yes **X** No ____

Section 5 – Temporary Crossing

1. Is the crossing proposed to be temporary? Yes ____ No __X__

2. If so, describe the purpose of the crossing and the estimated time it will be needed

_____

_____

_____

3. Will the petitioner remove the crossing at completion of the activity requiring the temporary crossing? Yes ____ No __X__

Approximate date of removal _____

Section 6 – Current Highway Traffic Information

1. Name of roadway/highway **Shaw Road**

2. Roadway classification **Urban Major Arterial**

3. Road authority ~~City~~

4. Average annual daily traffic (AADT) **20,730**

5. Number of lanes **4 Lane, 2 NB, 2 SB**

6. Roadway speed **40, 40 Trucks**

7. Is the crossing part of an established truck route? Yes _____ No __X__

8. If so, trucks are what percent of total daily traffic? **NA**

9. Is the crossing part of an established school bus route? Yes _____ No __X__

10. If so, how many school buses travel over the crossing each day? **NA**

11. Describe any changes to the information in 1 through 7, above, expected within ten years:

~~**Surrounding area may be developed for industry or business use.**~~

Section 7 – Alternatives to the Proposal

1. Does a safer location for a crossing exist within a reasonable distance of the proposed location?
   Yes ____ No **X**

2. If a safer location exists, explain why the crossing should not be located at that site.

3. Are there any hillsides, embankments, buildings, trees, railroad loading platforms or other barriers in the vicinity which may obstruct a motorist's view of the crossing?
   Yes ____ No **X**

4. If a barrier exists, describe:
   - ♦ Whether petitioner can relocate the crossing to avoid the obstruction and if not, why not.
   - ♦ How the barrier can be removed.
   - ♦ How the petitioner or another party can mitigate the hazard caused by the barrier.

5. Is it feasible to construct an over-crossing or under-crossing at the proposed location as an alternative to an at-grade crossing?
   Yes ____ No **X**

6. If an over-crossing or under-crossing is not feasible, explain why.

~~**1. Adjacent Pioneer roadway parallels the track and does not allow for a separation.**~~

~~**2. Rail traffic frequency does not warrant a grade separation.**~~

3. Cost to raise or lower adjacent roads is cost prohibited.

7. Does the railway line, at any point in the vicinity of the proposed crossing, pass over a fill area or trestle or through a cut where it is feasible to construct an over-crossing or an under-crossing, even though it may be necessary to relocate a portion of the roadway to reach that point?

Yes ____ No X

8. If such a location exists, state:
   - ♦ The distance and direction from the proposed crossing.
   - ♦ The approximate cost of construction.
   - ♦ Any reasons that exist to prevent locating the crossing at this site.

9. Is there an existing public or private crossing in the vicinity of the proposed crossing?

Yes ____ No X

10. If a crossing exists, state:
   - ♦ The distance and direction from the proposed crossing.
   - ♦ Whether it is feasible to divert traffic from the proposed to the existing crossing.

Nearest approximately crossings: .85 miles to the west, .29 miles to the east. This is currently a 3-way intersection, to become 4-way when the crossing is installed. This extends Shaw Road to Main street and must cross over the BNSF at a specified location.

Section 8 – Sight Distance

1. Complete the following table, describing the sight distance for motorists when approaching the tracks from either direction.

a. Approaching the crossing from **W** , the current approach provides an unobstructed view as follows: (North, South, East, West)

Direction of sight (left or right)	Number of feet from proposed crossing	Provides an unobstructed view for how many feet
Right	**300 +**	**Unobstructed view**
Right	200	
Right	100	
Right	50	
Right	25	
Left	300	
Left	200	
Left	100	
Left	50	
Left	25	

b. Approaching the crossing from **E** , the current approach provides an unobstructed view as follows: (Opposite direction-North, South, East, West)

Direction of sight (left or right)	Number of feet from proposed crossing	Provides an unobstructed view for how many feet
Right	**300 +**	**Unobstructed view**
Right	200	
Right	100	
Right	50	
Right	25	
Left	300	
Left	200	
Left	100	
Left	50	
Left	25	

2. Will the new crossing provide a level approach measuring 25 feet from the center of the railway on both approaches to the crossing?

Yes ____ No **X**

3. If not, state in feet the length of level grade from the center of the railway on both approaches to the crossing. **South Bound > 25', North Bound < 25', but traffic held at intersection stop bars. See attached plan.**

4. Will the new crossing provide an approach grade of not more than five percent prior to the level grade?

Yes **X** No ____

3. If not, state the percentage of grade prior to the level grade and explain why the grade exceeds five percent.

_____

_____

_____

_____

Section 9 – Illustration of Proposed Crossing Configuration

Attach a detailed diagram, drawing, map or other illustration showing the following:

- ♦ The vicinity of the proposed crossing.
- ♦ Layout of the railway and highway 500 feet adjacent to the crossing in all directions.
- ♦ Percent of grade.
- ♦ Obstructions of view as described in Section 7 or identified in Section 8.
- ♦ Traffic control layout showing the location of the existing and proposed signage.

SEE ATTACHED DRAWING AND SKETCH.

Section 10 – Proposed Warning Signals or Devices

1. Explain in detail the number and type of automatic signals or other warning devices planned at the proposed crossing, including a cost estimate for each. If requesting pre-emption include the type of train detection circuitry, sequencing and advanced preemption time, justification for the changes and its effects on current warning devices and warning times for drivers.

Crossing will consist of gates, cantilevers with flashers, approach warning signs in all directions. Preemption (full) of standard traffic signals, and 'No-Turn' blank-out signs mounted on the traffic signal bridge. Provisions (block-outs or bracket attachments) for pedestrian gates are also included. See attached sketch.

2. Provide an estimate for maintaining the signals for 12 months. **TBD**

3. Is the petitioner prepared to pay to the respondent railroad company its share of installing the warning devices as provided by law?

Yes **X** No ____

Section 11 – Traffic Signal Preemption

Complete the attached Guide for Determining Time Requirements for Traffic Signal Preemption at Highway-Rail Grade Crossings.

1. Specify simultaneous or advance preemption requested.
   Advance Preemption will be provided.

If advance preemption, what is the preemption time.
   See Worksheet Below.

Section 12 – Additional Information

Provide any additional information supporting the proposal, including information such as the public benefits that would be derived from constructing a new crossing as proposed.

Additional project support information available from the City of Puyallup. This project is a benefit to the City of Puyallup.

Section 13 – Waiver of Hearing by Respondent
TR-070591 – Shaw Road

Waiver of Hearing

The undersigned represents the Respondent in the revised petition to construct a highway-railroad grade crossing at Shaw Road.

We have investigated the conditions at the proposed or existing crossing site. We are satisfied the conditions are the same as described by the Petitioner in this docket. We agree that a crossing be installed or reconstructed and consent to a decision by the commission without a hearing.

Dated at _____ , Washington, on the _____ day of

_____, 20 ____.

_____

Printed name of Respondent

_____

Signature of Respondent's Representative

_____

Title

_____

Phone number and e-mail address

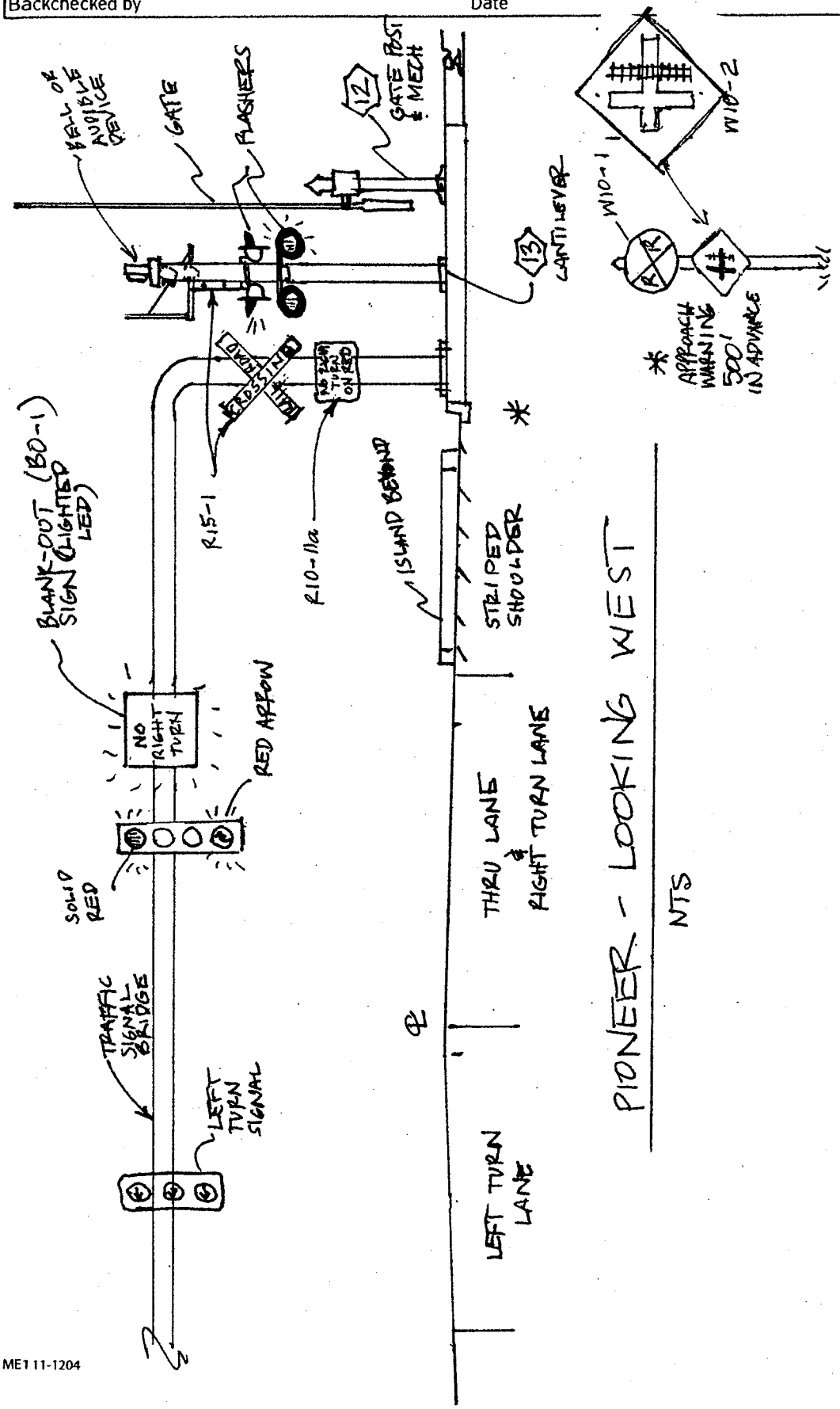
_____

_____

Mailing address

Calculations For	SHAW RD RR XING Job No. 43419 Sheet No.
Made by	MM Date 7/28/08
Checked by	Date
Backchecked by	Date

HNTB



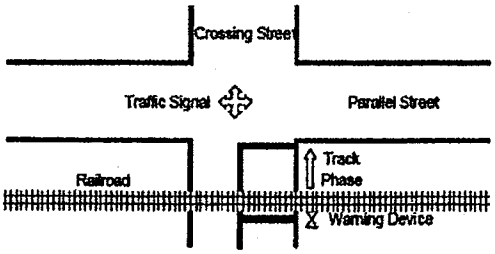
WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

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
Railroad Contact: BYRON COLE
Crossing DOT#:
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 1	

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	

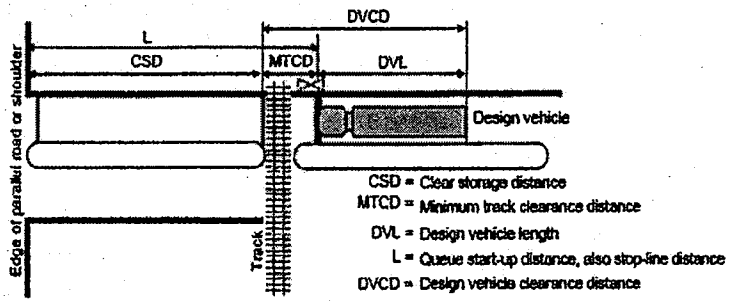
Worst-case conflicting pedestrian time

			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. [ ] Remarks
39. Minimum duration for the track clearance green interval (seconds) ..... 39. [15.0] 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. [ ] Remarks
42. Best-case conflicting vehicle or pedestrian time (seconds): usually 0..... 42. [ ]
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. [ ] Remarks
47. Portion of CSD to clear during track clearance phase (feet) ... 47. [ ] 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. [ ]

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		100	165		0	335		0	300		500
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	30	30	30	30	30		30	30		30	30	30
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.979			0.977				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	3465	0	1770	3458	0	1770	3539	1583
Flt Permitted	0.950			0.950			0.133			0.229		
Satd. Flow (perm)	1770	1863	1583	1770	3465	0	248	3458	0	427	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			139		19			21				12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2825			1239			1388			1767	
Travel Time (s)		55.0			24.1			31.5			40.2	
Volume (vph)	4	509	268	59	313	51	149	479	87	236	1293	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	4	553	291	64	340	55	162	521	95	257	1405	12
Lane Group Flow (vph)	4	553	291	64	395	0	162	616	0	257	1405	12
Turn Type	Prot		Perm	Prot			pm+pt			pm+pt		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2				8			4		4
Detector Phases	5	2	2	1	6		3	8		7	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	9.0	22.0	22.0	9.0	22.0		9.0	22.0		9.0	20.5	20.5
Total Split (s)	9.0	36.0	36.0	9.0	36.0	0.0	10.0	34.0	0.0	21.0	45.0	45.0
Total Split (%)	9.0%	36.0%	36.0%	9.0%	36.0%	0.0%	10.0%	34.0%	0.0%	21.0%	45.0%	45.0%
Maximum Green (s)	4.5	31.5	31.5	4.5	31.5		5.5	29.5		16.5	40.5	40.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min		None	None		None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		12.0	12.0		12.0			12.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	5.1	29.9	29.9	5.0	35.0		38.1	32.0		49.0	39.4	39.4
Actuated g/C Ratio	0.05	0.32	0.32	0.05	0.37		0.40	0.34		0.52	0.42	0.42
v/c Ratio	0.05	0.94	0.49	0.69	0.30		0.81	0.52		0.62	0.95	0.02
Control Delay	48.2	57.5	16.8	83.0	21.2		51.5	27.7		20.7	42.8	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	48.2	57.5	16.8	83.0	21.2		51.5	27.7		20.7	42.8	9.0

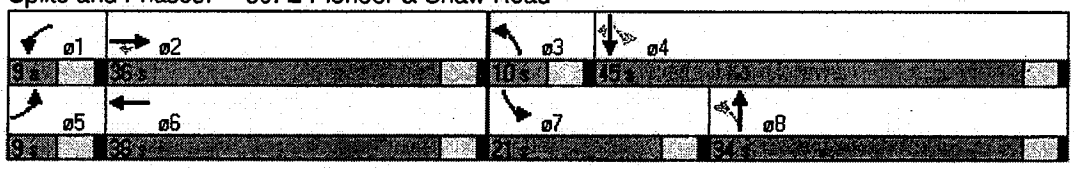
30: E Pioneer & Shaw Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	D	E	B	F	C		D	C		C	D	A
Approach Delay		43.5			29.8			32.6			39.2	
Approach LOS		D			C			C			D	
Queue Length 50th (ft)	2	339	73	41	81		53	161		90	451	0
Queue Length 95th (ft)	14	#546	152	#113	136		#176	226		142	#612	11
Internal Link Dist (ft)		2745			1159			1308			1687	
Turn Bay Length (ft)	100		100	165			335			300		500
Base Capacity (vph)	88	622	621	93	1356		199	1187		450	1519	686
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.05	0.89	0.47	0.69	0.29		0.81	0.52		0.57	0.92	0.02

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 94.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 37.6 Intersection LOS: D
Intersection Capacity Utilization 87.5% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 30: E Pioneer & Shaw Road



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		100	165		0	335		0	300		500
Storage Lanes	1		1	1		0	1		0	1		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	30	30	30	30	30		30	30		30	30	30
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.979			0.977				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	3465	0	1770	3458	0	1770	3539	1583
Flt Permitted	0.435			0.129			0.950			0.950		
Satd. Flow (perm)	810	1863	1583	240	3465	0	1770	3458	0	1770	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137		19			21				12
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2825			1239			1388			1767	
Travel Time (s)		55.0			24.1			31.5			40.2	
Volume (vph)	4	509	268	59	313	51	149	479	87	236	1293	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	4	553	291	64	340	55	162	521	95	257	1405	12
Lane Group Flow (vph)	4	553	291	64	395	0	162	616	0	257	1405	12
Turn Type	pm+pt		Perm	pm+pt			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6								4
Detector Phases	5	2	2	1	6		3	8		7	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	9.0	22.0	22.0	9.0	22.0		9.0	22.0		9.0	20.5	20.5
Total Split (s)	9.0	35.0	35.0	9.0	35.0	0.0	13.0	34.0	0.0	22.0	43.0	43.0
Total Split (%)	9.0%	35.0%	35.0%	9.0%	35.0%	0.0%	13.0%	34.0%	0.0%	22.0%	43.0%	43.0%
Maximum Green (s)	4.5	30.5	30.5	4.5	30.5		8.5	29.5		17.5	38.5	38.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min	Min	None	Min		None	None		None	None	None
Walk Time (s)		5.0	5.0		5.0			5.0			5.0	5.0
Flash Dont Walk (s)		12.0	12.0		12.0			12.0			11.0	11.0
Pedestrian Calls (#/hr)		0	0		0			0			0	0
Act Effct Green (s)	34.1	30.2	30.2	36.5	35.5		9.0	31.3		16.9	39.1	39.1
Actuated g/C Ratio	0.33	0.31	0.31	0.37	0.36		0.09	0.32		0.17	0.40	0.40
v/c Ratio	0.01	0.96	0.50	0.39	0.31		0.99	0.55		0.84	0.99	0.02
Control Delay	20.0	62.8	17.6	25.7	22.2		114.8	29.6		63.2	51.8	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	20.0	62.8	17.6	25.7	22.2		114.8	29.6		63.2	51.8	9.6

30: E Pioneer & Shaw Road

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	B	E	B	C	C		F	C		E	D	A
Approach Delay		47.1			22.7			47.3			53.3	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)	2	344	76	25	83		~107	168		159	~482	0
Queue Length 95th (ft)	8	#558	156	52	138		#239	226		#286	#637	11
Internal Link Dist (ft)		2745			1159			1308			1687	
Turn Bay Length (ft)	100		100	165			335			300		500
Base Capacity (vph)	311	589	594	166	1294		164	1124		324	1421	643
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	0
Reduced v/c Ratio	0.01	0.94	0.49	0.39	0.31		0.99	0.55		0.79	0.99	0.02

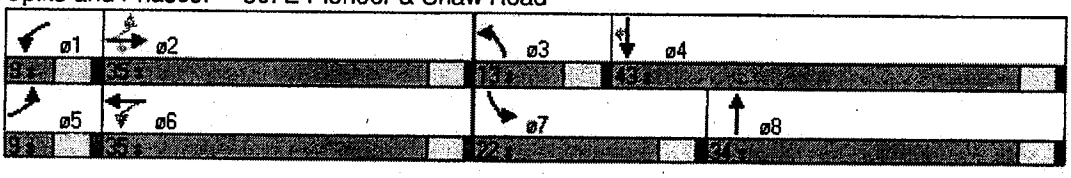
Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 97.4
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 46.9 Intersection LOS: D
Intersection Capacity Utilization 87.5% ICU Level of Service E
Analysis Period (min) 15

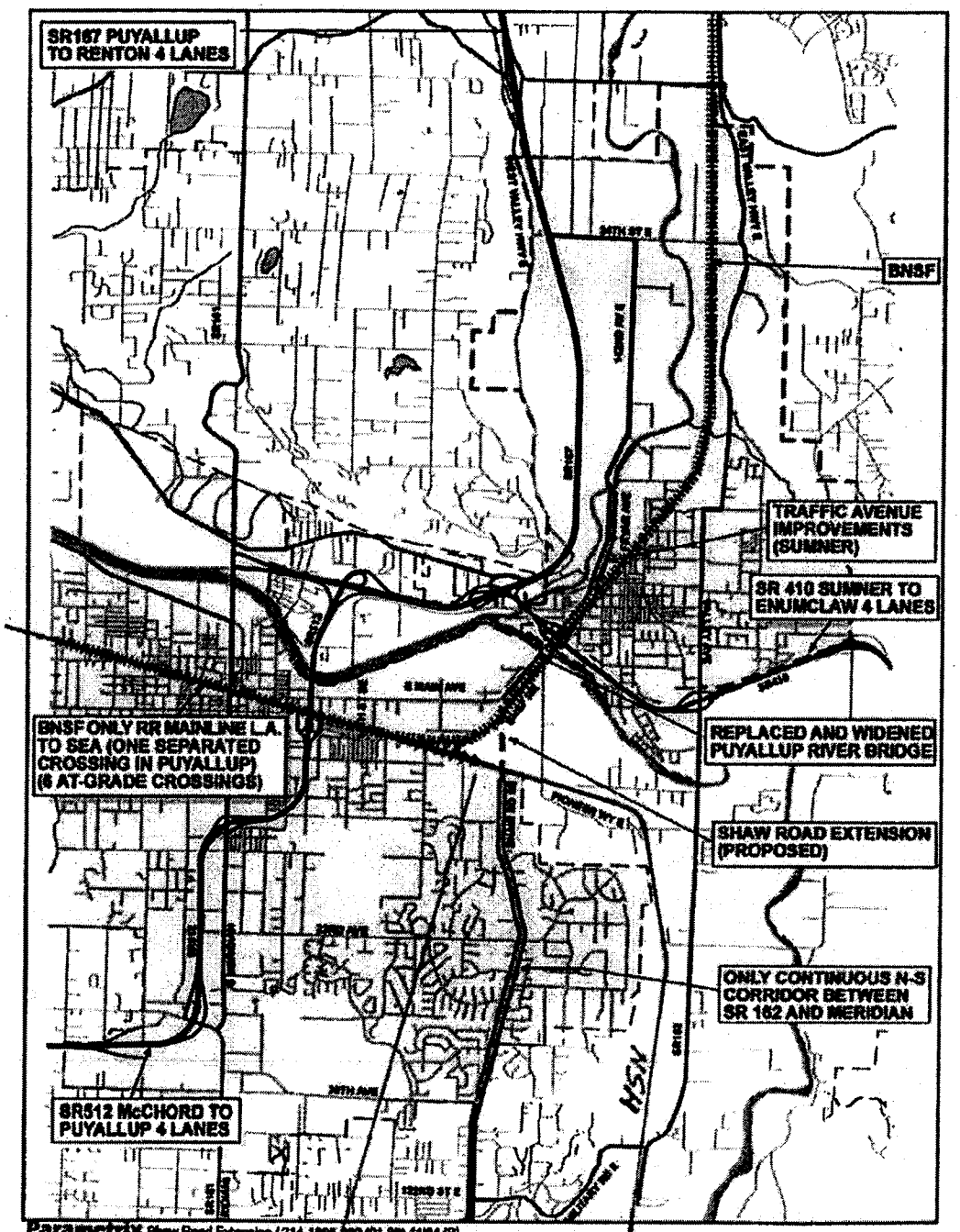
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 30: E Pioneer & Shaw Road



Shaw Road Extension



Parametrix Shaw Road Extension / 214-1895-032 (01-09) 11/04 (3)

NOT TO SCALE

BEGIN NECKER SOUTHERN TRACKAGE