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DRAFT TECHNICAL MEMORANDUM

Clark County Safety Management Program

Study Site Selection

Date: September 24, 2015

Project #: 13889.4

To: Ejaz Khan, Clark County

From: Casey Bergh, PE, Matt Braughton, and Brian L. Ray, PE

KAI applied network screening tools and methods from the Highway Safety Manual (HSM) to prioritize sites with potential for crash reduction (as summarized in the Network Screening Memorandum, dated July 22, 2015). Our next scoped task is to diagnose and identify projects at 25 intersections and 5 corridors (up to 1 mile each). The potential study sites are identified in Figure 1 and Tables 1 through 11. A summary of the selection process is provided in the following sections.

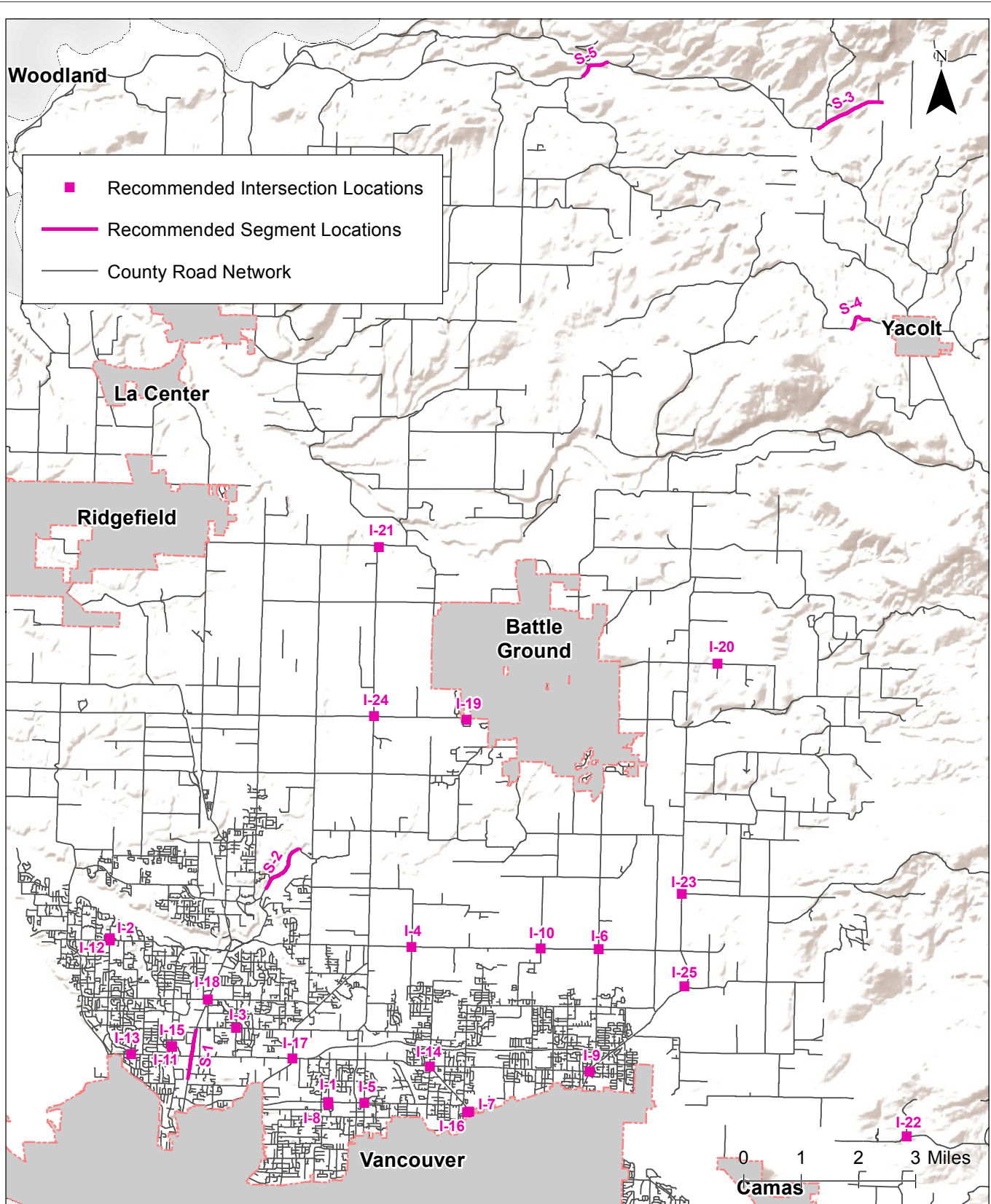
We request the County review this list of potential study sites and provide input before we begin our study. The input and feedback includes anything that may influence the potential for identifying countermeasures to reduce crashes at these locations. The type of feedback that is most helpful includes:

- Identifying changes (geometric, traffic control, cross-section, etc.) that may have influenced crash patterns or frequency (from 6/1/08 to current)
- Identifying planned projects that may impact these sites in the future
- Identifying previous attempts to reduce crash frequency at these sites

STUDY CORRIDORS

Table 1 through Table 5 summarize 0.5-mile segments, identified through network screening, that have the greatest potential for crash reduction. Each segment has a total performance score of 4 or 5 and had at least one reported Fatal or Injury A crash during the study period (6/1/08-5/31/13). From among the segments listed below, five corridors (including multiple overlapping 0.5-mile segments) were selected for field review, diagnosis, and project development.

Consideration was given to selecting one study corridor from each of five reference populations; however, priority was given to corridors with the greatest crash reduction potential. Therefore, the five proposed study corridors (see orange highlighted segments in Tables 1-5) were identified within the Urban Arterial, Rural Local, and Rural Collector populations. Potential for crash reduction was measured in terms of the number of Fatal and Injury A crashes, the degree to which a corridor exceeds the proportion of target crash types, and Critical Crash Rate Ratios on each segment. Segments that were prioritized through network screening, but not selected for study are shown for comparison purposes.



**Recommended Locations for Field Review
Clark County, WA**

**Figure
1**

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STUDY INTERSECTIONS

Table 6 through Table 11 summarize intersections, identified through network screening, that have the greatest potential for crash reduction in Clark County. Each intersection has a total performance score of 4 or 5 and had at least one reported Fatal or Injury A crash during the study period (6/1/08-5/31/13). From among the intersections listed below, 25 intersections were selected for field review, diagnosis, and project development.

Intersections were selected for study from each of six reference populations, however, the number of intersections with each population varies to reflect crash reduction potential. Potential for crash reduction was measured in terms of the number of Fatal and Injury A crashes, the degree to which a corridor exceeds the proportion of target crash types, and Critical Crash Rate Ratios on each segment. Intersections that were prioritized through network screening, but not selected for study are shown for comparison purposes.

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Table 1. Urban Arterial Potential Study Corridors and Segment Performance Measure Results

Study Segment	ID#	Road Name	Start Mile Post	End Mile Post	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Fixed Object Proportion Excess	Fixed Object Proportion Excess Probability	Bicycle or Pedestrian Proportion Excess	Bicycle or Pedestrian Proportion Excess Probability	Total Fatal + Injury A Crashes	EPDO Score	Annual EPDO Score	Total Performance Measure Score
1	333	NE HWY 99	3.69	4.19	0.60	1.65	2.75	-0.26	0.00	0.13	0.99	4	492	98.4	5
	341	NE HWY 99	3.59	4.09	0.60	1.67	2.77	-0.26	0.00	0.13	0.99	4	492	98.4	5
	320	NE HWY 99	3.79	4.29	0.60	1.20	2.00	-0.24	0.00	0.10	0.94	4	457	91.4	5
	343	NE HWY 99	3.49	3.99	0.60	1.23	2.03	-0.24	0.00	0.15	0.99	3	368	73.6	5
	312	NE HWY 99	3.89	4.39	0.60	0.75	1.26	-0.30	0.00	0.19	0.99	3	332	66.4	5
2	211	NE SALMON CK AV	1.57	2.07	1.02	2.23	2.18	0.42	0.98	-0.06	1.00	1	124	24.8	5
	482	NE SALMON CK AV	1.67	2.17	1.03	2.25	2.19	0.42	0.98	-0.06	1.00	1	124	24.8	5
	572	NE SALMON CK AV	1.47	1.97	1.02	2.22	2.17	0.56	1.00	-0.06	1.00	1	124	24.8	5
	84	NE SALMON CK AV	1.77	2.27	1.03	1.92	1.87	0.54	0.99	-0.06	1.00	1	123	24.6	5
	355	NE SALMON CK AV	1.87	2.37	1.03	1.60	1.56	0.50	0.98	-0.06	1.00	1	122	24.4	5
	575	NE SALMON CK AV	1.97	2.47	1.03	1.28	1.25	0.45	0.95	-0.06	1.00	1	108	21.6	5

Table 2. Rural Local Access Potential Study Corridors and Segment Performance Measure Results

Study Segment	ID#	Road Name	Start Mile Post	End Mile Post	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Fixed Object Proportion Excess	Fixed Object Proportion Excess Probability	Alcohol Impaired Proportion Excess	Alcohol Impaired Excess Probability	Total Fatal + Injury A Crashes	EPDO Score	Annual EPDO Score	Total Performance Measure Score
3	1692	NE CEDAR CK RD	0.87	1.37	2.52	2.62	1.04	0.31	0.38	0.98	0.42	2	313	62.6	5
	1712	NE CEDAR CK RD	0.70	1.20	2.53	3.17	1.25	0.31	0.47	0.80	0.15	1	220	44	5
	1728	NE CEDAR CK RD	0.50	1.00	2.52	2.63	1.04	0.11	0.17	0.47	0.02	1	114	22.8	5
	1740	NE CEDAR CK RD	0.30	0.80	2.52	3.13	1.24	0.15	0.23	0.80	0.15	1	110	22	5
	1733	NE CEDAR CK RD	0.40	0.90	2.52	2.62	1.04	0.11	0.17	0.47	0.02	1	109	21.8	5
	1766	NE CEDAR CK RD	0.10	0.60	2.51	2.58	1.03	0.11	0.17	0.87	0.22	1	109	21.8	5
	1751	NE CEDAR CK RD	0.20	0.70	2.51	2.60	1.03	0.11	0.17	0.87	0.22	1	104	20.8	5
	827	NE 259TH ST	1.90	2.40	4.02	8.22	2.04	0.31	0.38	0.47	0.02	2	212	42.4	5
	1363	NE 259TH ST	2.00	2.50	4.02	8.22	2.04	0.31	0.38	0.47	0.02	2	212	42.4	5
	1886	NE 259TH ST	2.10	2.60	4.01	4.92	1.23	0.31	0.21	0.70	0.15	1	102	20.4	5

Table 3. Rural Collector Potential Study Corridors and Segment Performance Measure Results

Study Segment	ID#	Road Name	Start Mile Post	End Mile Post	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Fixed Object Proportion Excess	Fixed Object Proportion Excess Probability	Alcohol Impaired Proportion Excess	Alcohol Impaired Excess Probability	Total Fatal + Injury A Crashes	EPDO Score	Annual EPDO Score	Total Performance Measure Score
4	102	NE W H GARNER RD	0.70	1.20	2.72	5.76	2.11	0.21	0.95	-0.11	0.03	3	329	65.8	5
5	2462	NE CEDAR CK RD	11.90	12.40	3.43	8.01	2.34	0.29	0.97	0.04	0.52	2	314	62.8	5
	1145	NE CEDAR CK RD	11.80	12.30	3.43	6.87	2.00	0.26	0.96	0.06	0.58	2	313	62.6	5
	2708	NE 182ND AV	0.00	0.50	2.22	5.59	2.51	0.12	0.89	-0.04	0.21	1	252	50.4	5
	560	NE 182ND AV	0.10	0.60	2.23	3.85	1.73	0.07	0.78	-0.11	0.02	1	247	49.4	5
	545	WASHOUGAL RIVER RD	5.40	5.90	2.53	2.59	1.03	0.43	0.99	0.29	0.93	1	223	44.6	5
	2492	WA. RI. RD 1.34M FR SR-14	1.00	1.50	2.39	3.95	1.65	0.21	0.95	0.23	0.95	1	132	26.4	5
	13	NE AMBOY RD	12.20	12.70	2.86	5.11	1.79	0.29	0.97	0.18	0.87	1	121	24.2	5
	1132	NE AMBOY RD	12.21	12.71	2.86	5.10	1.78	0.29	0.97	0.18	0.87	1	121	24.2	5
	1966	NE AMBOY RD	12.10	12.60	2.88	5.20	1.81	0.29	0.97	0.18	0.87	1	121	24.2	5

Table 4. Urban Local Access Segment Performance Measure Results

Study Segment	ID#	Road Name	Start Mile Post	End Mile Post	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Fixed Object Proportion Excess	Bicycle or Pedestrian Proportion Excess	Total Fatal + Injury A Crashes	EPDO Score	Annual EPDO Score	Total Performance Measure Score
	237	NW 99TH ST	0.97	1.16	22.70	33.28	1.47	0.73	-0.03	1	200	40	5

Table 5. Urban Collector Segment Performance Measure Results

Study Segment	ID#	Road Name	Start Mile Post	End Mile Post	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Fixed Object Proportion Excess	Fixed Object Proportion Excess Probability	Bicycle or Pedestrian Proportion Excess	Bicycle or Pedestrian Proportion Excess Probability	Total Fatal + Injury A Crashes	EPDO Score	Annual EPDO Score	Total Performance Measure Score
	320	NE 139TH ST	0.01	0.51	1.45	1.30	0.89	0.17	0.77	-0.06	0	1	101	20.2	4
	324	NE 139TH ST	0.00	0.50	1.44	1.28	0.89	0.17	0.77	-0.06	0	1	101	20.2	4

Table 6. Urban Local Access Potential Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Angle Proportion Excess	Angle Probability	Opposite Direction Proportion Excess	Opposite Direction Probability	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
1	1900	NE 62ND CR & NE 58TH AV	Two Way Stop	1.45	12.79	8.81	0.57	1.00	0.00	0.41	2	344	68.8	5
2	1487	NW 21ST AV & NW 120TH ST	Two Way Stop	0.55	0.86	1.57	0.28	0.97	0.06	0.63	1	135	27	5
	855	NE 89TH AV & NE 87TH CIR	Two Way Stop	1.49	1.92	1.29	0.28	0.88	-0.07	1.00	1	110	22	5
	545	NE 159TH AV & NE 73RD ST	Two Way Stop	3.27	6.45	1.97	-0.22	1.00	0.43	0.95	1	106	21.2	5
	446	NE 93RD CT & NE 68TH ST	Two Way Stop	N/A ¹	N/A ¹	1.82	-0.22	1.00	0.93	1.00	1	100	20	5
	2046	NE 92ND ST & NE 133RD AV	Two Way Stop	1.10	1.10	1.00	0.78	1.00	-0.07	1.00	1	101	20.2	4

¹ Traffic volume too low to calculate accurate rate.

Table 7. Urban Collector Potential Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Angle Proportion Excess	Angle Probability	Opposite Direction Proportion Excess	Opposite Direction Probability	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
3	382	NE 25TH AV & NE 88TH ST	Signal	0.20	0.46	2.38	0.21	0.95	0.26	0.98	3	368	73.6	5
4	413	NE 87TH AV & NE 119TH ST	Signal	0.18	0.34	1.87	-0.11	0.11	0.07	0.66	2	250	50	5
5	351	NE 63RD ST & NE 72ND AV	Signal	0.19	0.33	1.71	-0.07	0.22	0.22	0.93	2	233	46.6	5
6	416	NE 152ND AV & NE 119TH ST	Signal	0.20	0.87	4.35	0.05	0.69	0.43	1.00	1	210	42	5
	125	NE 67TH ST & NE 102ND AV	Two Way Stop	0.32	0.34	1.08	0.08	0.51	-0.14	0.04	1	207	41.4	5
7	350	NE ROSEWOOD AV & NE 109TH AV	Two Way Stop	0.35	3.00	8.52	0.17	0.95	0.24	0.99	1	152	30.4	5
	366	NE 76TH ST & NE 124TH AV	Signal	0.17	0.28	1.61	0.03	0.54	-0.07	0.11	1	152	30.4	5
	42	NE 54TH AV & NE 40TH ST	Two Way Stop	0.22	0.27	1.22	0.08	0.59	0.19	0.76	1	110	22	5

Table 8. Urban Arterial Potential Unsignalized Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Angle Proportion Excess	Angle Probability	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
8	309	NE 59TH AV & NE MINNEHAHA ST	Two Way Stop	0.16	0.30	1.91	0.56	1.00	2	344	68.8	5
9	313	NE 76TH ST & NE WARD RD	Two Way Stop	0.15	0.23	1.50	0.31	0.99	2	231	46.2	5
10	362	NE 132ND AV & NE 119TH ST	Two Way Stop	0.21	0.34	1.64	0.20	0.84	2	219	43.8	5
11	108	NE 6TH AV & NE 81ST ST	Two Way Stop	0.16	0.55	3.45	0.00	0.47	1	164	32.8	5
12	361	NW 21ST AV & NW 119TH ST	Two Way Stop	0.17	0.21	1.23	0.27	0.93	1	135	27	5
13	118	NW 12TH AV & NW 78TH ST	Two Way Stop	0.17	0.25	1.46	0.55	1.00	1	117	23.4	5

Table 9. Urban Arterial Potential Signalized Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Opposite Direction Proportion Excess	Opposite Direction Probability	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
14	66	NE 94TH AV & NE COVINGTON RD	Signal	0.30	0.47	1.55	0.21	1.00	6	714	142.8	5
15	17	NE HAZEL DELL AV & NE 82ND ST	Signal	0.41	1.46	3.5	0.35	1.00	1	165	33	5
16	59	NE ROSEWOOD AV & NE COVINGTON RD	Signal	0.32	0.38	1.18	0.17	0.95	1	152	30.4	5
17	67	NE 78TH ST & NE ST JOHNS RD	Signal	0.27	0.31	1.15	-0.03	0.25	3	445	89	4
18	81	NE 99TH ST & NE HWY 99	Signal	0.27	0.31	1.15	-0.17	0.00	2	362	72.4	4
	65	NE 78TH ST & NE HWY 99	Signal	0.28	0.49	1.75	-0.15	0.00	1	315	63	4
	90	NE 20TH AV & NE HWY 99	Signal	0.31	0.55	1.75	-0.09	0.06	1	200	40	4
	39	NE 96TH WY & NE HWY 99	Signal	0.31	0.32	1.04	-0.03	0.32	1	165	33	4
	68	NE 107TH AV & NE 76TH ST	Signal	0.32	0.34	1.04	-0.04	0.27	1	162	32.4	4

Table 10. Rural Local Access Potential Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
19	122	NE 104TH AV & NE 198TH ST	Two Way Stop	0.77	2.74	3.54	1	205	41	4
20	134	NE 192ND AV & NE 219TH ST	Two Way Stop	0.71	1.16	1.64	1	102	20.4	4

Table 11. Rural Collector Potential Study Intersections and Performance Measure Results

Study Intersection	ID#	Intersection Name	Traffic Control	Critical Crash Rate	Crash Rate	Crash-Critical Crash Rate Ratio	Total Fatal and Injury A Crashes	Equivalent PDO Score	Annual Equivalent PDO Score	Total Score
21	272	NE 259TH ST & NE 72ND AV	Two Way Stop	0.33	0.67	2.03	2	321	64.2	4
22	75	NE BRADFORD RD & NE 262ND AV	Two Way Stop	0.44	0.48	1.09	2	311	62.2	4
23	93	NE 139TH ST & NE 182ND AV	Two Way Stop	0.28	0.33	1.16	1	233	46.6	4
24	451	NE 199TH ST & NE 72ND AV	Signal	0.26	0.47	1.83	1	205	41	4
25	87	NE DAVIS RD & NE WARD RD	Two Way Stop	0.26	0.26	1.02	1	131	26.2	4
	124	NE CAPLES RD & NE 159TH ST	Two Way Stop	0.33	0.49	1.46	1	127	25.4	4
	263	NE 167TH AV & NE 244TH ST	Two Way Stop	0.48	0.60	1.25	1	126	25.2	4
	285	NE BOUTELLE ST & NE 172ND AV	Two Way Stop	0.35	0.38	1.08	1	119	23.8	4
	206	NE 199TH ST & NE 87TH AV	Two Way Stop	0.38	0.40	1.05	1	118	23.6	4
	437	NE 137TH AV & NE 159TH ST	Two Way Stop	0.49	0.80	1.62	1	113	22.6	4
	268	NE 259TH ST & NE 182ND AV	Two Way Stop	0.55	0.83	1.50	1	112	22.4	4
	150	NE BAKER CK RD & NE 174TH ST	Two Way Stop	1.03	3.40	3.30	1	104	20.8	4
	484	NE 359TH ST & NE 119TH AV	Two Way Stop	0.49	0.64	1.29	1	103	20.6	4