Appendix D: Air Quality Erratum

Point Defiance Bypass Project

Air Quality Discipline Report Erratum

Washington State Department of Transportation

November 2012

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Table of Exhibits

Chapter 1 – Introduction

What is the purpose of this erratum?

This erratum updates the results of the project-level carbon monoxide (CO) conformity analysis performed for the Point Defiance Bypass Project (Project) that were presented in the Project's Air Quality Discipline Report, dated September, 2012 (WSDOT 2012).

Why do the project-level conformity results need to be updated?

The results of the original air quality analysis conducted for the Project were presented in the Draft Air Quality Discipline Report, dated October, 2011 (WSDOT 2011a). The intersections selected for project-level CO) conformity analysis (also called a hot spot analysis) were based on an operational ranking of project-affected intersections based on level-of-service (LOS) and average intersection delay in seconds. The data upon which the intersection selection was made was contained in Attachment A of the Project's Draft Transportation Discipline Report, dated December, 2011 (WSDOT 2011b).

Revisions to the transportation analysis between the date of the Draft Air Quality Discipline Report (October, 2011) and the Draft Transportation Discipline Report (December, 2011) indicated that the intersections with the worst LOS changed slightly. This change meant that not all the intersections analyzed in the CO hot spot analysis were the worst performing intersections and that there were intersections that had a greater potential to impact continued compliance with the CO National Ambient Air Quality Standards (NAAQS) than those analyzed for the Project. Therefore, the hot spot analysis needed to be updated to include the more congested intersections to demonstrate compliance with the project-level conformity requirements for projects in CO maintenance areas.

Chapter 2 – Methodology

The following updates Chapter 2 – Methodology of the September 2012 Air Quality Discipline Report.

Which intersections were included in the revised project-level conformity analysis?

The original project-level conformity analysis was performed on the following intersections:

- East "D" Street and East 26th Street
- Barksdale Avenue and Northbound I-5 Ramps
- Berkeley Street and Union Avenue

Attachment A of the Project's Draft Transportation Discipline Report (WSDOT, 2011b) indicates that the three intersections with the worst LOS (and hence, most congestion) are:

- East "D" Street and East 26th Street
- North Thorne Lane Southwest and I-5 Northbound Ramps
- North Thorne Lane Southwest and Union Avenue Southwest

Therefore, the project-level conformity analysis was updated to include the intersections of North Thorne Lane Southwest and I-5 Northbound Ramps, and North Thorne Lane Southwest and Union Avenue Southwest. Exhibit 1 shows the LOS and delay for the three analysis intersections.

Exhibit 1. Level of Service and Delay for the At-Grade Intersections (PM Peak Hour)

	2010 Existing Year LOS/Delay		2030 LOS/Delay			
			No-Build		Build	
Intersection Name	***LOS***	***Average Delay***	***LOS***	***Average Delay***	***LOS***	***Average Delay***
East "D" Street and East 26th Street	**B**	**10.7**	**E**	**72.6**	**E**	**72.8**
North Thorne Lane Southwest and Northbound I-5 Ramps	**B**	**17.2**	**F**	**91.3**	**E**	**74.8**
North Thorne Lane Southwest and Union Street	**F**	**52.4**	**F**	**182.9**	**F**	**188.0**

Source: HDR Traffic Data Submittals

Notes: Delay is shown in seconds

How were the intersections analyzed?

The project-level conformity analysis for the two additional intersections was performed using the same procedures as the previous analysis. The analysis used the WSDOT WASIST model (version 2.0). WASIST is a Windows-based screening model used for determining worst-case CO concentrations at signalized intersections throughout the State of Washington. WASIST uses readily available data in a user-friendly application to make a conservative estimate of project-related CO levels. This is done by using a combination of worst-case conditions that, when occurring simultaneously, produce the highest levels of CO. If the results from WASIST do not violate NAAQS for CO, the impact from any other combination of conditions would also be below the standards and no further modeling is required.

Traffic data for the revised project-level conformity analysis were obtained from Appendix D of the *Proposed Signal Phasing/Timing and Traffic Operations Technical Memorandum (without Cross-Base Highway)* (HDR, 2011). Traffic data used in the analysis are included in Attachment A. Turning movement traffic volume data were not available for the intersections of North Thorne Lane Southwest and I-5 Northbound Ramps, and North Thorne Lane Southwest and Union Avenue Southwest in the project year of opening (2017), so the WASIST model was conservatively run with 2017 emission factors and 2030 traffic volumes to demonstrate compliance in 2017 where appropriate.

Chapter 3 – Affected Environment

There were no updates to Chapter 3 – Affected Environment of the September 2012 Air Quality Discipline Report.

Chapter 4 – Project Effects

The following updates Chapter 4 – Project Effects of the September 2012 Air Quality Discipline Report.

What were the results of the revised analysis?

The Project is not anticipated to create any new violations, nor increase the frequency of an existing violation of the CO standard at project-affected, signalized roadway intersections; it would conform with the purpose of the current SIP and the requirements of the federal CAA and the Washington CAA.

A project-level conformity analysis was performed for the existing year (2010) and for all the alternatives of the year of opening (2017) and the horizon year (2030), including the No Build Alternative where the intersection LOS was at D or below.

For the intersection of North Thorne Lane Southwest and Union Avenue Southwest, traffic volumes under the existing, No Build, and Build Alternatives were low enough that the intersection passed the initial WASIST screen and a full WASIST hot spot analysis was not required.

For the intersection of North Thorne Lane Southwest and I-5 Northbound Ramps, traffic volumes were high enough that full WASIST analysis was required.

The results for the worst-case receptor at this intersection were below the 1-hour average NAAQS for CO of 35 ppm and below the 8-hour average standard of 9 ppm under all modeled conditions. Exhibit 2 provides the maximum CO concentrations of WASIST Model Outputs.

WASIST output files for both intersections are included in Attachment B.

Conformity Statement

This erratum provides additional information that should be considered in addition to the evaluation of potential air quality emissions from construction and operation of the project presented in the Air Quality Discipline Report. The revised project-level conformity analysis confirms

the conclusion presented in the Air Quality Discipline Report that the Project is not expected to:

- Cause or contribute to any new violations of the NAAQS;
- Increase the frequency or severity of any existing violation of the NAAQS; or
- Delay the timely attainment of the NAAQS.

Exhibit 2. Maximum Predicted CO Concentrations at the Intersection of North Thorne Lane Southwest and I-5 Northbound Ramps

Alternatives	Intersection	
	North Thorne Lane Southwest and I-5 Northbound Ramps	
Averaging Time	*1 hr*	*8 hr*
2010 (Existing)	**4.9**	**4.3**
2017 No Build	**4.5**	**4.0**
2017 Build	**4.5**	**4.0**
2030 No Build	**4.3**	**3.9**
2030 Build	**4.3**	**3.9**

Notes: Concentration values are in parts per million. The one-hour NAAQS for CO is 35 ppm and for the eight-hour CO is 9 ppm. A background ambient CO concentration of 3 ppm was used in the WASIST modeling.

Chapter 5 – Recommended Minimization Measures

The following updates Chapter 5 – Recommended Minimization Measures of the September 2012 Air Quality Discipline Report.

Are any additional mitigation measures proposed?

The results of the revised air quality study indicate that no exceedance of the NAAQS will occur as a result of Project implementation. Therefore no additional mitigation measures are required or recommended.

References

HDR Engineering. 2011. *Proposed Signal Phasing/Timing and Traffic Operations Technical Memorandum (without Cross-Base Highway).* April, 2011.

Washington State Department of Transportation. 2011a. *Point Defiance Bypass Project Air Quality Discipline Report. October, 2011.*

Washington State Department of Transportation. 2011b. *Point Defiance Bypass Project Transportation Discipline Report. December, 2011.*

Washington State Department of Transportation. 2012. *Point Defiance Bypass Project Air Quality Discipline Report. September2012.*

Attachment A – Traffic Data

Appendix D-4b Thorne Lane Existing PM Peak Hour Scenario (4) - VISSIM Simulation Outputs

Node	Intersection	Movement	VISSIM Output Volume	Movement Delay	Avg. Queue	Max Queue	Avg. Stop Delay	Avg. # of Stop
2a	North Thorne Ln & Union Ave	EBT	157	46.4	37	239	39.7	0.8
		EBR	1	14.3	14	186	14.1	0.4
		WBL	297	0.9	1	60	0.9	0.1
		WBT	110	1.4	1	60	0.4	0.0
		NBL	7	120.1	193	682	93.5	3.6
		NBR	301	122.5	235	736	99.7	2.1
		All	873	52.4	-	-	42.6	0.9
2b	North Thorne Ln & I-5 SB Ramp	EBT	441	28.7	125	203	25.7	0.3
		EBR	16	35.0	125	203	32.8	0.4
		WBL	166	2.4	1	23	1.1	0.0
		WBT	54	2.5	1	23	0.7	0.0
		SBL	302	48.3	102	514	35.5	0.8
		SBT	96	49.4	102	514	34.8	0.8
		SBR	352	10.0	122	544	0.6	0.7
		All	1426	25.6	-	-	18.5	0.5
2c	North Thorne Ln & I-5 NB Ramp	EBL	364	3.5	5	66	1.9	0.0
		EBT	378	0.9	5	66	0.3	0.0
		WBT	213	52.5	94	712	41.4	0.8
		WBR	696	19.7	94	712	0.1	0.6
		NBL	6	82.1	16	171	77.3	1.0
		NBT	2	78.5	16	171	71.8	0.9
		NBR	167	24.7	27	184	11.8	2.0
		All	1827	17.2	-	-	6.7	0.5
	Network Summary	All	4126	27.5	-	-	18.3	0.6

Appendix D-10b Thorne Lane 2030 No-Build PM Peak Hour Scenario (10) - VISSIM Simulation Outputs

Node	Intersection	Movement	VISSIM Output Volume	Movement Delay	Avg. Queue	Max Queue	Avg. Stop Delay	Avg. # of Stop
2a	North Thorne Ln & Union Ave	EBT	109	63.4	39	227	56.8	0.8
		EBR	9	37.9	14	174	13.8	0.6
		WBL	261	0.6	1	31	0.6	0.1
		WBT	118	1.2	1	31	0.4	0.0
		NBL	7	434.4	1109	1345	344.2	6.0
		NBR	328	431.9	1162	1399	348.0	4.6
		All	833	182.9	-	-	147.9	2.0
2b	North Thorne Ln & I-5 SB Ramp	EBT	429	30.7	132	200	28.3	0.2
		EBR	7	34.3	132	200	32.9	0.2
		WBL	195	4.6	3	45	2.8	0.0
		WBT	89	4.6	3	45	2.4	0.0
		SBL	372	94.5	245	1018	73.9	1.0
		SBT	19	88.4	245	1018	66.2	0.9
		SBR	290	17.9	269	1047	5.3	0.9
		All	1402	40.7	-	-	31.1	0.5
2c	North Thorne Ln & I-5 NB Ramp	EBL	310	3.5	5	53	2.0	0.0
		EBT	491	1.1	5	53	0.5	0.0
		WBT	278	117.3	427	1188	69.0	1.0
		WBR	737	65.5	427	1188	2.3	0.9
		NBL	6	384.6	790	1184	232.1	12.2
		NBT	6	370.3	790	1184	223.8	12.0
		NBR	315	345.4	803	1197	177.9	13.3
		All	2144	91.3	-	-	37.6	2.5
	Network Summary	All	4378	92.5	-	-	56.4	1.7

Appendix D-11b Thorne Lane 2030 Build with Train PM Peak Hour Scenario (11) - VISSIM Simulation Outputs

Node	Intersection	Movement	VISSIM Output Volume	Movement Delay	Avg. Queue	Max Queue	Avg. Stop Delay	Avg. # of Stop
2a	North Thorne Ln & Union Ave	EBT	112	42.2	27	190	36.7	0.7
		EBR	9	23.7	12	154	11.9	0.5
		WBL	261	1.5	3	77	1.5	0.1
		WBT	119	2.5	3	77	1.0	0.0
		NBL	6	520.8	1176	1397	431.6	6.3
		NBR	287	489.9	1175	1396	410.3	4.8
		All	796	188.0	-	-	157.2	1.9
2b	North Thorne Ln & I-5 SB Ramp	EBT	393	2.3	2	82	0.6	0.1
		EBR	7	0.1	2	82	0.0	0.0
		WBL	208	6.8	6	220	2.3	0.2
		WBT	94	7.4	6	220	3.4	0.1
		SBL	370	59.4	149	745	43.2	0.8
		SBT	19	61.6	149	745	44.1	0.8
		SBR	286	57.0	149	745	46.1	0.8
		All	1376	30.9	-	-	22.5	0.5
2c	North Thorne Ln & I-5 NB Ramp	EBL	282	12.4	30	266	7.0	0.6
		EBT	480	2.3	30	266	1.0	0.1
		WBT	295	69.7	214	1159	44.1	0.9
		WBR	779	33.6	214	1159	0.7	0.6
		NBL	7	324.1	752	1184	181.2	11.2
		NBT	7	307.2	752	1184	172.3	10.4
		NBR	352	310.0	765	1197	146.5	12.8
		All	2202	74.8	-	-	31.7	2.5
	Network Summary	All	4374	81.5	-	-	51.6	1.8

Attachment B – WASIST Output Files

WASIST 2.0 PRE-SCREEN MODELING RESULTS

11-01-12
04:07 PM
Point Definace Bypass

Intersection Description:	**Existing - N. Thorne Lane SW & Union Ave SW**
Performed by:	**Craig Miliken - HDR Engineering Inc.**
	503-423-3845 - craig.milliken@hdrinc.com
Intersection Location:	**Western Washington - PIERCE County**
CO Maintenance Area:	**Puget Sound**
I/M Program:	**No**
Highest Traffic Volume:	**865 vph**
Closest Receptor:	**10 feet**

Pass

Intersection PASSES the CO Pre-Screen. Additional WASIST analysis is not required. Traffic volume on the busiest leg of intersection is below Pre-Screen cutoff volume for the closest receptor distance. Traffic volume includes vehicles traveling in both directions on the intersection leg.

Please include the following statement in the air quality report, NEPA or SEPA document:

A Pre-Screen analysis was completed for the proposed project. The results from this proposed roadway improvement indicate that a more in-depth WASIST air quality analysis is not required. The results for the worst-case receptor are below the 1-hour average National Ambient Air Quality Standard (NAAQS) for CO of 35 ppm and the 8-hour average standard of 9 ppm. These standards have been determined by the US Environmental Protection Agency to protect public health and welfare. This intersection scenario conforms to both the 1-hour and 8-hour NAAQS for project level analysis.

WASIST 2.0 PRE-SCREEN MODELING RESULTS

11-02-12
09:17 AM
Point Definace Bypass

Intersection Description:	**No Build - N. Thorne Lane SW & Union Ave SW**
Performed by:	**Craig Miliken - HDR Engineering Inc.**
	503-423-3845 - craig.milliken@hdrinc.com
Intersection Location:	**Western Washington - PIERCE County**
CO Maintenance Area:	**Puget Sound**
I/M Program:	**No**
Highest Traffic Volume:	**816 vph**
Closest Receptor:	**10 feet**

Pass

Intersection PASSES the CO Pre-Screen. Additional WASIST analysis is not required. Traffic volume on the busiest leg of intersection is below Pre-Screen cutoff volume for the closest receptor distance. Traffic volume includes vehicles traveling in both directions on the intersection leg.

Please include the following statement in the air quality report, NEPA or SEPA document:

A Pre-Screen analysis was completed for the proposed project. The results from this proposed roadway improvement indicate that a more in-depth WASIST air quality analysis is not required. The results for the worst-case receptor are below the 1-hour average National Ambient Air Quality Standard (NAAQS) for CO of 35 ppm and the 8-hour average standard of 9 ppm. These standards have been determined by the US Environmental Protection Agency to protect public health and welfare. This intersection scenario conforms to both the 1-hour and 8-hour NAAQS for project level analysis.

WASIST 2.0 PRE-SCREEN MODELING RESULTS

11-02-12
09:17 AM
Point Definace Bypass

Intersection Description:	**Build - N. Thorne Lane SW & Union Ave SW**
Performed by:	**Craig Miliken - HDR Engineering Inc.**
	503-423-3845 - craig.milliken@hdrinc.com
Intersection Location:	**Western Washington - PIERCE County**
CO Maintenance Area:	**Puget Sound**
I/M Program:	**No**
Highest Traffic Volume:	**779 vph**
Closest Receptor:	**10 feet**

Pass

Intersection PASSES the CO Pre-Screen. Additional WASIST analysis is not required. Traffic volume on the busiest leg of intersection is below Pre-Screen cutoff volume for the closest receptor distance. Traffic volume includes vehicles traveling in both directions on the intersection leg.

Please include the following statement in the air quality report, NEPA or SEPA document:

A Pre-Screen analysis was completed for the proposed project. The results from this proposed roadway improvement indicate that a more in-depth WASIST air quality analysis is not required. The results for the worst-case receptor are below the 1-hour average National Ambient Air Quality Standard (NAAQS) for CO of 35 ppm and the 8-hour average standard of 9 ppm. These standards have been determined by the US Environmental Protection Agency to protect public health and welfare. This intersection scenario conforms to both the 1-hour and 8-hour NAAQS for project level analysis.

Washington State Intersection Screening Tool 2.0

11-02-12

09:00 AM

Point Defiance Bypass

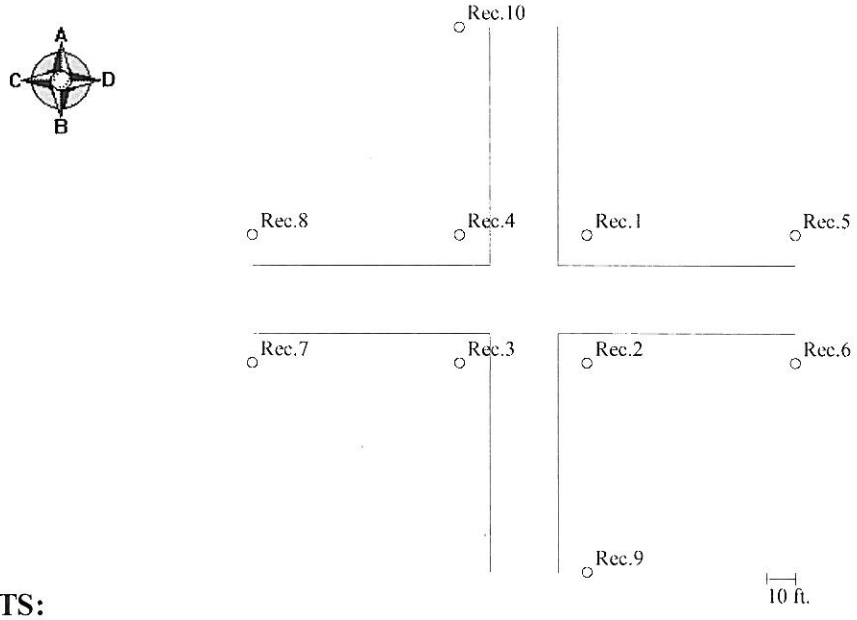
Description: **Existing - N. Thorne Lane SW & I-5 NB Ramps**

Performed by: **Craig Milliken - HDR Engineering Inc.**

503-423-3845 - craig.milliken@hdrinc.com

Intersection Type: **Four-Way Intersection, 2 x 2**

Street Names: **A-B: I-5 Ramps C-D: N Thorne Ln SW - Murray Rd SW**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	**1**	**10**	**10**	**4.7**	**4.2**	**Pass**
2	**2**	**10**	**10**	**4.8**	**4.3**	**Pass**
3	**3**	**10**	**10**	**4.7**	**4.2**	**Pass**
4	**4**	**10**	**10**	**4.9**	**4.3**	**Pass**
5	**1**	**82**	**10**	**4.7**	**4.2**	**Pass**
6	**2**	**82**	**10**	**4.5**	**4.0**	**Pass**
7	**3**	**82**	**10**	**4.6**	**4.1**	**Pass**
8	**4**	**82**	**10**	**4.2**	**3.8**	**Pass**
9	**2**	**10**	**82**	**3.9**	**3.6**	**Pass**
10	**4**	**10**	**82**	**3.9**	**3.6**	**Pass**

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 4**.

- All CO concentrations include a background concentration of **3.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 2.0

USER INPUTS

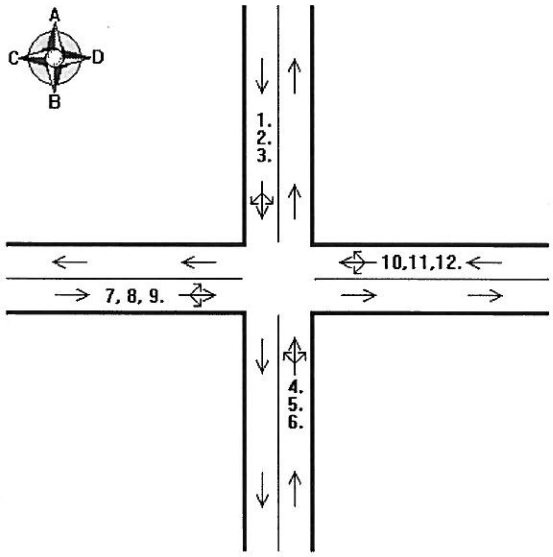
Point Defiance Bypass

Intersection Data:

Predominant Surroundings: **City Park**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	**A-B Thru**	**3**
2	**A-D Left Turn**	**3**
3	**A-C Right Turn**	**3**
4	**B-A Thru**	**3**
5	**B-C Left Turn**	**6**
6	**B-D Right Turn**	**167**
7	**C-D Thru**	**378**
8	**C-A Left Turn**	**364**
9	**C-B Right Turn**	**3**
10	**D-C Thru**	**213**
11	**D-B Left Turn**	**3**
12	**D-A Right Turn**	**696**



CO Emission Factors Based On:

Location: **Western Washington - PIERCE County**
CO Maint. Area: **Puget Sound**
I/M Program: **No**
Model Year: **2010**
Gasoline sulfur content of 30 ppm for all model years.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **110.67**

Approach	Speed (mph)	EF (g/mile)
Leg A	**40**	**10.05**
Leg B	**40**	**10.05**
Leg C	**27**	**9.80**
Leg D	**27**	**9.80**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **60**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**42**
Leg A Left Turn	**---**
Leg B Thru & Rt	**42**
Leg B Left Turn	**---**
Leg C Thru & Rt	**42**
Leg C Left Turn	**---**
Leg D Thru & Rt	**42**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

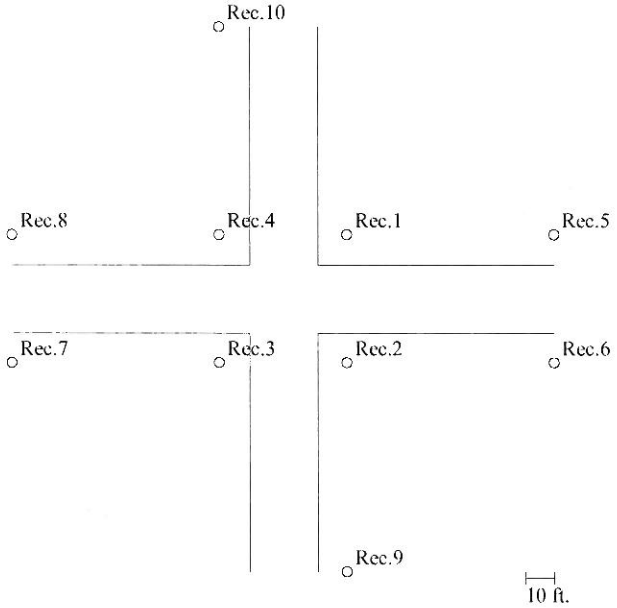
User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 2.0

11-02-12
09:05 AM
Point Defiance Bypass

Description: **2017 No Build - N. Thorne Lane SW & I-5 NB Ramps**
Performed by: **Craig Milliken - HDR Engineering Inc.**
503-423-3845 - craig.milliken@hdrinc.com
Intersection Type: **Four-Way Intersection, 2 x 2**
Street Names: **A-B: I-5 Ramps C-D: N Thorne Ln SW - Murray Rd SW**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	**1**	**10**	**10**	**4.4**	**4.0**	**Pass**
2	**2**	**10**	**10**	**4.4**	**4.0**	**Pass**
3	**3**	**10**	**10**	**4.5**	**4.0**	**Pass**
4	**4**	**10**	**10**	**4.4**	**4.0**	**Pass**
5	**1**	**82**	**10**	**4.4**	**4.0**	**Pass**
6	**2**	**82**	**10**	**4.2**	**3.8**	**Pass**
7	**3**	**82**	**10**	**4.3**	**3.9**	**Pass**
8	**4**	**82**	**10**	**4.1**	**3.8**	**Pass**
9	**2**	**10**	**82**	**3.8**	**3.6**	**Pass**
10	**4**	**10**	**82**	**3.6**	**3.4**	**Pass**

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.
Largest modeled CO concentrations are at **receptor 3**.
- All CO concentrations include a background concentration of **3.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 2.0

USER INPUTS

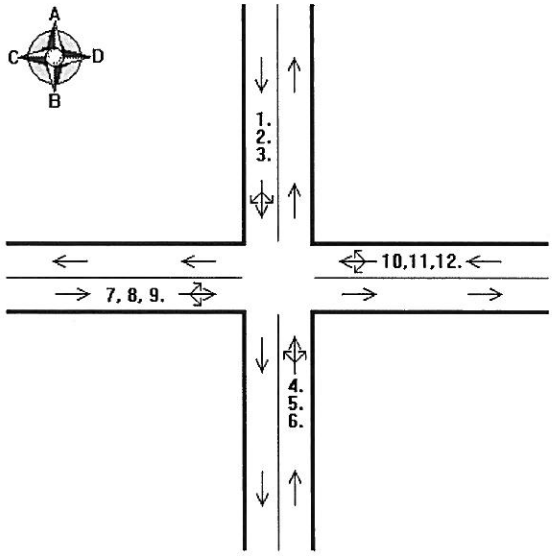
Point Defiance Bypass

Intersection Data:

Predominant Surroundings: **City Park**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	**A-B Thru**	**3**
2	**A-D Left Turn**	**3**
3	**A-C Right Turn**	**3**
4	**B-A Thru**	**6**
5	**B-C Left Turn**	**6**
6	**B-D Right Turn**	**315**
7	**C-D Thru**	**491**
8	**C-A Left Turn**	**310**
9	**C-B Right Turn**	**3**
10	**D-C Thru**	**278**
11	**D-B Left Turn**	**3**
12	**D-A Right Turn**	**737**



CO Emission Factors Based On:

Location: **Western Washington - PIERCE County**
CO Maint. Area: **Puget Sound**
I/M Program: **No**
Model Year: **2017**
Gasoline sulfur content of 30 ppm for all model years.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.75**

Approach	Speed (mph)	EF (g/mile)
Leg A	**40**	**7.53**
Leg B	**40**	**7.53**
Leg C	**27**	**7.29**
Leg D	**27**	**7.29**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **60**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**42**
Leg A Left Turn	**---**
Leg B Thru & Rt	**42**
Leg B Left Turn	**---**
Leg C Thru & Rt	**42**
Leg C Left Turn	**---**
Leg D Thru & Rt	**42**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

1. **< blank >**

Washington State Intersection Screening Tool 2.0

11-02-12

09:09 AM

Point Defiance Bypass

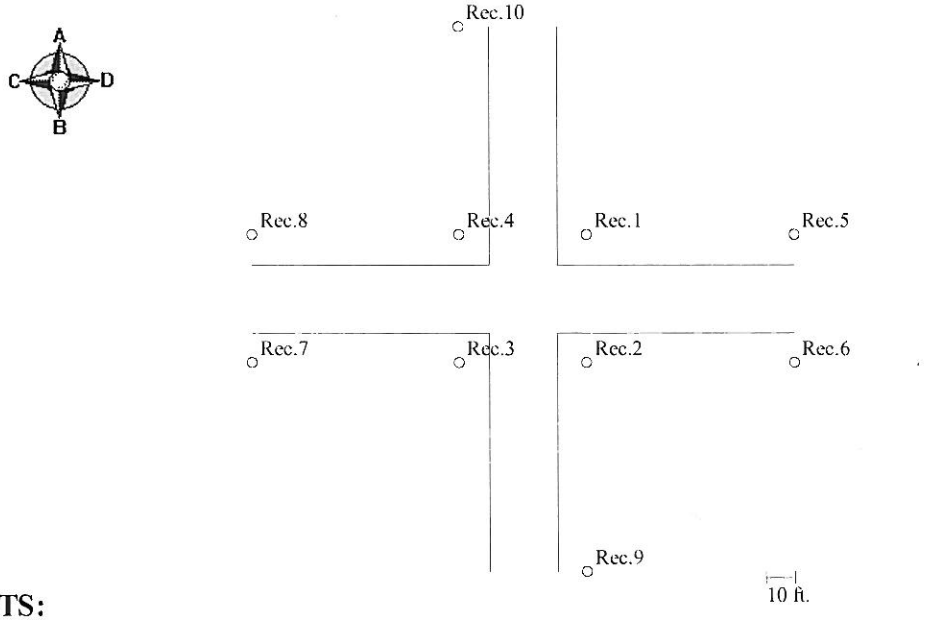
Description: **2017 Build - N. Thorne Lane SW & I-5 NB Ramps**

Performed by: **Craig Milliken - HDR Engineering Inc.**

503-423-3845 - craig.milliken@hdrinc.com

Intersection Type: **Four-Way Intersection, 2 x 2**

Street Names: **A-B: I-5 Ramps C-D: N Thorne Ln SW - Murray Rd SW**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	**1**	**10**	**10**	**4.5**	**4.0**	**Pass**
2	**2**	**10**	**10**	**4.4**	**4.0**	**Pass**
3	**3**	**10**	**10**	**4.5**	**4.0**	**Pass**
4	**4**	**10**	**10**	**4.4**	**4.0**	**Pass**
5	**1**	**82**	**10**	**4.5**	**4.0**	**Pass**
6	**2**	**82**	**10**	**4.2**	**3.8**	**Pass**
7	**3**	**82**	**10**	**4.3**	**3.9**	**Pass**
8	**4**	**82**	**10**	**4.1**	**3.8**	**Pass**
9	**2**	**10**	**82**	**3.8**	**3.6**	**Pass**
10	**4**	**10**	**82**	**3.6**	**3.4**	**Pass**

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 1**.

- All CO concentrations include a background concentration of **3.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 2.0

USER INPUTS

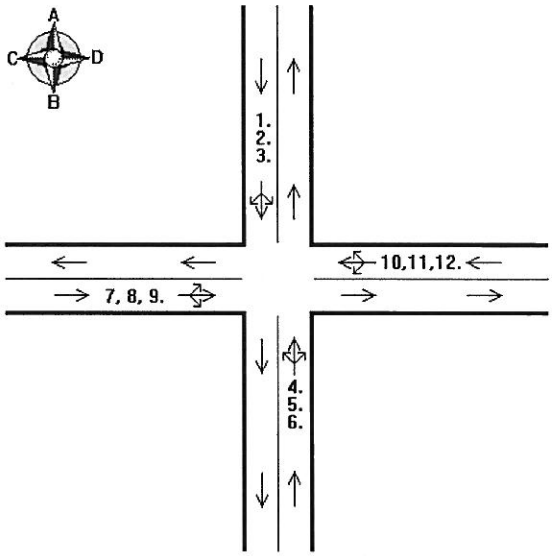
Point Defiance Bypass

Intersection Data:

Predominant Surroundings: **City Park**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	**A-B Thru**	**3**
2	**A-D Left Turn**	**3**
3	**A-C Right Turn**	**3**
4	**B-A Thru**	**7**
5	**B-C Left Turn**	**7**
6	**B-D Right Turn**	**352**
7	**C-D Thru**	**480**
8	**C-A Left Turn**	**282**
9	**C-B Right Turn**	**3**
10	**D-C Thru**	**295**
11	**D-B Left Turn**	**3**
12	**D-A Right Turn**	**779**



CO Emission Factors Based On:

Location: **Western Washington - PIERCE County**
CO Maint. Area: **Puget Sound**
I/M Program: **No**
Model Year: **2017**
Gasoline sulfur content of 30 ppm for all model years.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **78.75**

Approach	Speed (mph)	EF (g/mile)
Leg A	**40**	**7.53**
Leg B	**40**	**7.53**
Leg C	**27**	**7.29**
Leg D	**27**	**7.29**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **60**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**42**
Leg A Left Turn	**---**
Leg B Thru & Rt	**42**
Leg B Left Turn	**---**
Leg C Thru & Rt	**42**
Leg C Left Turn	**---**
Leg D Thru & Rt	**42**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

User Comments:

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Washington State Intersection Screening Tool 2.0

11-02-12

09:16 AM

Point Defiance Bypass

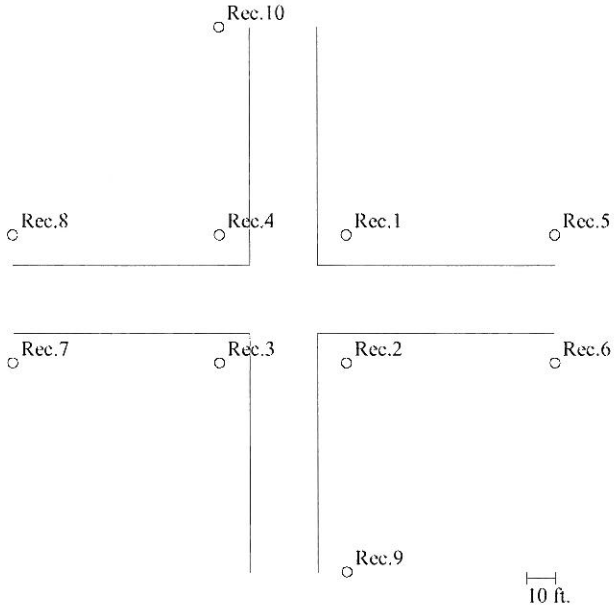
Description: **2030 No Build - N. Thorne Lane SW & I-5 NB Ramps**

Performed by: **Craig Milliken - HDR Engineering Inc.**

503-423-3845 - craig.milliken@hdrinc.com

Intersection Type: **Four-Way Intersection, 2 x 2**

Street Names: **A-B: I-5 Ramps C-D: N Thorne Ln SW - Murray Rd SW**



RESULTS:

Receptor#	Quadrant	Distance from A-B roadway (feet)	Distance from C-D roadway (feet)	CO 1-hour avg. Conc. (ppm)	CO 8-hour avg. Conc. (ppm)	Pass/Fail*
1	**1**	**10**	**10**	**4.2**	**3.8**	**Pass**
2	**2**	**10**	**10**	**4.2**	**3.8**	**Pass**
3	**3**	**10**	**10**	**4.3**	**3.9**	**Pass**
4	**4**	**10**	**10**	**4.2**	**3.8**	**Pass**
5	**1**	**82**	**10**	**4.2**	**3.8**	**Pass**
6	**2**	**82**	**10**	**4.0**	**3.7**	**Pass**
7	**3**	**82**	**10**	**4.1**	**3.8**	**Pass**
8	**4**	**82**	**10**	**3.8**	**3.6**	**Pass**
9	**2**	**10**	**82**	**3.7**	**3.5**	**Pass**
10	**4**	**10**	**82**	**3.6**	**3.4**	**Pass**

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

- All CO concentrations include a background concentration of **3.0** ppm.
- 8-hr average CO concentrations are calculated by multiplying the 1-hr average concentrations (without background) by a persistence factor of 0.7 and then adding the background concentration.

Washington State Intersection Screening Tool 2.0

USER INPUTS

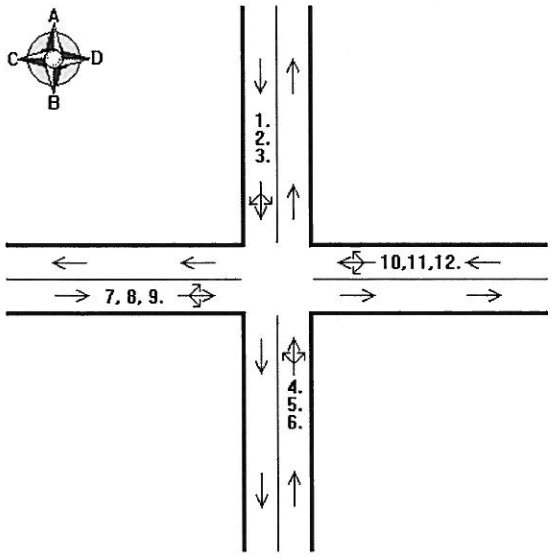
Point Defiance Bypass

Intersection Data:

Predominant Surroundings: **City Park**

Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	**A-B Thru**	**3**
2	**A-D Left Turn**	**3**
3	**A-C Right Turn**	**3**
4	**B-A Thru**	**6**
5	**B-C Left Turn**	**6**
6	**B-D Right Turn**	**315**
7	**C-D Thru**	**491**
8	**C-A Left Turn**	**310**
9	**C-B Right Turn**	**3**
10	**D-C Thru**	**278**
11	**D-B Left Turn**	**3**
12	**D-A Right Turn**	**737**



CO Emission Factors Based On:

Location: **Western Washington - PIERCE County**
CO Maint. Area: **Puget Sound**
I/M Program: **No**
Model Year: **2030**
Gasoline sulfur content of 30 ppm for all model years.

MOBILE6.2 CO Emission Factors:

Idle Emission Factor (g/hr): **66.06**

Approach	Speed (mph)	EF (g/mile)
Leg A	**40**	**6.30**
Leg B	**40**	**6.30**
Leg C	**27**	**6.10**
Leg D	**27**	**6.10**

***Note: Local roadways should be modeled using an approach speed of 15 mph or less. Highway ramps should be modeled using an approach speed of 5 mph.**

Traffic Signal Timing:

Total Cycle Length (sec): **60**

Red Times:

Type of Movement	Red Times (sec)
Leg A Thru & Rt	**42**
Leg A Left Turn	**---**
Leg B Thru & Rt	**42**
Leg B Left Turn	**---**
Leg C Thru & Rt	**42**
Leg C Left Turn	**---**
Leg D Thru & Rt	**42**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 2.0

USER COMMENTS

Point Defiance Bypass

User Comments:

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Washington State Intersection Screening Tool 2.0

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09:16 AM

Point Defiance Bypass

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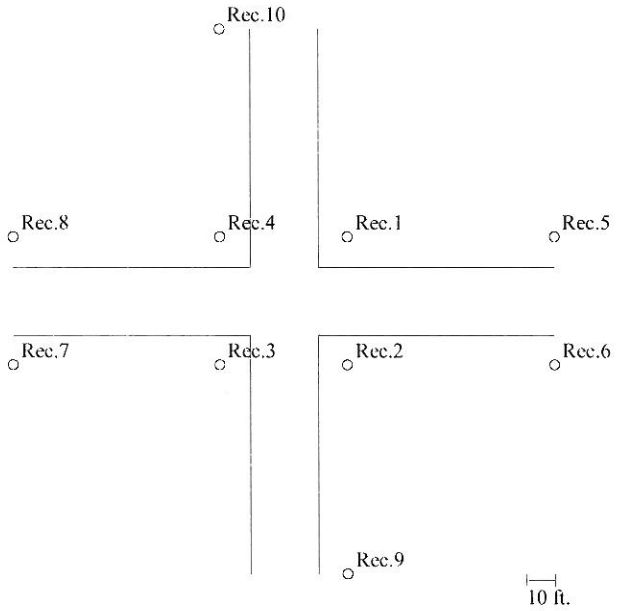

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1	**1**	**10**	**10**	**4.2**	**3.8**	**Pass**
2	**2**	**10**	**10**	**4.2**	**3.8**	**Pass**
3	**3**	**10**	**10**	**4.3**	**3.9**	**Pass**
4	**4**	**10**	**10**	**4.2**	**3.8**	**Pass**
5	**1**	**82**	**10**	**4.2**	**3.8**	**Pass**
6	**2**	**82**	**10**	**4.0**	**3.7**	**Pass**
7	**3**	**82**	**10**	**4.1**	**3.8**	**Pass**
8	**4**	**82**	**10**	**3.8**	**3.6**	**Pass**
9	**2**	**10**	**82**	**3.7**	**3.5**	**Pass**
10	**4**	**10**	**82**	**3.6**	**3.4**	**Pass**

*Project **PASSES** 1-hr and 8-hr NAAQS of 35 ppm and 9 ppm, respectively.

Largest modeled CO concentrations are at **receptor 3**.

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Washington State Intersection Screening Tool 2.0

USER INPUTS

Point Defiance Bypass

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Traffic Volumes:

Vol. Index	Movement	Volume (vph)
1	**A-B Thru**	**3**
2	**A-D Left Turn**	**3**
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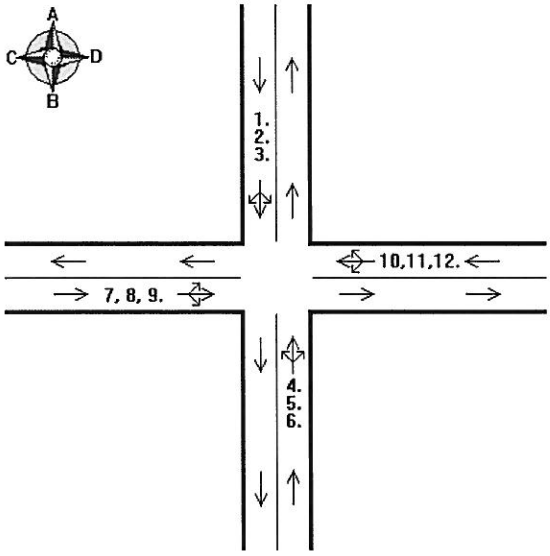
5	**B-C Left Turn**	**7**
6	**B-D Right Turn**	**352**
7	**C-D Thru**	**480**
8	**C-A Left Turn**	**282**
9	**C-B Right Turn**	**3**
10	**D-C Thru**	**295**
11	**D-B Left Turn**	**3**
12	**D-A Right Turn**	**779**



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I/M Program: **No**
Model Year: **2030**
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Type of Movement	Red Times (sec)
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Leg A Left Turn	**---**
Leg B Thru & Rt	**42**
Leg B Left Turn	**---**
Leg C Thru & Rt	**42**
Leg C Left Turn	**---**
Leg D Thru & Rt	**42**
Leg D Left Turn	**---**

***Red times are equal to the "Quick and Easy" values.**

Washington State Intersection Screening Tool 2.0

USER COMMENTS

Point Defiance Bypass

User Comments:

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