June 19, 2012

Dan Handa
City of Puyallup Development Services
333 S Meridian
Puyallup, WA 98371

Subject: Tarragon Puyallup Traffic Impact Analysis – Pierce County Comment Response

Dear Mr. Handa:

This letter serves to address comments made by Pierce County Traffic in the June 7, 2012 letter regarding the Tarragon Puyallup TIA.

An LOS analysis was performed for the Freeman Road & Valley Avenue intersection specified in the comment letter. Baseline volumes for the analysis were taken from a City of Fife count from April of 2012. A 2% annual growth rate was applied with a 2017 horizon year based on the standard Pierce County 5 year outlook. Pipeline volumes from the Benaroya Fife and Stowe Fife projects were included, and those projects' required mitigation of a southbound left turn lane on Freeman Road was also incorporated into the analysis. Refer to the attached count and figure to see applicable volumes. The analysis program was based on Signal 2000 to meet Pierce County requirements rather than the Synchro program used in the original TIA. The results of the analysis are summarized in the table below.

2017 Level of Service
Delays given in Seconds Per Vehicle

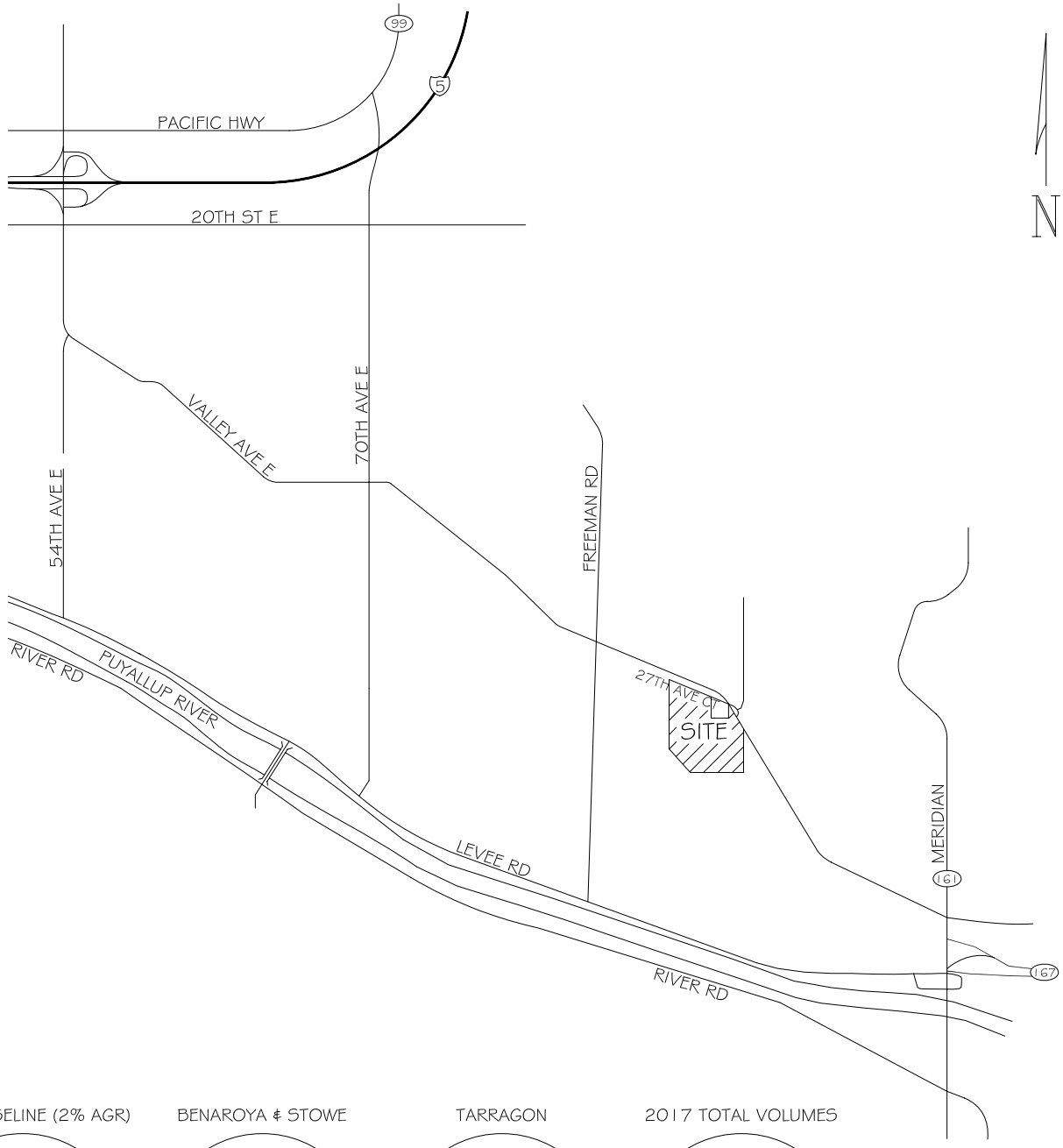
			Without Project			With Project		
Intersection	*Control*	*Approach*	*LOS*	*Delay*	*Xc*	*LOS*	*Delay*	*Xc*
Freeman/Valey	Signal	Southbound	D	52.7		D	52.7	
		Westbound	C	22.5		C	23.2	
		Northbound	D	53.7		D	54.9	
		Eastbound	D	45.5		D	48.1	
		Overall	D	41.4	0.839	D	42.4	0.851

As shown in the table, the intersection should operate without excessive delays with Tarragon traffic included. Intersection capacity also should be adequate. Based on these results, offsite mitigation at this intersection is not proposed for the Tarragon Puyallup project.

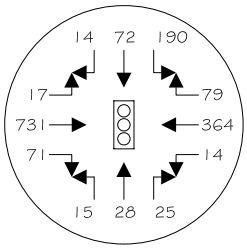
I hope this letter answers the comments sufficiently. Please call if you have any further questions.

Sincerely,

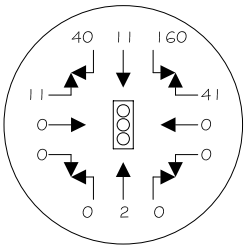
Gregary B. Heath, P.E.



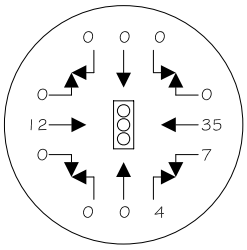
2017 BASELINE (2% AGR)



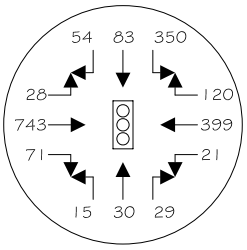
BENAROYA & STOWE



TARRAGON



2017 TOTAL VOLUMES



TARRAGON PUYALLUP

HEATH & ASSOCIATES, INC
Transportation and Civil Engineering

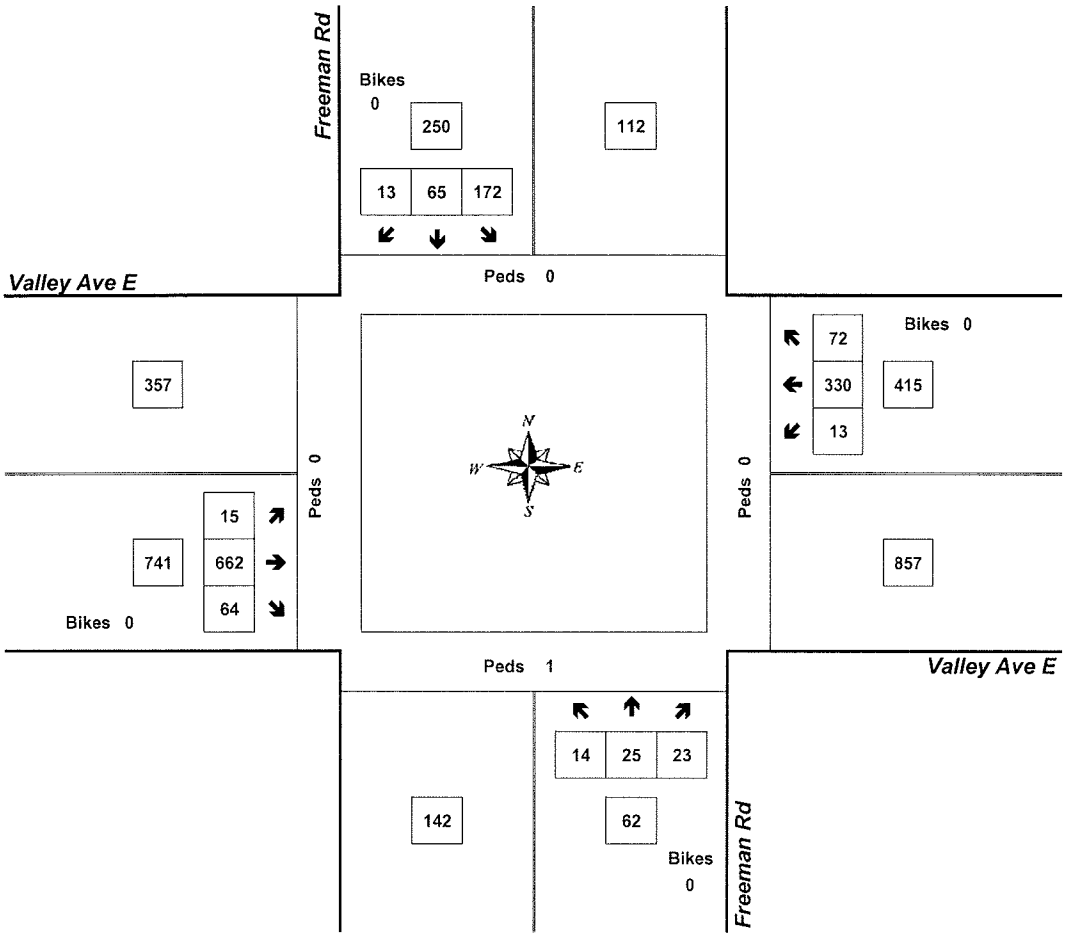
FREEMAN RD & VALLEY AVE VOLUMES

Peak Hour Summary

All Traffic Data Services Inc
Mark Skaggs
(206) 251-0300

Freeman Rd & Valley Ave E

4:15 PM to 5:15 PM
Wednesday, April 18, 2012

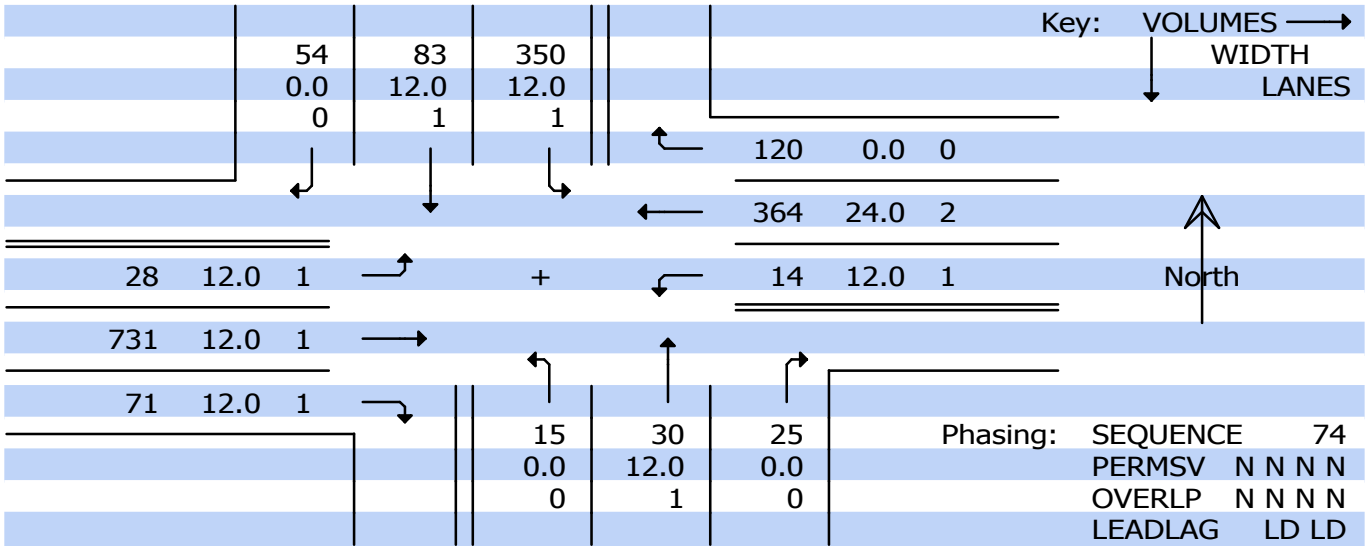


Approach	PHF	HV%	Volume
EB	0.95	7.4%	741
WB	0.86	6.7%	415
NB	0.82	6.5%	62
SB	0.86	0.4%	250
Intersection	0.96	6.0%	1,468

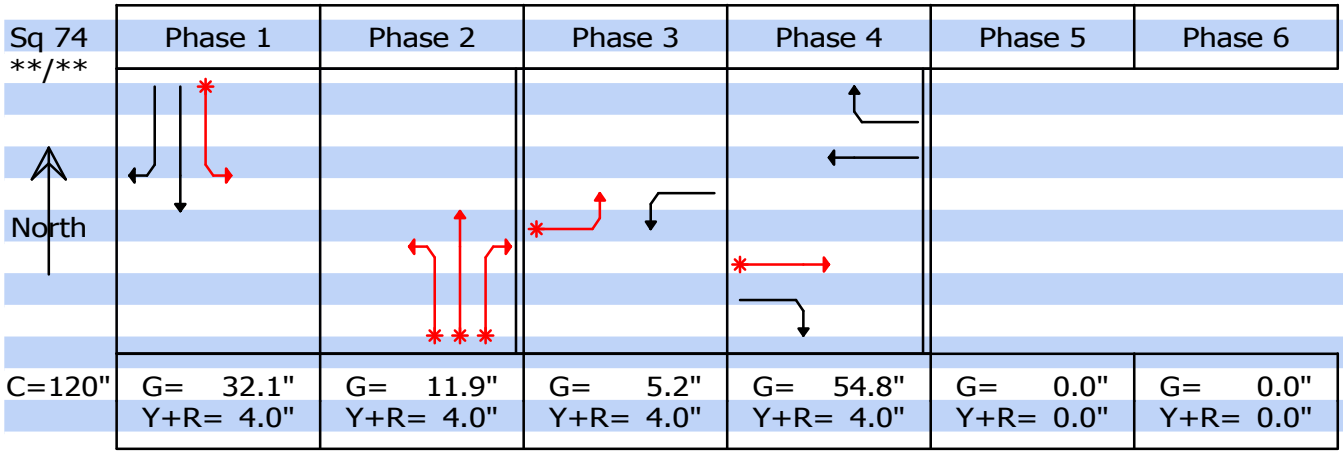
Count Period: 4:00 PM to 6:00 PM

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	18.0	1.0	4.0	4.0	7.0	.0	6.0	6.0	6.0	.0	5.0	9.0
Pk-hr fact, PHF	.86	.86	.86	.86	.86	.86	.82	.82	.82	.95	.95	.95
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			0			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	



SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Volume Adjust & Satflow Worksheet

Volume Adjustment	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Volume, V	54	83	350	120	364	14	25	30	15	71	731	28
Pk-hr fact, PHF	.86	.86	.86	.86	.86	.86	.82	.82	.82	.95	.95	.95
Adj mv flow, vp	63	97	407	140	423	16	30	37	18	75	769	29
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT		RT	TH	LT
Adj LG flow, v		160	407		563	16		85		75	769	29
Prop LT, PLT		.000	1.00		.000	1.00		.212		.000	.000	1.00
Prop RT, PRT		.394	.000		.249	.000		.353		1.000	.000	.000

Saturation Flow Rate	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Base satflo, so		1900	1900		1900	1900		1900		1900	1900	1900
Number lanes, N		1	1		2	1		1		1	1	1
Lane width, fW		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Heavy veh, fHV		.929	.962		.941	1.00		.943		1.000	.952	.917
Grade, fg		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Parking, fp		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Bus block, fbb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Area type, fa		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Lane util, fLU		1.000	1.00		.952	1.00		1.000		1.000	1.00	1.00
Left-turn, fLT		1.000	.950		1.000	.950		.990		1.000	1.00	.950
Right-turn, fRT		.941	1.00		.963	1.00		.952		.850	1.00	1.00
PedBike LT,fLpb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
PedBike RT,fRpb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Local adjustmnt		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Adj satflow, s		1660	1736		3278	1805		1689		1615	1810	1656

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Capacity and LOS Worksheet

Capacity Analysis	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT		RT	TH	LT
Adj Flow, v		160	407		563	16		85		75	769	29
Satflow, s		1660	1736		3278	1805		1689		1615	1810	1656
Lost time, tL		4.0	4.0		4.0	4.0		4.0		4.0	4.0	4.0
Effect green, g		32.1	32.1		54.8	5.2		11.9		54.8	54.8	5.2
Grn ratio, g/C		.267	.267		.457	.043		.099		.457	.457	.043
LG capacity, c		444	464		1497	79		168		738	827	72
v/c ratio, X		.360	.877		.376	.203		.506		.102	.930	.403
Flow ratio, v/s		.096	.235		.172	.009		.050		.046	.425	.018
Crit lane group			*					*			*	*
Sum crit v/s,Yc		0.727		Total lost, L				16.0				
Crit v/c, Xc		.839										

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Capacity and LOS Worksheet

Delay and LOS	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT		RT	TH	LT
Adj Flow, v		160	407		563	16		85		75	769	29
LG capacity, c		444	464		1497	79		168		738	827	72
v/c ratio, X		.360	.877		.376	.203		.506		.102	.930	.403
Grn ratio, g/C		.267	.267		.457	.043		.099		.457	.457	.043
Unif delay, d1		35.6	42.1		21.4	55.4		51.3		18.6	30.8	55.9
Incr calib, k		.11	.40		.11	.11		.11		.11	.45	.11
Incr delay, d2		.5	17.1		.2	1.3		2.5		.1	16.8	3.7
Queue Delay, d3		.0	.0		.0	.0		.0		.0	.0	.0
Unif delay, d1*		.0	.0		.0	.0		.0		.0	.0	.0
Prog factor, PF		1.00	1.00		1.00	1.00		1.00		1.00	1.00	1.00
Contrl delay, d		36.2	59.2		21.5	56.7		53.7		18.6	47.6	59.5
Lane group LOS		D+	E+		C+	E+		D		B	D	E+
Final Queue,Qbi		0	0		0	0		0		0	0	0
Appr delay, dA		52.7			22.5			53.7			45.5	
Approach LOS		D			C+			D			D	
Appr flow, vA		567			579			85			873	
Intersection:	Delay		41.4	LOS		D+						

TARRAGON PUYALLUP
FREEMAN RD & VALLEY AVE
2017 PM PEAK HOUR VOLUMES WITHOUT PROJECT

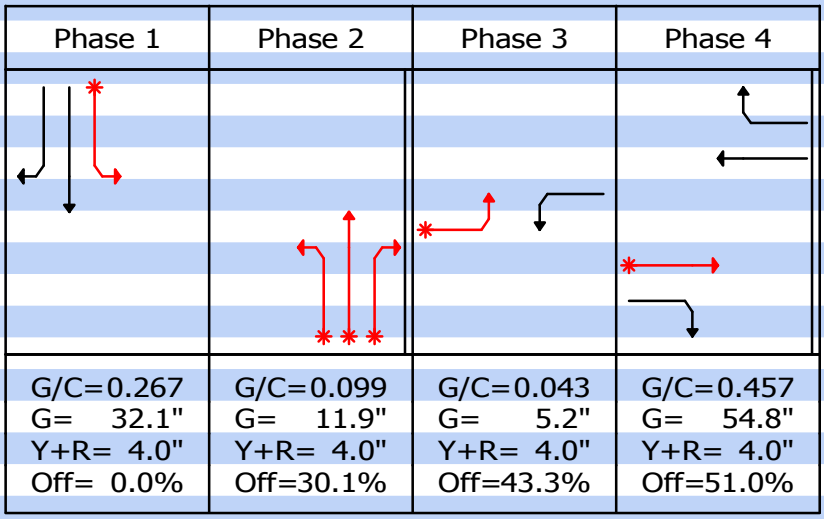
06/19/12
15:55:39

SIGNAL2000/TEAPAC[Ver 2.70.07] - Evaluation of Intersection Performance

Intersection # 1 -

Sq 74
/

North



C=120 sec G=104.0 sec = 86.7% Y=16.0 sec = 13.3% Ped= 0.0 sec = 0.0%

MVMT TOTALS	SB Approach			WB Approach			NB Approach			EB Approach			Int
Param:Units	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
AdjVol: vph	63	97	407	140	423	16	30	37	18	75	769	29	2104
Wid/Ln:ft/#	0/0	12/1	12/1	0/0	24/2	12/1	0/0	12/1	0/0	12/1	12/1	12/1	
g/C Rqd@C:%	0	28	36	0	31	24	0	26	0	26	49	24	
g/C Used: %	0	27	27	0	46	4	0	10	0	46	46	4	
SV @E: vph	0	434	455	0	1497	55	0	139	0	738	827	50	4195
Svc Lvl:LOS		D+	E+		C+	E+		D		B	D	E+	D+
Deg Sat:v/c	0.00	0.36	0.88	0.00	0.38	0.20	0.00	0.51	0.00	0.10	0.93	0.40	0.67
HCM Del:s/v	0.0	36.2	59.2	0.0	21.5	56.7	0.0	53.7	0.0	18.6	47.6	59.5	41.4
Tot Del:min	0	24	100	0	51	4	0	19	0	6	152	7	363
# Stops:veh	0	32	97	0	92	4	0	20	0	11	182	7	445
Queue 1:veh	0	8	25	0	12	1	0	5	0	3	44	2	44

SIGNAL2000/TEAPAC[Ver 2.70.07] - Evaluation of Intersection Performance

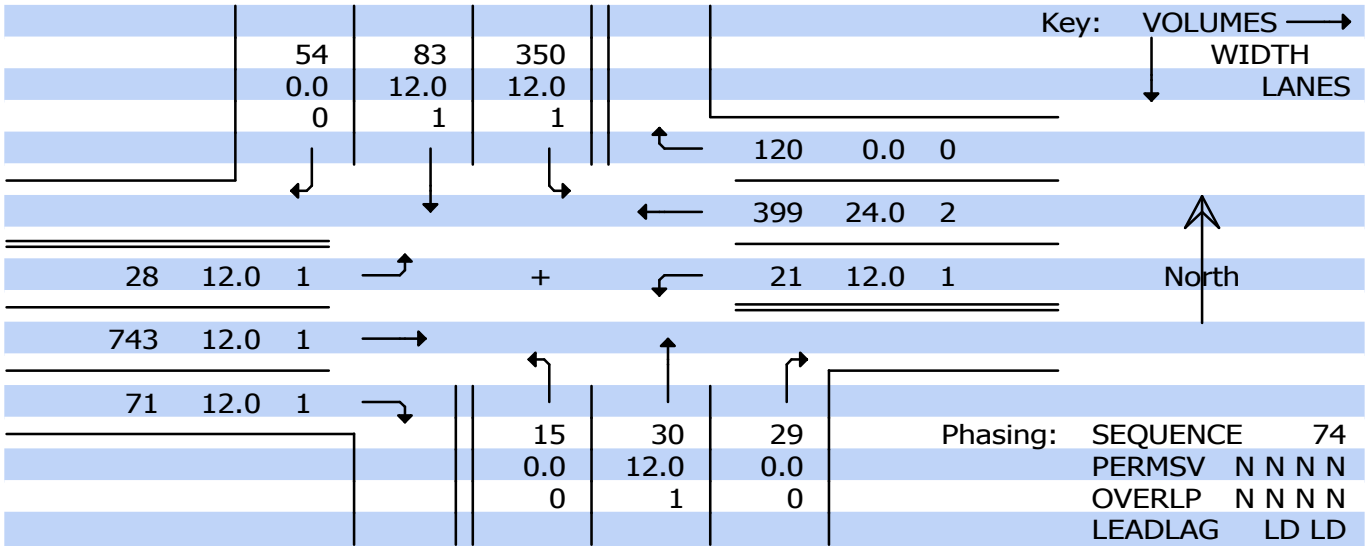
APPR TOTALS Param:Units	B Approach	B Approach	B Approach	B Approach	Int Total
AdjVol: vph	567	579	85	873	2104
Svc Lvl:LOS	D	C+	D	D	D+
Deg Sat:v/c	0.73	0.37	0.51	0.84	0.67
HCM Del:s/v	52.7	22.5	53.7	45.5	41.4
Tot Del:min	124	55	19	165	363
# Stops:veh	129	96	20	200	445
Queue 1:veh	25	12	5	44	44

TARRAGON PUYALLUP
FREEMAN RD & VALLEY AVE
2017 PM PEAK HOUR VOLUMES WITH PROJECT

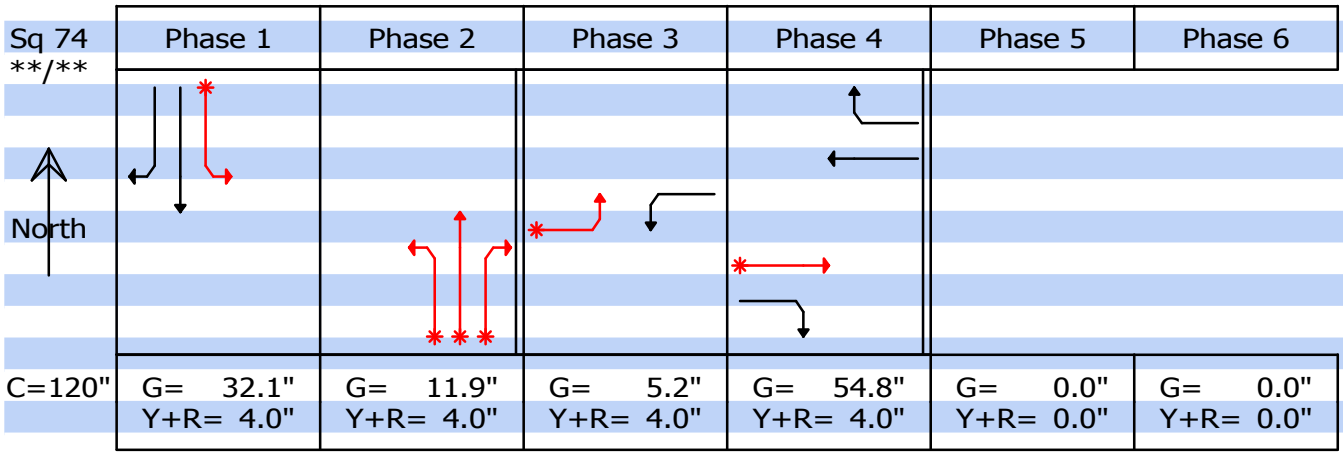
06/19/12
15:56:19

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD



	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	18.0	1.0	4.0	4.0	7.0	.0	6.0	6.0	6.0	.0	5.0	9.0
Pk-hr fact, PHF	.86	.86	.86	.86	.86	.86	.82	.82	.82	.95	.95	.95
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			0			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	



SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Volume Adjust & Satflow Worksheet

Volume Adjustment	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Volume, V	54	83	350	120	399	21	29	30	15	71	743	28
Pk-hr fact, PHF	.86	.86	.86	.86	.86	.86	.82	.82	.82	.95	.95	.95
Adj mv flow, vp	63	97	407	140	464	24	35	37	18	75	782	29
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT		RT	TH	LT
Adj LG flow, v		160	407		604	24		90		75	782	29
Prop LT, PLT		.000	1.00		.000	1.00		.200		.000	.000	1.00
Prop RT, PRT		.394	.000		.232	.000		.389		1.000	.000	.000

Saturation Flow Rate	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Base satflo, so		1900	1900		1900	1900		1900		1900	1900	1900
Number lanes, N		1	1		2	1		1		1	1	1
Lane width, fW		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Heavy veh, fHV		.929	.962		.941	1.00		.943		1.000	.952	.917
Grade, fg		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Parking, fp		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Bus block, fbb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Area type, fa		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Lane util, fLU		1.000	1.00		.952	1.00		1.000		1.000	1.00	1.00
Left-turn, fLT		1.000	.950		1.000	.950		.990		1.000	1.00	.950
Right-turn, fRT		.941	1.00		.965	1.00		.947		.850	1.00	1.00
PedBike LT,fLpb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
PedBike RT,fRpb		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Local adjustmnt		1.000	1.00		1.000	1.00		1.000		1.000	1.00	1.00
Adj satflow, s		1660	1736		3285	1805		1682		1615	1810	1656

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Capacity and LOS Worksheet

Capacity Analysis	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT		RT	TH	LT
Adj Flow, v		160	407		604	24		90		75	782	29
Satflow, s		1660	1736		3285	1805		1682		1615	1810	1656
Lost time, tL		4.0	4.0		4.0	4.0		4.0		4.0	4.0	4.0
Effect green, g		32.1	32.1		54.8	5.2		11.9		54.8	54.8	5.2
Grn ratio, g/C		.267	.267		.457	.043		.099		.457	.457	.043
LG capacity, c		444	464		1500	79		167		738	827	72
v/c ratio, X		.360	.877		.403	.304		.539		.102	.946	.403
Flow ratio, v/s		.096	.235		.184	.013		.054		.046	.432	.018
Crit lane group			*					*			*	*
Sum crit v/s,Yc		0.738		Total lost, L				16.0				
Crit v/c, Xc		.851										

SIGNAL2000/TEAPAC[Ver 2.70.07] - HCM Capacity and LOS Worksheet

Delay and LOS	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Lane group, LG		RT+TH	LT		RT+TH	LT		RT+TH+LT			RT	TH	LT
Adj Flow, v		160	407		604	24		90			75	782	29
LG capacity, c		444	464		1500	79		167			738	827	72
v/c ratio, X		.360	.877		.403	.304		.539			.102	.946	.403
Grn ratio, g/C		.267	.267		.457	.043		.099			.457	.457	.043
Unif delay, d1		35.6	42.1		21.7	55.6		51.4			18.6	31.2	55.9
Incr calib, k		.11	.40		.11	.11		.14			.11	.46	.11
Incr delay, d2		.5	17.1		.2	2.2		3.5			.1	19.3	3.7
Queue Delay, d3		.0	.0		.0	.0		.0			.0	.0	.0
Unif delay, d1*		.0	.0		.0	.0		.0			.0	.0	.0
Prog factor, PF		1.00	1.00		1.00	1.00		1.00			1.00	1.00	1.00
Contrl delay, d		36.2	59.2		21.9	57.8		54.9			18.6	50.5	59.5
Lane group LOS		D+	E+		C+	E+		D			B	D	E+
Final Queue,Qbi		0	0		0	0		0			0	0	0
Appr delay, dA		52.7			23.2			54.9				48.1	
Approach LOS		D			C+			D				D	
Appr flow, vA		567			628			90				886	
Intersection:	Delay		42.4	LOS		D+							

SIGNAL2000/TEAPAC[Ver 2.70.07] - Evaluation of Intersection Performance

Intersection # 1 -

Sq 74
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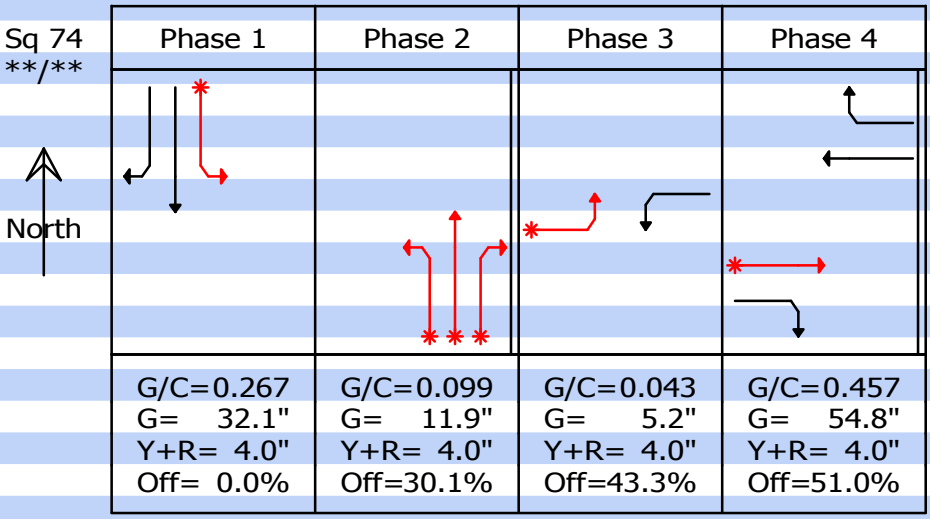

Phase 1	Phase 2	Phase 3	Phase 4
G/C=0.267	G/C=0.099	G/C=0.043	G/C=0.457
G= 32.1"	G= 11.9"	G= 5.2"	G= 54.8"
Y+R= 4.0"	Y+R= 4.0"	Y+R= 4.0"	Y+R= 4.0"
Off= 0.0%	Off=30.1%	Off=43.3%	Off=51.0%

C=120 sec G=104.0 sec = 86.7% Y=16.0 sec = 13.3% Ped= 0.0 sec = 0.0%

MVMT TOTALS	SB Approach			WB Approach			NB Approach			EB Approach			Int
Param:Units	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT	Total
AdjVol: vph	63	97	407	140	464	24	35	37	18	75	782	29	2171
Wid/Ln:ft/#	0/0	12/1	12/1	0/0	24/2	12/1	0/0	12/1	0/0	12/1	12/1	12/1	
g/C Rqd@C:%	0	28	36	0	32	24	0	26	0	26	50	24	
g/C Used: %	0	27	27	0	46	4	0	10	0	46	46	4	
SV @E: vph	0	434	455	0	1500	55	0	138	0	738	827	50	4197
Svc Lvl:LOS		D+	E+		C+	E+		D		B	D	E+	D+
Deg Sat:v/c	0.00	0.36	0.88	0.00	0.40	0.30	0.00	0.54	0.00	0.10	0.95	0.40	0.68
HCM Del:s/v	0.0	36.2	59.2	0.0	21.9	57.8	0.0	54.9	0.0	18.6	50.5	59.5	42.4
Tot Del:min	0	24	100	0	55	6	0	21	0	6	165	7	384
# Stops:veh	0	32	97	0	101	6	0	21	0	11	187	7	462
Queue 1:veh	0	8	25	0	13	2	0	6	0	3	46	2	46

SIGNAL2000/TEAPAC[Ver 2.70.07] - Evaluation of Intersection Performance

APPR TOTALS Param:Units	B Approach	B Approach	B Approach	B Approach	Int Total
AdjVol: vph	567	628	90	886	2171
Svc Lvl:LOS	D	C+	D	D	D+
Deg Sat:v/c	0.73	0.40	0.54	0.86	0.68
HCM Del:s/v	52.7	23.2	54.9	48.1	42.4
Tot Del:min	124	61	21	178	384
# Stops:veh	129	107	21	205	462
Queue 1:veh	25	13	6	46	46