City of Bellevue, Transportation
Modeling and Analysis Group

Final Report

November 13, 2007

CONCURRENCY UPDATE

LOS Snapshot as of September 15, 2007

Introduction

The Washington State Growth Management Act (GMA) of 1990 requires that local jurisdictions adopt ordinances to establish *concurrency* measurement mechanisms to determine the ability of the transportation system to support new development. The City of Bellevue's adopted Traffic Standards Code (TSC Chapter 14.10) establishes the city's transportation concurrency requirements, level of service (LOS) standards and methodologies, and compliance determination process. The Director's Guidelines of 2001 further define the specifications of this procedure.

An assessment of transportation concurrency is prepared annually by the Bellevue Transportation Department to update information on land use developments and transportation conditions within the city. The primary objective is to provide a snapshot of the latest transportation system LOS findings to inform land use and transportation decision-making. In addition, the concurrency report is used to identify problem areas so that traffic mitigation options may be explored to effectively accommodate changing conditions.

This report summarizes existing LOS analysis results as well as the future concurrency LOS forecast from the city's Concurrency Model platform (MP6-R9). This model takes into account development applications that had received either design review or building permit approvals from the City's Planning and Community Development Department (PCD) as of September 15, 2007. The transportation network assumed in the analysis is the 2006 existing roadway network, plus fully funded capacity improvement projects in the Amended 2007-2013 Capital Investment Program (CIP) as adopted by the Bellevue City Council.

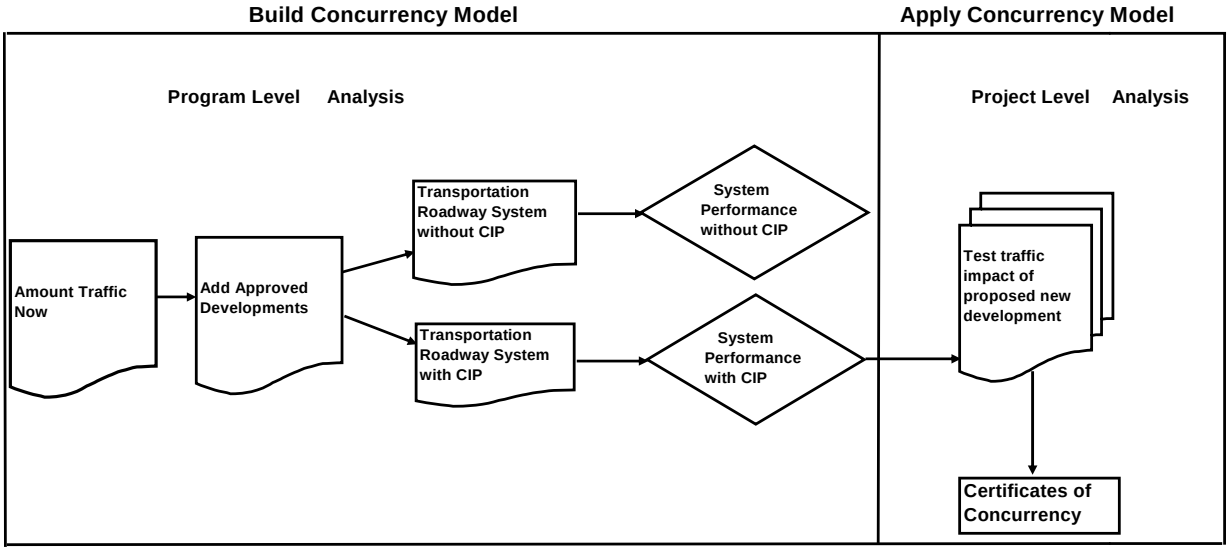
The concurrency snapshot reflects short-range projections about average traffic conditions within the city during the PM peak 2 hour period. The conditions described represent computed volume-to-capacity (v/c) ratios for 104 "system" intersections within fourteen Mobility Management Areas (MMAs). System intersections are arterial street intersections controlled (and to be controlled) by traffic signals, and MMAs are geographic sub-areas of the city, designated for traffic analysis purposes.

Methodology

The analysis documented in this report is based on the Highway Capacity Manual (HCM) 209/2-Hour average method updated in 2000. This is the City's adopted LOS analysis procedure as outlined in the Traffic Standards Code (Chapter 14.10). The city adopted this method in 1998.

Based on the 2000 HCM 209 document, the operational method provides a complex set of procedures to intersection-specific geometric, traffic and signal conditions for a performance rating, i.e. level of service, including:

- For intersection capacity analysis, peak hour traffic volumes are averaged over a two-hour period from 4 PM to 6 PM, which generally represents the most congested traffic conditions.
- Uniform traffic demand has been assumed over the two-hour period, as represented by a peak hour factor (PHF) of 1.
- Intersection utilization is estimated and reported in v/c ratios.
- The intersection v/c ratios are averaged for the system intersections in each MMA and then compared with the adopted standards for each MMA to estimate available reserve capacity.
- Each sub-area has a "congestion allowance", which is the maximum number of intersections allowed to exceed the standard v/c ratio for that sub-area.
- Lastly, development is considered concurrent if resulting traffic impacts do not cause the area-wide average to exceed the adopted v/c ratio and the number of congested intersections in the area does not exceed the congestion allowance.



Note: This LOS snapshot was prepared at a PROGRAM level as opposed to a PROJECT level (usually referred to as development review project modeling). This distinction is important because the two approaches produce slightly different results. At the PROGRAM level, all analysis is done using the city's 6-year EMME/2 travel demand model platform (MP6), including trip generation, where broad categorical trip rates are used. In contrast, a PROJECT level concurrency analysis involves a combined ITE (Institute of Transportation Engineers) and EMME/2 approach. Trip generation applies detailed ITE based trip generation and pass-by percentage rates for the specific building size or use. The mode split for drive-alone and share-ride, traffic distribution and assignment modeling steps are done within the MP6 EMME/2 model.

Figure 1: New Development Approved as of 9/15/2007

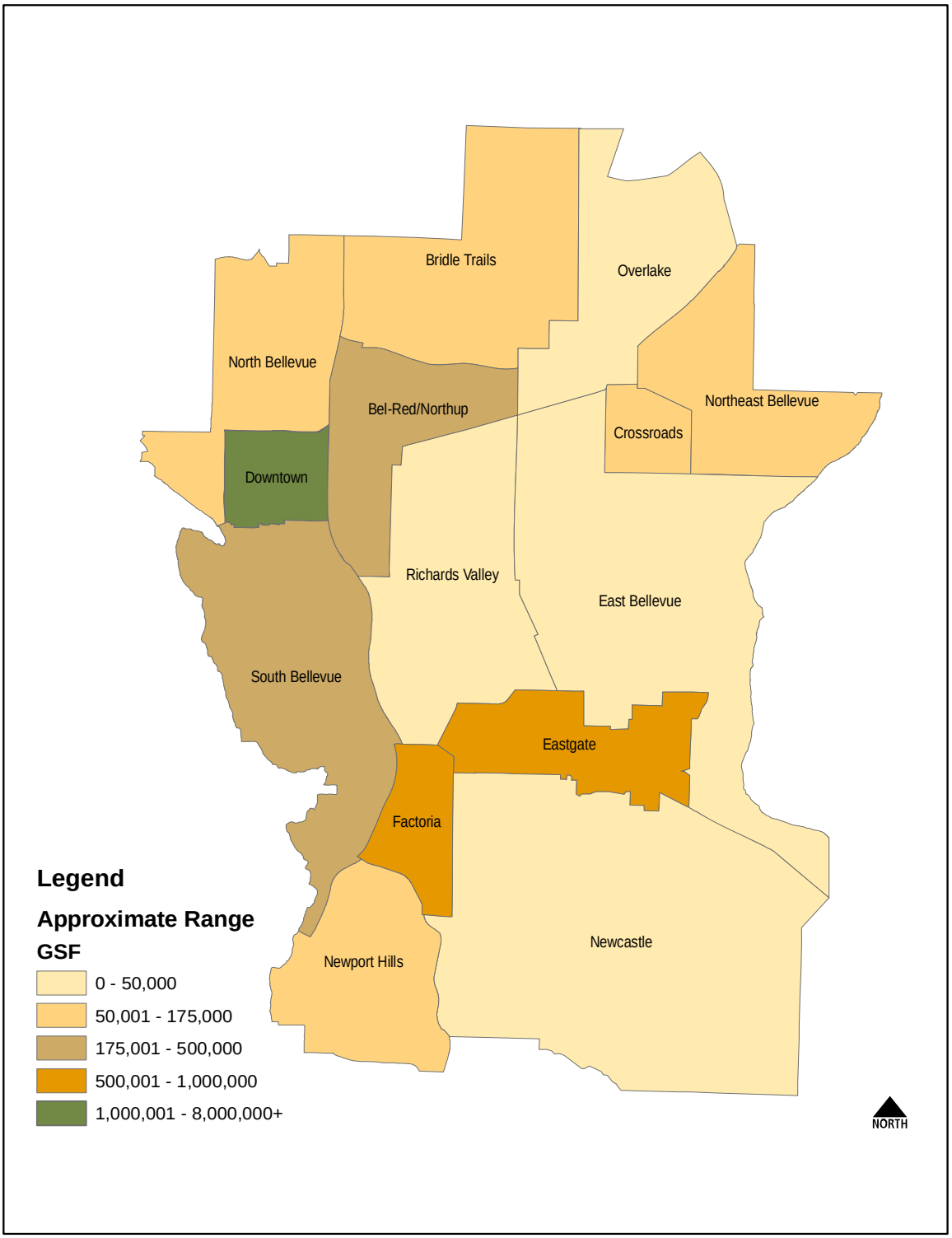


Figure 1 shows MMAs where development occurred or was approved during a period from 1/1/07 to 9/15/07. Development is shown by the approximate range of gross square feet. A detailed breakdown is provided in Tables 1 and 2.

Assumptions

LAND USE: The cities of Redmond and Kirkland provided their 2006 land use for validation of the 2006 existing BKR (Bellevue-Kirkland-Redmond) model platform. The land use estimates for Bellevue include all existing year 2006 land use extracted from the land use permit tracking system (AMANDA) as of December 31, 2006 and permitted developments approved by the City of Bellevue by the current update (September 15, 2007). These permitted developments represent the new increment of land use change for concurrency testing. Table 1 provides an MMA-level summary of the estimate of the existing 2006 land use. Since not all development occurs on formerly vacant land, the land use information also accounted for demolition and conversions of land use. This provides the net amount of development in the various land use categories. Table 2 provides details of new and permitted land use. Tables 3 and 4 list the MMA level summary of estimated new and permitted land use, and concurrency land use in mid-September 2007, respectively.

Vacancy rates are assumed citywide for modeling of existing and concurrency land use snapshots: Office = 10%, Retail = 5%, and Industrial = 7.5%. Actual vacancy rates may differ from the assumed pro forma rates but the assumed rates provide reasonable averages that are generally consistent over time.

Table 1: Base Year Land Use Summary as of 12/31/06

		COMMERCIAL DEVELOPMENT			DWELLING UNITS	
MMA	SUBAREA	OFFICE	RETAIL	OTHER	S_Family	M_Family
1	North Bellevue	1,690,913	106,234	474,857	2,049	3,031
2	Bridle Trails	557,716	498,039	339,302	1,622	3,176
3	Downtown	6,909,828	3,825,658	1,441,902	8	4,125
4	Bel-Red/Northup	4,047,854	1,963,345	5,376,484	128	1,008
5	Crossroads	136,785	861,300	177,907	11	3,317
6	Northeast Bellevue	391,830	8,600	539,478	3,230	160
7	South Bellevue	1,269,735	98,496	1,447,895	2,617	2,019
8	Richards Valley	565,508	21,411	462,639	2,385	3,130
9	East Bellevue	601,981	424,362	1,764,384	7,206	2,731
10	Eastgate	2,937,201	324,820	3,082,138	293	818
11	Newcastle	147,338	65,368	648,019	8,449	1,084
12	Overlake*	614,298	933,772	981,815	19	265
13	Factoria	1,427,820	930,868	528,974	327	1,120
14	Newport Hills	14,698	179,591	48,112	3,675	632
	TOTAL	21,313,503	10,241,862	17,313,906	32,019	26,616

* Bellevue portion only

This concurrency update indicates that more than 5.6 million additional gross square feet (GSF) of non-residential development and nearly 4,500 residential dwelling units are permitted or being built in the city since the update for year end 2006. A comparison of the land use totals by category for the 14 MMAs results in the following observations for concurrency:

TABLE 2: Projects Contributing to Change (As of September 15, 2007)

Development Name	MMA	Office	Retail	Other	SF Units	MF Units
Parkside Villa	1	-	-	-		5
15th Street, LLC now known as 405 Office	1	9,782	-	-		-
1200 Bellevue Way Townhomes -	1	-	-	-		49
The Commons	1	31,620		-		
Westminster Chapel	2	-	-	51,608		-
1020 Residential Tower	3		3,925	-		129
Belletini	3	3,618	19,658	-		150
BRE Belcarra	3			-		300
Vue Hanover	3	2,482		-		202
Williams Sonoma Expansion	3	-	22,595	-		-
Gregg's Bellevue Cycle	3	-	11,918	-		-
Main Street	3			-		65
Bellevue at Main	3					138
Ventana on Main	3			-		68
Metro 112	3			-		300
Meydenbauer Inn	3		-	-		68
The Summit - Phase II/Bldg C	3	390,000		-		
Tower 333 - Office Building	3	447,015	10,423	2,620		-
Avalon Meydenbauer	3	3,161	89,961	-		368
Bellevue Towers	3	-	16,114	-		557
City Center II	3	558,921	16,765	-		
The Bravern	3	733,042	265,847	-		455
Lincoln Square North Office Tower	3	573,367	-	-		-
Bellevue Place Hyatt and Retail Expansion	3	-	4,134	339,267		-
Washington Square	3	7,455	8,603	-		373
European Tower	3			-		18
Ashwood II (Ashwood Commons)	3	15,460	64,502	-		274
Gateway	3			-		130
Lexus of Bellevue - Dealership	4	29,961	66,517	-		-
Wilburton Instructional Service Center	4	3,116	5,325	1,200		-
Spectrum Controls	4	8,450	-	-		-
Overlake Hospital Medical Center - S Tower	4	-	-	140,000		-
Group Health Cooperative Medical Center	4			200,000		
Crossroads II	5	27,856		-		
Crossroads Plaza	5		9,600	-		
Enclave at Fox Glen (Bellevue Townhomes)	5			-	-	26
Rozenblat Townhomes	5	-	-	-		20
Youth Eastside Services	5	15,653	2,984	2,222		-
5 Corners Development	5	33,610	-	1,216		-
Bel Red Office	5	19,871		-		
Sherwood Forest Elementary School	6	-	10,122	55,489		-
Mercer Slough Environmental Education Ctr	7	-	-	10,252		-
Bellevue Club	7	-	15,574	-		-
Residence Inn by Marriott	7	-	-	115,500		-
Advanced Dentistry Northwest	7	2,000		-		
Bellevue City View	7	-	-	-		47
305 Bellevue Way Townhomes	7	-	-	-		9
Bellevue Pump Station Upgrade	7			2910		
Bellevue CC Science & Technology Bldg	10	-	-	62,556		-
Landerholm Plaza	10	27,256		-		
Advanta	10	614,919	-	-		-
Sierra Suites Hotel	10	-	-	97,132		-
Marketplace @ Factoria	13		151,000	-		685
Two Newport Office Building	13	131,833		-		
Newport Heights Elementary School	14	-	19,299	58,681		-
	Total	3,690,448	814,866	1,140,653	-	4,436

Note: Shaded cells are Downtown Bellevue sites (MMA 3).

1. Between the end of 2006 and September 15, 2007, the new and permitted office development is more than 3.6 million GSF, growing from about 21.3 million GSF to 25 million GSF. Of additional office space citywide, 75% is sited within Downtown Bellevue (MMA 3). Retail development will increase by over 814,850 GSF from about 10.2 million GSF to 11. million GSF. About 66% of the city's new retail land use is located on downtown sites.

2. The Other development category consists of hotels, churches, school buildings, social services, maintenance facilities and child care facilities, which total over 1.1 million GSF citywide. Downtown Bellevue and BelRed/Northup MMAs each will take 30% of this growth due to new hotel rooms and the medical facilities (as shown specifically in Table 2). Also the Bridle Trails, Crossroads, Northeast Bellevue, South Bellevue, Eastgate, and Newport Hills MMAs each have some projects in the Other land use category.

3. New or permitted housing developments between the end of 2006 and September 15, 2007 consist of 4,436 multi-family units and 55 additional single-family units. More than 80% of new multi-family permitted development is in downtown Bellevue and a large amount in Factoria. The citywide residential pattern is 51% single-family and 49% multifamily units.

TABLE 3: Summary of New & Permitted Land Use by MMA as of 9/15/2007

		COMMERCIAL DEVELOPMENT			DWELLING UNITS	
MMA	SUBAREA	OFFICE	RETAIL	OTHERS	S_Family	M_Family
1	North Bellevue	41,402	-	-	-	54
2	Bridle Trails	-	-	51,608	-	-
3	Downtown	2,734,521	534,445	341,887	-	3,595
4	Bel-Red/Northup	41,527	71,842	341,200	-	-
5	Crossroads	96,990	12,584	3,438	-	46
6	Northeast Bellevue	-	10,122	55,489	-	-
7	South Bellevue	2,000	15,574	128,662	-	56
8	Richards Valley					
9	East Bellevue					
10	Eastgate	642,175	-	159,688	-	-
11	Newcastle	-	-	-	-	-
12	Overlake*					
13	Factoria	131,833	151,000	-	-	685
14	Newport Hills	-	19,299	58,681		-
	TOTAL	3,690,448	814,866	1,140,653	55	4,436

Note: The Single Family includes only the net new units completed in first half of 2007.

Table 4: Concurrency Land Use Summary as of 9/15/2007

(2006 Existing Land Use + Permitted Land Use)

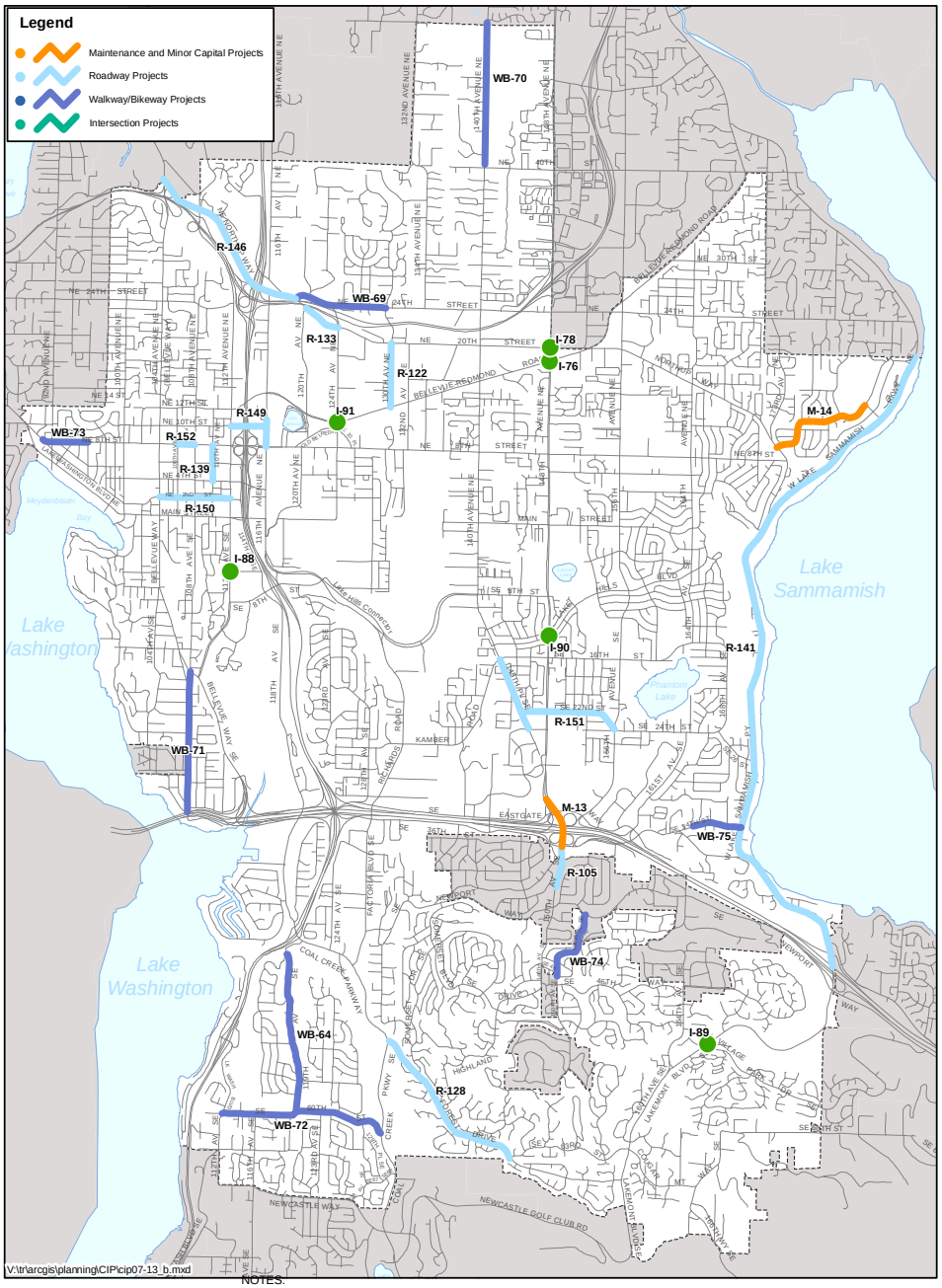
		COMMERCIAL DEVELOPMENT			DWELLING UNITS	
MMA	SUBAREA	OFFICE	RETAIL	OTHERS	S_Family	M_Family
1	North Bellevue	1,732,315	106,234	474,857	2,049	3,085
2	Bridle Trails	557,716	498,039	390,910	1,622	3,176
3	Downtown	9,644,349	4,360,103	1,783,789	8	7,720
4	Bel-Red/Northup	4,089,381	2,035,187	5,717,684	128	1,008
5	Crossroads'	233,775	873,884	181,345	11	3,363
6	Northeast Bellevue	391,830	18,722	594,967	3,230	160
7	South Bellevue	1,271,735	114,070	1,576,557	2,617	2,075
8	Richards Valley	565,508	21,411	462,639	2,385	3,130
9	East Bellevue	601,981	424,362	1,764,384	7,206	2,731
10	Eastgate	3,579,376	324,820	3,241,826	293	818
11	Newcastle	147,338	65,368	648,019	8,449	1,084
12	Overlake*	614,298	933,772	981,815	19	265
13	Factoria	1,559,653	1,081,868	528,974	327	1,805
14	Newport Hills	14,698	198,890	106,793	3,675	632
	TOTAL	25,003,951	11,056,728	18,454,559	32,074	31,052

TRANSPORTATION: The adopted 2007-2013 CIP, as amended through September 15th, 2007, is used for this analysis and report. The concurrency model network includes all funded projects that would add capacity to roadways and intersections. These capacity projects include roadway widening, intersection signalization and channelization, and access improvements. The 2007-2013 CIP capacity project locations are shown in Figure 2.

The current CIP intersection capacity projects are listed as follows:

I-76	148th Avenue NE/Bel-Red Road
I-78	148th Avenue NE/NE 20th Street
I-83	Redmond BROTS Projects
I-88	112th Avenue SE/SE 6th Street Signal
I-89	Lakemont Blvd/Village Pk Drive
I-90	148th Ave SE/Lk Hills Blvd

Fig. 2: 2007 - 2013 Transportation CIP Projects



NOTES:

1. Projects R-44 and R-145 are not shown as they are study projects.

2. Projects R-46, R-87, R-130, R-136, R-147, R-153, R-154, R-155, R-156, R-157, WB-49, WB-56, I-83, I-84, M-1, M-2, M-3, M-7, M-8, M-12, M-15, and M-19 are not shown as they are in multiple or non-specific locations in the City.

3. Projects R-82 and R-83 are not shown as they are administrative projects.

4. Project WB-53 is not shown as it is a maintenance program project.

NORTH

= 5,400 feet

City of Bellevue
IT Department
GIS Services
Plot Date: 1/25/2007

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The CIP roadway capacity projects are listed as follows (note: * indicates projects completed by 2006; work continued into 2007 for the others):

R-105*	150th Ave SE - Newport Way to SE 36th St
R-128*	Forest Drive Improvements – Intersection geometry, add left turn pocket
R-133	Northup Way - 120th to 124th Avenues NE
R-139	110th Ave NE - NE 4th St to NE 6th St
R-149	NE 10th Street Extension
R-151	145th Place SE/SE 16th Street to SE 24th Street AND SE 22nd Street/145th Place to 156th Place SE
R-152	NE 8th Street/106th Avenue NE to 108th Avenue NE

This concurrency update includes the 2006 base year LOS analysis as a benchmark to compare concurrency LOS with and without the 2007-2013 CIP projects.

TRAFFIC COUNTS: Figure 3 shows the change in observed 2006 compared to 2005 measures of Average Annual Weekday Traffic (AAWT) in Bellevue. Table 5 shows the actual difference between 2005 and 2006 PM peak 2-hour average traffic volumes for all 104 system intersections in Bellevue, as well as 300 citywide intersections. As shown by Table 5, intersection PM peak hour volumes increased by an overall citywide average of 2% from 2005 to 2006, while system intersections show an average increase of 3.3%.

The 2006 base year PM peak 2 hour average counts were used along with the 2006 existing intersection geometry and signal timing plan to calculate system intersection volume to capacity (v/c) ratios for LOS analysis based on the 2000 HCM/209 method. The results are summarized at the MMA level, compared with City's LOS standards (Table 6), and shown in Table 7.

The concurrency model outputs from MP6-R9 were adjusted using a post processor (a computer program) to account for model validation differences. The base year 2006 2-hour average counts were post - processed to adjust the model output for the predicted concurrency intersection traffic volumes. Based on the forecast volume, intersection v/c ratios were analyzed for future 6-year conditions with and without the 2007-2013 CIP capacity projects (as shown in Table 8).

Figure 3: Change in Annual Average Weekday Traffic 2006 - 2005

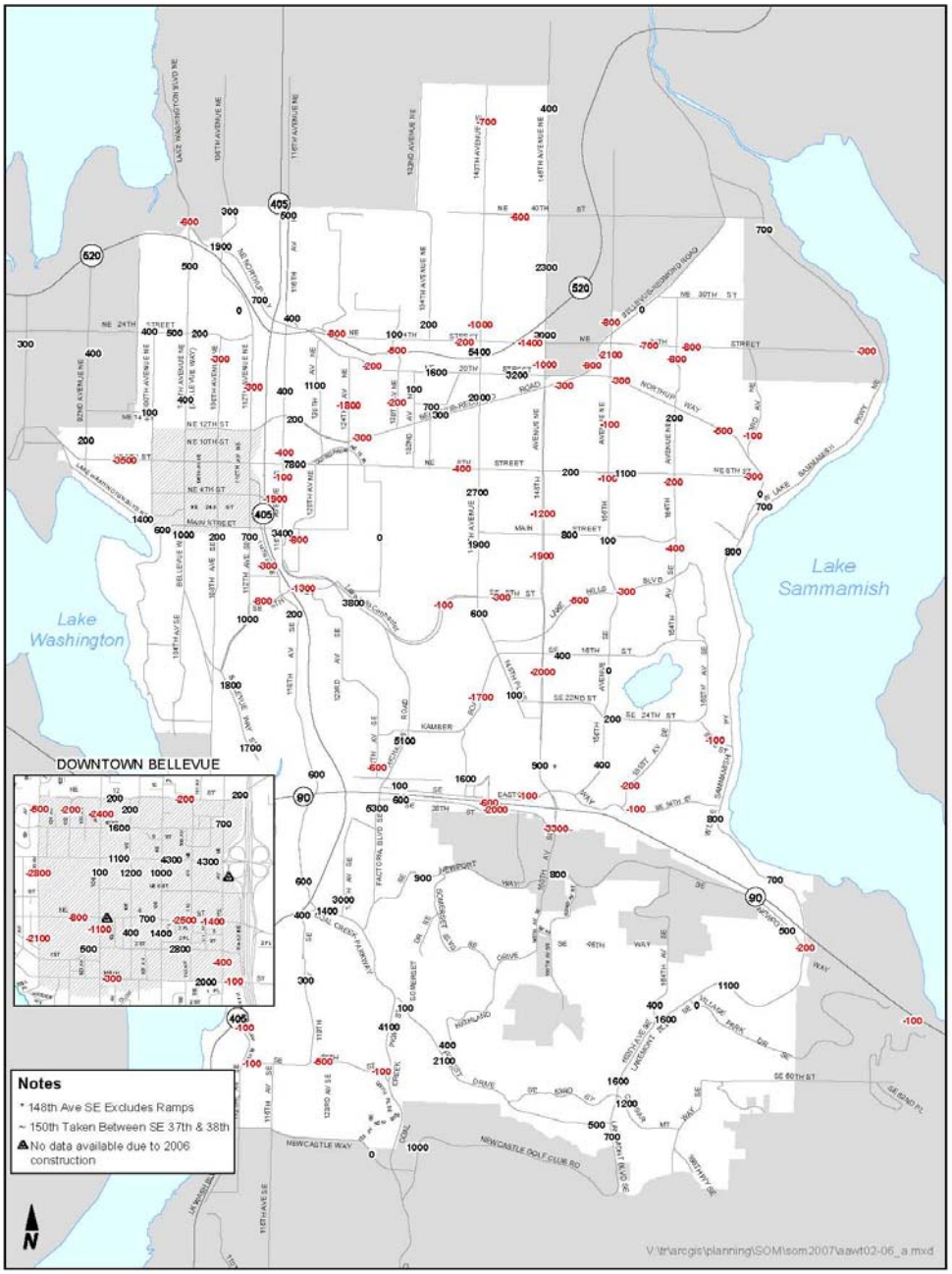
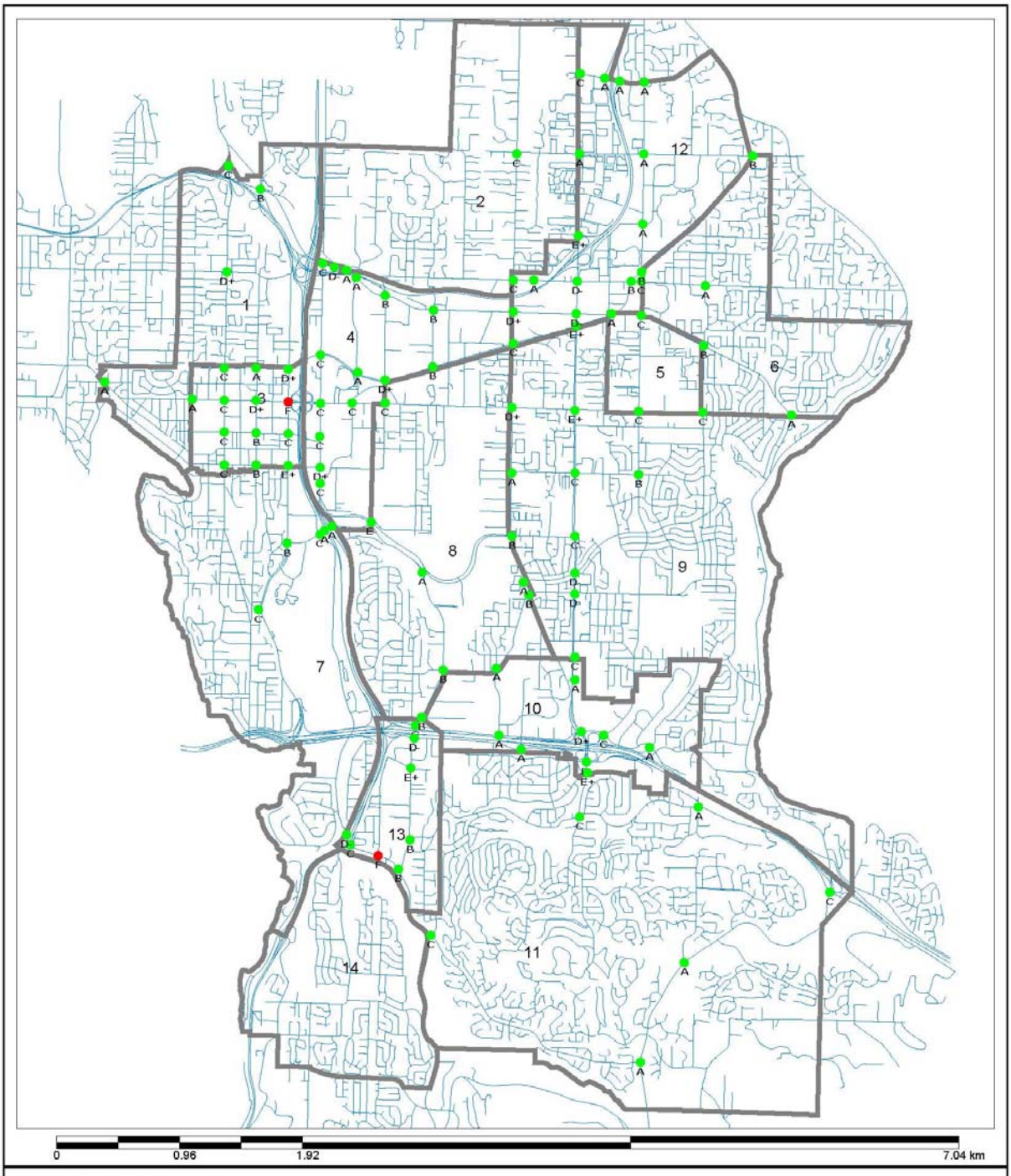


Figure 3 shows the change in annual average weekday traffic between 2006 and 2005.

Figure 4 shows intersection LOS analysis for the 2013 horizon year if no CIP Improvements are made.



MP6_R9 (2006 base)

Figure 4 2013 No Action PM PK 2hr Average System Intersection LOS

Prepared by Bellevue Transportation Modeling Group

Table 5: Changes from 2005 to 2006 in PM Peak 2-Hour Average Intersection Volumes

2006 2hr Avg - 2005 2hr Avg		Total Turning Movement Volumes for all MMA System Intersections												MMA	%
MMA	#	NB_L	NB_T	NB_R	SB_L	SB_T	SB_R	EB_L	EB_T	EB_R	WB_L	WB_T	WB_R	Delta	Change
North Bellevue	1	-119	254	24	24	238	48	103	1	-82	109	119	36	755	8.5%
BridleTrails	2	-2	18	-2	29	41	-1	0	1	-3	0	2	-34	53	1.7%
Downtown	3	-6	359	247	141	236	68	30	418	127	180	320	162	2282	6.1%
Bel-Red/Northup	4	42	46	-27	72	357	186	-80	56	195	97	354	-61	1237	2.9%
Crossroads	5	-34	-147	-24	51	91	65	20	4	-24	4	-44	-37	-78	-0.8%
NE Bellevue	6	35	16	19	-4	151	-29	-5	-88	68	15	10	-5	183	3.4%
South Bellevue	7	-36	-58	-76	-116	22	1	-77	-46	368	-96	34	-43	-123	-1.0%
Richards Valley	8	151	211	-171	-49	750	111	66	-34	115	-74	-71	-44	961	5.8%
East Bellevue	9	-29	95	156	-35	1083	-290	-113	-40	66	132	-34	-16	975	3.4%
Eastgate	10	-71	-81	25	117	262	-23	-186	13	-163	41	-8	-53	-115	-0.6%
Newcastle	11	-12	15	107	196	226	58	7	-23	7	78	70	-42	687	7.4%
Overlake	12	-84	14	113	43	228	94	55	423	75	166	319	92	1558	2.8%
Factoria	13	-78	170	-118	-40	372	-58	-100	595	-11	-94	88	-116	607	2.3%
Newport Hills	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Other Non-System	0	-150	331	156	70	269	368	85	560	17	-8	316	55	2091	0.8%
Total All Intersections		-393	1243	429	499	4326	598	-195	1840	755	550	1475	-106	11073	2.0%
Total System Intersections		-243	912	273	429	4057	230	-280	1280	738	558	1159	-161	8982	3.3%

Notes:

NB_L Northbound Left	SB_L Southbound Left	EB_L Eastbound Left	WB_L Westbound Left
NB_T Northbound Thru	SB_T Southbound Thru	EB_T Eastbound Thru	WB_T Westbound Thru
NB_R Northbound Right	SB_R Southbound Right	EB_R Eastbound Right	WB_R Westbound Right

Total System Intersection		
Left	Thru	Right
464	7408	1080
0.9%	4.3%	2.2%

TABLE 6

Average Intersection

Levels Of Service (LOS) Definition

[Range of Volume -to-Capacity Ratios with User Impressions]

LOS Categories	Average Volumeto-Capacity Ratios		Description *(Subjective Impression of User)*
LOS A	Less than or equal to 0.600		Highest driver comfort.Little delay. Free flow.
LOS B	0.601 - 0.70		High degree of driver comfort.Little delay.
LOS C	0.701 - 0.80		Some delays. Acceptable level of driver comfort. Efficient traffic operation.
LOS D	LOS D+ *(High D)*	0.801 - 0.85	Some driver frustration. Efficient traffic operation.
	LOS D- *(Low D)*	0.851 – 0.90	Increased driver frustration. Long cycle length.
LOS E	LOS E+ *(High E)*	0.901 - 0.95	Near capacity. Notable delays. Low driver comfort. Difficulty of signal progression.
	LOS E- *(Low E)*	0.951 - 1.00	At capacity. High level of congestion. High level of driver frustration.
LOS F	Greater than or equal to 1.001		Breakdown flow. Excessive delays.

Note: The information reported in Table 6 represents the City's adopted Traffic Standards Code (Chapter 14.10) for satisfying concurrency requirements under the Washington Growth Management Act. It is also used in the City of Bellevue Vital Signs as a transportation performance indicator.

LOS Snapshots

This section presents four LOS snapshots for comparison over time. One was previously reported and three are new (Appendix A provides a complete list of system intersections with PM peak 2-hour average v/c ratios and LOS for last year's and this year's concurrency update, including 2005 and 2006 existing conditions, as well as 2013 with or without the CIP capacity projects). The four snapshots are:

1. 2005 Old Existing LOS Snapshot reporting observed year 2005 PM Peak 2-hour average traffic counts (See Table 7 for summary by MMA).

2. 2006 New Existing LOS Snapshot reporting observed year 2006 PM Peak 2-hour average traffic counts (See Table 7 for summary by MMA and Figure 5 for intersection specific details).

3. Future Concurrency LOS Forecast without CIP Projects (No Action) including land use permits as of September 15, 2007. However, the LOS calculation was based on existing intersection geometry and signal timing plans. For the purpose of comparison with the concurrency LOS, none of the uncompleted 2007-2013 CIP projects were included (See Table 8 for summary by MMA).

4. Future Concurrency LOS Forecast (CIP Scenario) including land use permits as of September 15, 2007 and the Council adopted 2007-2013 CIP capacity projects. (See Table 8 for summary by MMA and Figure 5 for intersection specific details).

The LOS snapshots portray traffic conditions on an average scale for a two-hour PM peak period on a typical weekday, ignoring specific spikes in the demand pattern. Overall the two-hour v/c ratios do not fully reflect delays and backups that might occur due to unpredictable conditions such as weather or accidents, or special events of a temporary nature such as construction.

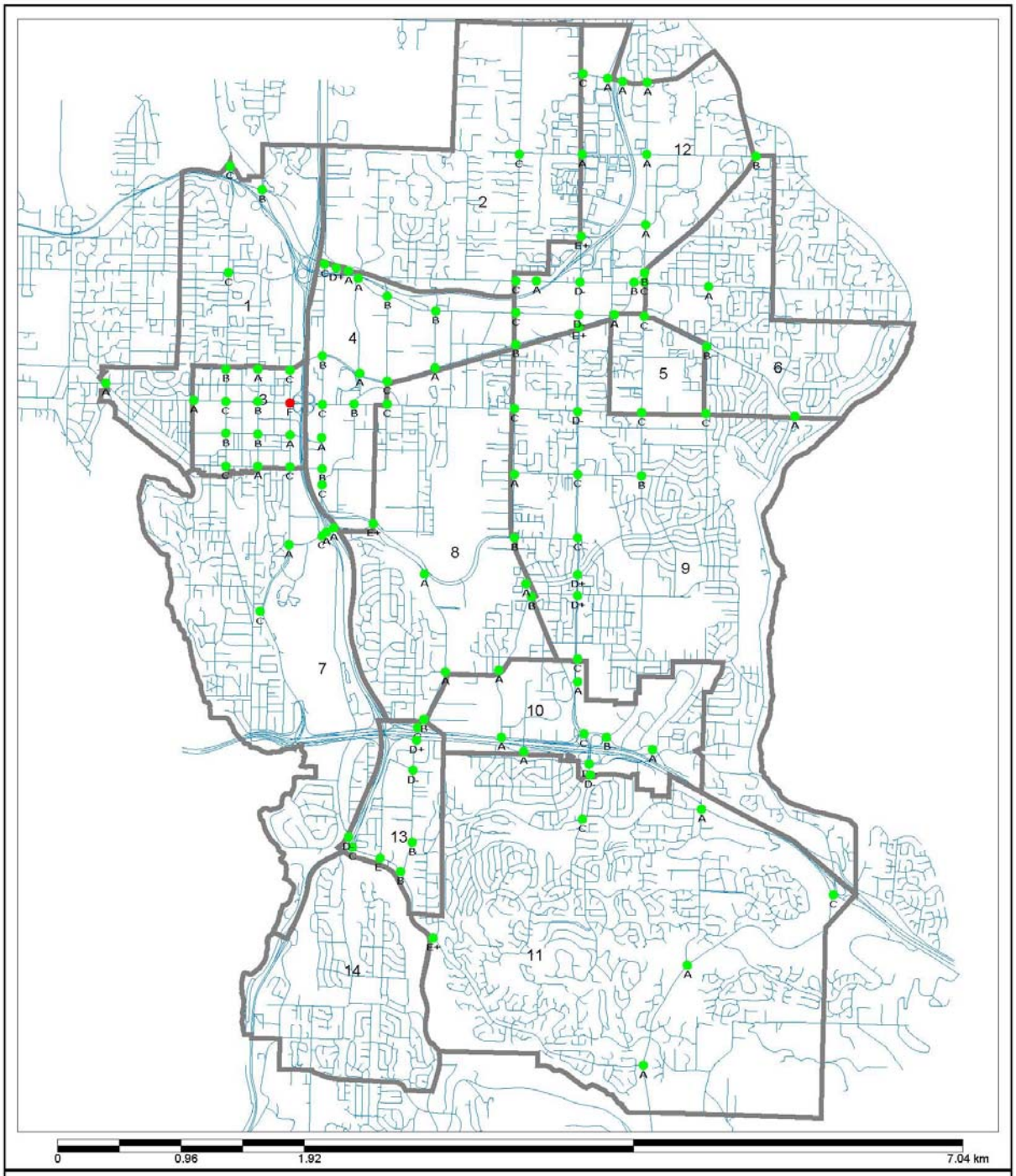
Table 7: Comparison of 2-Hour Average LOS in Annual Concurrency as of 9/15/07

--- 2000 Highway Capacity Manual (HCM) 209/Two-Hour Method

Based on existing 2-hour PM peak average counts				2005 Existing *Based on 2005 Counts*			2006 Existing *Based on 2006 Counts*			
MMA#	MMA Name	LOS Standard (Volume/ Capacity Ratios)	No of Intersections Allowed Over the Standard	Average V/C Ratio	% Capacity Available	No of Intersections Over the Standard	Average V/C Ratio	% Capacity Available	No of Intersections Over the Standard	Change in V/C Ratio* From 2005 to 2006
1	North Bellevue	0.85	3	0.553	35%	0	0.619	27%	0	0.066
2	Bridle Trails	0.80	2	0.559	30%	0	0.532	34%	0	-0.027
3	Downtown	0.95	9	0.632	33%	1	0.660	31%	1	0.028
4	Bel-Red/Northup	0.90	10	0.646	28%	0	0.666	26%	0	0.020
5	Crossroads	0.90	2	0.646	28%	0	0.663	26%	0	0.017
6	North-East Bellevue	0.80	2	0.622	22%	0	0.632	21%	0	0.010
7	South Bellevue	0.85	4	0.604	29%	0	0.600	29%	0	-0.004
8	Richards Valley	0.85	5	0.573	33%	1	0.598	30%	1	0.025
9	East Bellevue	0.85	5	0.720	15%	0	0.749	12%	1	0.029
10	Eastgate	0.90	4	0.644	28%	1	0.607	33%	0	-0.037
11	Newcastle	0.80	3	0.740	8%	0	0.732	9%	0	-0.008
12	Overlake	0.95	9	0.652	31%	1	0.663	30%	0	0.011
13	Factoria	0.95	5	0.754	21%	1	0.782	18%	1	0.028
	TOTAL		63			5			4	0.158

Notes:

- MMA 14 Newport Hills has no signalized intersections, and so is not considered here.
- Critical intersection movements, geometry, and signal phasing/timing plans affect LOS results.
- Intersection volume reduction may contribute to v/c ratio decline, as may the 2005 completed CIP capacity projects.
- Positive v/c ratio changes indicate MMA degradation while negative shows MMA improvement.
- In 2006 four intersections failed the LOS standards.
- Four MMAs show v/c ratio declines (improvements) in the range of -0.004 to -0.037.
- Nine MMAs show v/c ratio increases (degradation) in the range of 0.010 to 0.066



MP0_R8 (2006 base)

Figure 5: 2006 PM PK 2hr Average System Intersection LOS

Prepared by Bellevue Transportation Modeling Group

Table 8: Comparison of Concurrency System Intersection LOS Snapshots

--- 2000 Highway Capacity Manual (HCM) 209/Two-Hour Method

2013 MP6-R9 Concurrency Model Platform				2013 w/o CIP			2013 w/ CIP			
MMA#	MMA Name	LOS Standard (Volume/ Capacity Ratios)	No of Intersections Allowed Over the Standard	Average V/C Ratio	% Capacity Available	No of Intersections Over the Standard	Average V/C Ratio	% Capacity Available	No of Intersections Over the Standard	Change in V/C Ratio* From mp6r8 to mp6r9
1	North Bellevue	0.85	3	0.660	22%	0	0.651	23%	0	-0.009
2	Bridle Trails	0.80	2	0.537	33%	0	0.522	35%	0	-0.015
3	Downtown	0.95	9	0.762	20%	1	0.730	23%	1	-0.032
4	Bel-Red/Northup	0.90	10	0.720	20%	0	0.685	24%	0	-0.035
5	Crossroads	0.90	2	0.677	25%	0	0.685	24%	0	0.008
6	North-East Bellevue	0.80	2	0.649	19%	0	0.639	20%	0	-0.010
7	South Bellevue	0.85	4	0.643	24%	0	0.629	26%	0	-0.014
8	Richards Valley	0.85	5	0.637	25%	1	0.632	26%	1	-0.005
9	East Bellevue	0.85	5	0.771	9%	3	0.763	10%	2	-0.008
10	Eastgate	0.90	4	0.665	26%	1	0.616	32%	0	-0.049
11	Newcastle	0.80	3	0.769	4%	0	0.771	4%	0	0.002
12	Overlake	0.95	9	0.677	29%	0	0.661	30%	0	-0.016
13	Factoria	0.95	5	0.817	14%	1	0.815	14%	1	-0.002
	TOTAL		63			7			5	-0.185

Notes:

- MMA 14 Newport Hills has no signalized intersections, and is therefore not considered here.
- Change in v/c ratio is due to the 2007-2013 CIP capacity projects or/and traffic redistribution.
- The number of system intersections that would fail the LOS standards drops from seven to five and the overall v/c ratio shows a decline (or improvement), with the CIP projects completed.
- With the CIP projects completed, twelve MMAs show a decline in v/c ratios (improvements) in the range of -0.002 to -0.049.

Findings

An overview of the above LOS Snapshots indicates the following:

Existing LOS Snapshot (traffic related to existing land use compared for 2005 and 2006 as shown in Table 7):

- The number of intersections failing the LOS MMA standards was five in 2005 and four in 2006. This quantity of failing intersections does not approach the maximum number of failing intersections allowed (congestion allowance) in any MMA.

- In four of the 13 MMAs, the average v/c ratio declined (improvement), resulting in increased reserve capacity in the Bridle Trails, South Bellevue, Newcastle, and Eastgate MMAs. MMA v/c ratios declined in the range of -0.004 (South Bellevue MMA) to -0.037 (Eastgate MMA).

- In nine of the 13 MMAs, the average v/c ratio increased (degradation), resulting in less available capacity in the North Bellevue, Downtown, Bel-Red/Northup, Crossroads, Northeast Bellevue, Richards Valley, Factoria, East Bellevue and Overlake MMAs. MMA v/c ratios increased in the range of 0.010 (Northeast Bellevue MMA) to 0.066 (North Bellevue MMA).

- All MMAs met their congestion allowance and were within the average v/c ratios allowed (or LOS standard). The Bridle Trails MMA has the most (34%) reserve capacity before reaching its LOS standard of 0.80.

Concurrency 2013 LOS Snapshot (permitted land use with the 2007-2013 CIP projects) compared with 2013 LOS Snapshot without CIP as shown in Table 8:

- The 2013 LOS Snapshot without the CIP assumes that the City does not provide the programmed capacity improvement projects to offset the permitted land use.

- There would be seven system intersections failing the LOS standards in 2013 without the 2007-2013 CIP capacity projects built, one each in the Downtown, Richards Valley, Eastgate and Factoria MMAs and three in the East Bellevue MMA.

- The 2013 LOS Snapshot with the 2007-2013 CIP assumes that the City completes the 2007-2013 programmed capacity improvement projects to offset the permitted land use. It is forecast that five system intersections would fail the LOS standards, one each in the Downtown, Richards Valley, and Factoria MMAs and two in the East Bellevue MMA.

- In comparison with the “No Action” scenario, the “ With CIP” scenario forecasts that in 11 of the 13 MMAs, v/c ratios would decline, indicating a gain in reserve capacity in the range of 0.002 to 0.049, including the North Bellevue, Bridle Trails, Downtown, Bel-Red/Northup, North-East Bellevue, South Bellevue, Richards Valley, East Bellevue, Eastgate, Overlake, and Factoria MMAs.

- With the CIP completed by 2013, the Eastgate MMA would gain the most (6%) in reserve capacity, but all MMAs are within the LOS standard both in terms of their respective v/c ratios and the congestion allowance. Only five intersections citywide exceed their respective MMA standards (refer to Appendix A).

- Under the "With CIP" scenario, the Crossroads and Newcastle MMAs are projected to increase their v/c ratios by 0.008 and 0.002, respectively, resulting in a very slight loss of reserve capacity when compared with the "No Action" scenario.

Discussion About Findings

The changes in the average LOS conditions are primarily attributable to the following reasons:

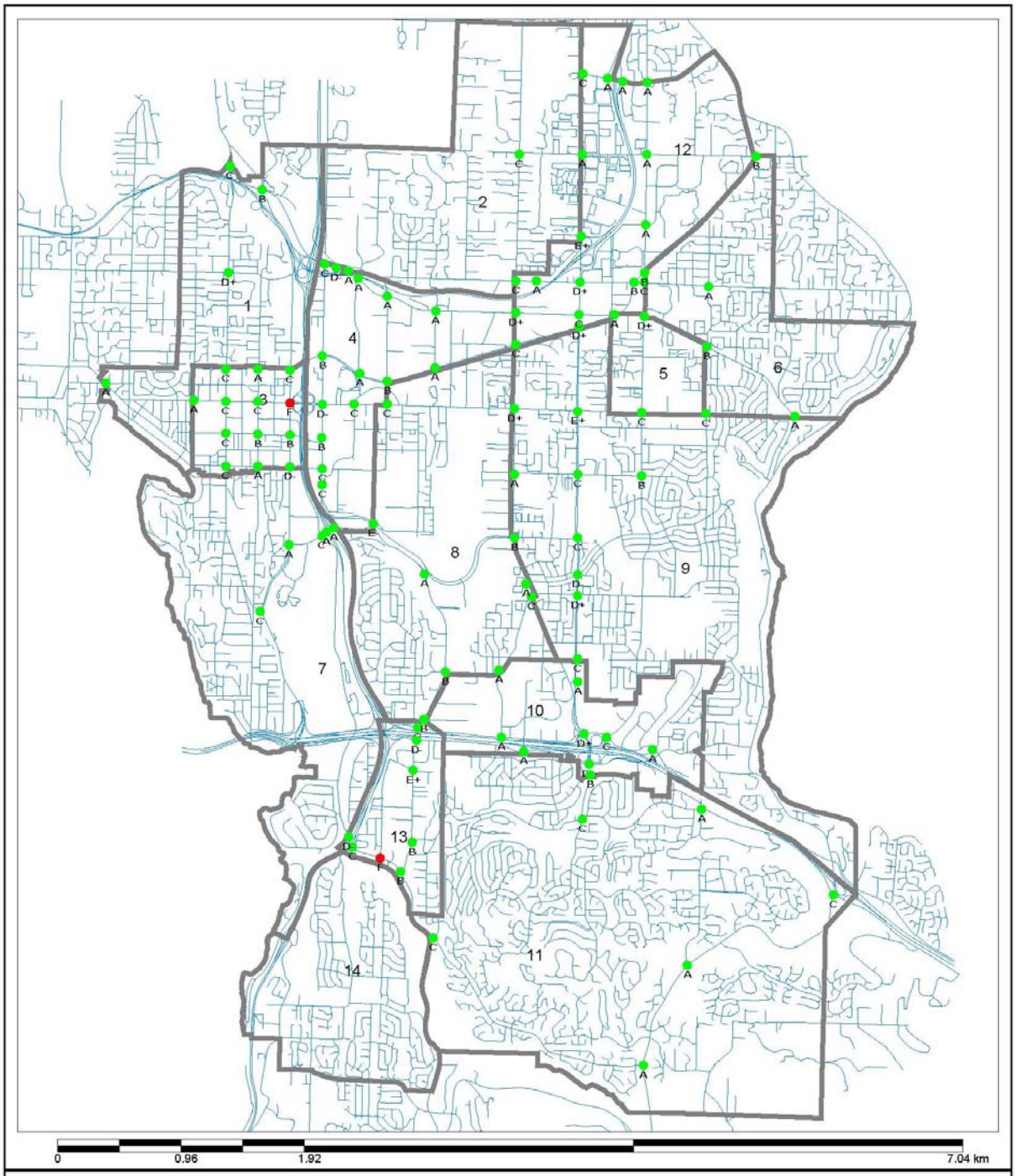
- Average 2 hour PM peak traffic volumes increased in Bellevue overall by 2.0% in 2006 compared to 2005. The loss in reserve capacity can be attributed to the volume increase in the system intersections.

- By 2013, completed CIP capacity projects will contribute to the transportation system improvements, reducing overall failed intersections from seven to five and improving eleven MMAs when compared with the "No CIP" scenario.

Concurrency analysis can be an effective tool to gauge the need for capacity projects to facilitate land developments while maintaining the transportation system at acceptable standards.

Implementation of the 2007-2013 CIP capacity projects will improve system intersection operations in a majority of the city.

Following the release of this Concurrency Report, the concurrency model platform (MP6-R9) will be used as a background condition for project-level development review modeling for next year until a new concurrency update is completed in 2008 for the 2007 time period.



MP6_R9 (2006 base)

Figure 6: 2013 PM PK 2hr Average System Intersection LOS w/2007-2013 CIP

Prepared by Bellevue Transportation Modeling Group

Conclusion

In conclusion, this concurrency update indicates the following:

- The 2007-2013 CIP will mitigate traffic volume growth in eleven MMAs while serving permitted land developments.

- Funded 2007-2013 CIP capacity projects, such as NE 10th Street Extension (R-149), NE 8th widening (R-152), and 150th Ave SE (R-105) will significantly improve system intersections in the Downtown, Bel-Red/Northup, and Eastgate MMAs, respectively.

- Improved signal design, intersection channelization and markings, and continuous efforts to improve signal system operations have added to arterial system operational efficiency.

- Bellevue improved the Bellevue-Kirkland-Redmond (BKR) region-wide model with addition of a pm peak transit model and a non-motorized component for the 2006 base year. The model will facilitate consideration of non-motorized travel and of transit system improvements in future concurrency determinations.

APPENDIX A:

PM PEAK 2-HOUR AVERAGE LOS FOR 2005, 2006, AND 2012 AND 2013 WITH OR WITHOUT CIP
(By Bellevue Modeling and Forecasting Group on 10/15/07)

Area 1: North Bellevue

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
69	Bellevue Way NE	NE 24th Street	0.572	A	0	0.754	C	0	0.841	D+	0	0.839	D+	0
74	Bellevue Way NE	Northup Way NE	0.615	B	0	0.759	C	0	0.784	C	0	0.762	C	0
78	108th Ave NE	Northup Way NE	0.756	C	0	0.668	B	0	0.696	B	0	0.687	B	0
93	Lk Washington B	NE 1st/NE 10 St.	0.269	A	0	0.293	A	0	0.319	A	0	0.316	A	0
		Area wide average ->	0.553	A	0	0.619	B	0	0.660	B	0	0.651	B	0
	LOS Threshold	0.850												
	Allowance	3			0			0			0			0

Area 2: Bridle Trails

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
118	Northup Way	NE 24th Street	0.559	A	0	0.532	A	0	0.537	A	0	0.522	A	0
123	140th Ave NE	NE 40th Street	-----	---	0	-----	---	0	-----	---	0	-----	---	0
		Area wide average ->	0.559	A	0	0.532	A	0	0.537	A	0	0.522	A	0
	LOS Threshold	0.800												
	Allowance	2			0			0			0			0

Area 3: Downtown

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
3	100th Ave NE	NE 8th Street	0.500	A	0	0.447	A	0	0.521	A	0	0.532	A	0
5	Bellevue Way NE	NE 12th Street	0.660	B	0	0.660	B	0	0.733	C	0	0.732	C	0
7	Bellevue Way NE	NE 8th Street	0.581	A	0	0.708	C	0	0.744	C	0	0.739	C	0
8	Bellevue Way NE	NE 4th Street	0.640	B	0	0.674	B	0	0.774	C	0	0.762	C	0
9	Bellevue Way	Main Street	0.768	C	0	0.758	C	0	0.766	C	0	0.758	C	0
20	108th Ave NE	NE 12th Street	0.377	A	0	0.397	A	0	0.501	A	0	0.543	A	0
21	108th Ave NE	NE 8th Street	0.654	B	0	0.695	B	0	0.817	D+	0	0.787	C	0
22	108th Ave NE	NE 4th Street	0.536	A	0	0.605	B	0	0.689	B	0	0.650	B	0
24	108th Ave	Main Street	0.458	A	0	0.475	A	0	0.625	B	0	0.592	A	0
25	112th Ave NE	NE 12th Street	0.732	C	0	0.711	C	0	0.820	D+	0	0.713	C	0
26	112th Ave NE	NE 8th Street	1.074	F	1	1.074	F	1	1.234	F	1	1.144	F	1
36	112th Ave	Main Street	0.669	B	0	0.794	C	0	0.947	E+	0	0.873	D-	0
72	112th Ave NE	NE 4th Street	0.574	A	0	0.587	A	0	0.731	C	0	0.668	B	0
		Area wide average ->	0.632	B	0	0.660	B	0	0.762	C	0	0.730	C	0
	LOS Threshold	0.950												
	Allowance	9			1			1			1			1

Area 4: Bel-Red/Northup

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
29	116th Ave NE	NE 12th Street	0.674	B	0	0.634	B	0	0.728	C	0	0.675	B	0
30	116th Ave NE	NE 8th Street	0.710	C	0	0.708	C	0	0.786	C	0	0.881	D-	0
32	120th Ave NE	NE 12th Street	0.539	A	0	0.510	A	0	0.551	A	0	0.549	A	0
34	124th Ave NE	Bellevue-Redmond	0.807	D+	0	0.796	C	0	0.817	D+	0	0.644	B	0
35	124th Ave NE	NE 8th Street	0.710	C	0	0.706	C	0	0.755	C	0	0.732	C	0
37	130th Ave NE	Bellevue-Redmond	0.568	A	0	0.574	A	0	0.605	B	0	0.593	A	0
68	130th Ave NE	NE 20th Street	0.577	A	0	0.604	B	0	0.619	B	0	0.601	A	0
73	116th Ave	Main Street	0.602	B	0	0.680	B	0	0.819	D+	0	0.768	C	0
88	124th Ave NE	Northup Way NE	0.624	B	0	0.652	B	0	0.697	B	0	0.541	A	0
114	116th Ave NE	Northup Way NE	0.697	B	0	0.723	C	0	0.779	C	0	0.763	C	0
116	115th Place NE	Northup Way	0.617	B	0	0.823	D+	0	0.855	D-	0	0.868	D-	0
117	120th Ave NE	NE 20th Street	0.524	A	0	0.575	A	0	0.594	A	0	0.574	A	0
131	116th Ave SE	SE 1st Street	0.718	C	0	0.724	C	0	0.768	C	0	0.741	C	0
139	116th Ave NE	NE 4th Street	0.607	B	0	0.578	A	0	0.716	C	0	0.615	B	0
233	120th Ave NE	NE 8th Street	0.723	C	0	0.699	B	0	0.712	C	0	0.730	C	0
		Area wide average ->	0.646	B	0	0.666	B	0	0.720	C	0	0.685	B	0
	LOS Threshold	0.900												
	Allowance	10			0			0			0			0

Area 5: Crossroads

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
58	Bellevue-Redmond	NE 20th Street	0.532	A	0	0.511	A	0	0.522	A	0	0.525	A	0
62	156th Ave NE	Northup Way	0.784	C	0	0.775	C	0	0.791	C	0	0.803	D+	0
63	156th Ave NE	NE 8th Street	0.623	B	0	0.704	C	0	0.719	C	0	0.726	C	0
		Area wide average ->	0.646	B	0	0.663	B	0	0.677	B	0	0.685	B	0
	LOS Threshold	0.900												
	Allowance	2			0			0			0			0

Area 6: North-East Bellevue

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
75	164th Ave NE	NE 24th Street	0.618	B	0	0.551	A	0	0.561	A	0	0.551	A	0
76	164th Ave NE	Northup Way	0.540	A	0	0.609	B	0	0.619	B	0	0.608	B	0
87	164th Ave NE	NE 8th Street	0.706	C	0	0.735	C	0	0.766	C	0	0.757	C	0
111	Northup Way	NE 8th Street	-----	---	0	-----	---	0	-----	---	0	-----	---	0
		Area wide average ->	0.622	B	0	0.632	B	0	0.649	B	0	0.639	B	0
	LOS Threshold	0.800												
	Allowance	2			0			0			0			0

Area 7: South Bellevue

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
14	112th Ave SE	Bellevue Way SE	0.767	C	0	0.702	C	0	0.734	C	0	0.732	C	0
89	112th Ave SE	SE 8th Street	0.596	A	0	0.570	A	0	0.606	B	0	0.564	A	0
102	118th Ave SE	SE 8th Street	0.719	C	0	0.709	C	0	0.777	C	0	0.778	C	0
219	I-405 NB Ramps	SE 8th Street	0.569	A	0	0.515	A	0	0.540	A	0	0.534	A	0
226	I-405 SB Ramps	SE 8th Street	0.367	A	0	0.503	A	0	0.560	A	0	0.537	A	0
		Area wide average ->	0.604	B	0	0.600	A	0	0.643	B	0	0.629	B	0
	LOS Threshold	0.850												
	Allowance	4			0			0			0			0

Area 8: Richards Valley

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
43	140th Ave SE	SE 8th Street	0.551	A	0	0.641	B	0	0.663	B	0	0.684	B	0
44	145th Place SE	Lake Hills Blvd	0.560	A	0	0.570	A	0	0.584	A	0	0.593	A	0
45	145th Place SE	SE 16th Street	0.612	B	0	0.648	B	0	0.697	B	0	0.709	C	0
71	Lk Hills Connec	SE 8th St/7t	0.930	E+	1	0.905	E+	1	0.974	E-	1	0.956	E-	1
82	Richards Rd	Kamber Rd	0.630	B	0	0.588	A	0	0.617	B	0	0.611	B	0
85	Richards Rd	SE 32nd Street	0.511	A	0	0.618	B	0	0.692	B	0	0.665	B	0
134	Richards Rd	Lk Hills Connec	0.452	A	0	0.480	A	0	0.520	A	0	0.504	A	0
280	139th Ave SE	Kamber Road	0.339	A	0	0.336	A	0	0.348	A	0	0.330	A	0
		Area wide average ->	0.573	A	0	0.598	A	0	0.637	B	0	0.632	B	0
	LOS Threshold	0.850												
	Allowance	5			1			1			1			1

Area 9: East Bellevue

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
41	140th Ave NE	NE 8th Street	0.728	C	0	0.794	C	0	0.835	D+	0	0.813	D+	0
42	140th Ave	Main Street	0.552	A	0	0.577	A	0	0.591	A	0	0.584	A	0
49	148th Ave NE	NE 8th Street	0.844	D+	0	0.888	D-	1	0.917	E+	1	0.908	E+	1
50	148th Ave	Main Street	0.784	C	0	0.776	C	0	0.782	C	0	0.784	C	0
51	148th Ave SE	Lake Hills Blvd	0.847	D+	0	0.849	D+	0	0.880	D-	1	0.874	D-	1
52	148th Ave SE	SE 16th Street	0.698	B	0	0.818	D+	0	0.854	D-	1	0.837	D+	0
55	148th Ave SE	SE 24th Street	0.764	C	0	0.733	C	0	0.734	C	0	0.729	C	0
65	148th Ave SE	NE 8th Street	0.641	B	0	0.706	C	0	0.723	C	0	0.719	C	0
83	156th Ave	Main Street	0.626	B	0	0.602	B	0	0.619	B	0	0.617	B	0
		Area wide average ->	0.720	C	0	0.749	C	0	0.771	C	0	0.763	C	0
	LOS Threshold	0.850												
	Allowance	5			0			1			3			2

Area 10: Eastgate

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
56	148th Ave SE	SE 27th Street	0.541	A	0	0.474	A	0	0.480	A	0	0.478	A	0
86	156th Ave SE	SE Eastgate Way	0.655	B	0	0.656	B	0	0.774	C	0	0.735	C	0
92	161st Ave SE	SE Eastgate Way	0.334	A	0	0.412	A	0	0.574	A	0	0.567	A	0
101	150th Ave SE	SE Eastgate Way	0.822	D+	0	0.789	C	0	0.834	D+	0	0.826	D+	0
171	142nd Ave SE	SE 36th Street	0.503	A	0	0.456	A	0	0.475	A	0	0.454	A	0
174	150th Ave SE	SE 38th Street	0.899	D-	0	0.899	D-	0	0.935	E+	1	0.678	B	0
227	150th Ave SE	I-90 EB Off-Ram	1.015	F	1	0.817	D+	0	0.866	D-	0	0.816	D+	0
272	139th Ave SE	SE Eastgate Way	0.386	A	0	0.351	A	0	0.379	A	0	0.375	A	0
		Area wide average ->	0.644	B	0	0.607	B	0	0.665	B	0	0.616	B	0
	LOS Threshold	0.900												
	Allowance	4			1			0			1			0

Area 11: Newcastle

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
98	Coal Creek Park	Forest Drive	0.775	C	0	0.707	C	0	0.743	C	0	0.749	C	0
133	150th Ave SE	SE Newport Way	0.684	B	0	0.726	C	0	0.780	C	0	0.783	C	0
228	Lakemont Blvd (	SE Newport Way	0.760	C	0	0.763	C	0	0.784	C	0	0.780	C	0
229	Lakemont Blvd	Forest Drive	-----	---	0	-----	---	0	-----	---	0	-----	---	0
242	164th Ave SE	Lakemont Blvd	-----	---	0	-----	---	0	-----	---	0	-----	---	0
257	164th Ave SE	SE Newport Way	-----	---	0	-----	---	0	-----	---	0	-----	---	0
		Area wide average ->	0.740	C	0	0.732	C	0	0.769	C	0	0.771	C	0
	LOS Threshold	0.800												
	Allowance	3			0			0			0			0

Area 12: Overlake

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
39	140th Ave NE	NE 20th Street	0.750	C	0	0.795	C	0	0.826	D+	0	0.810	D+	0
40	140th Ave NE	Bellevue-Redmond	0.712	C	0	0.694	B	0	0.709	C	0	0.704	C	0
47	148th Ave NE	NE 20th Street	0.933	E+	0	0.863	D-	0	0.881	D-	0	0.776	C	0
48	148th Ave NE	Bellevue-Redmond	0.884	D-	0	0.923	E+	0	0.945	E+	0	0.835	D+	0
59	Bellevue-Redmond	NE 24th Street	0.600	B	0	0.649	B	0	0.662	B	0	0.628	B	0
60	156th Ave NE	Bellevue-Redmond	0.643	B	0	0.682	B	0	0.680	B	0	0.685	B	0
61	156th Ave NE	NE 24th Street	0.678	B	0	0.759	C	0	0.770	C	0	0.765	C	0
64	140th Ave NE	NE 24th Street	0.626	B	0	0.715	C	0	0.730	C	0	0.783	C	0
79	148th Ave NE	NE 40th Street	0.592	A	0	0.536	A	0	0.557	A	0	0.531	A	0
81	148th Ave NE	NE 24th Street	0.970	E-	1	0.853	D-	0	0.865	D-	0	0.849	D+	0
138	Bellevue-Redmond	NE 40th Street	0.614	B	0	0.667	B	0	0.680	B	0	0.685	B	0
188	148th Ave NE	NE 29th Place	0.867	D-	0	0.910	E+	0	0.936	E+	0	0.927	E+	0
189	NE 29th Place	NE 24th Street	0.402	A	0	0.410	A	0	0.416	A	0	0.406	A	0
239	156th Ave NE	NE 40th Street	0.610	B	0	0.592	A	0	0.598	A	0	0.595	A	0
249	148th Ave NE	NE 51st Street	0.750	C	0	0.754	C	0	0.782	C	0	0.784	C	0
250	SR-520 SB Ramps	NE 51st Street	0.261	A	0	0.274	A	0	0.274	A	0	0.277	A	0
251	SR-520 NB Ramps	NE 51st Street	0.449	A	0	0.440	A	0	0.443	A	0	0.442	A	0
255	156th Ave NE	NE 51st Street	0.521	A	0	0.552	A	0	0.576	A	0	0.555	A	0
264	156th Ave NE	NE 31st Street	0.522	A	0	0.533	A	0	0.535	A	0	0.527	A	0
		Area wide average ->	0.652	B	0	0.663	B	0	0.677	B	0	0.661	B	0
	LOS Threshold	0.950												
	Allowance	9			1			0			0			0

Area 13: Factoria

INT	ADDRESS		2005 Existing			2006 Existing			2013 No-CIP			2013 w/ CIP		
105	Richards Rd	SE Eastgate Way	0.724	C	0	0.721	C	0	0.764	C	0	0.773	C	0
202	128th Ave SE/Ne	SE Newport Way	0.566	A	0	0.618	B	0	0.671	B	0	0.656	B	0
203	SE Newport Way	Coal Creek Pkwy	0.599	A	0	0.629	B	0	0.647	B	0	0.649	B	0
204	128th Ave SE	SE 36th Street	0.821	D+	0	0.825	D+	0	0.881	D-	0	0.861	D-	0
220	I-405 NB Ramps	Coal Creek Park	0.647	B	0	0.713	C	0	0.739	C	0	0.730	C	0
221	I-405 SB Ramps	Coal Creek Park	0.870	D-	0	0.880	D-	0	0.871	D-	0	0.896	D-	0
222	128th Ave SE	SE 38th Place	0.961	E-	1	0.881	D-	0	0.933	E+	0	0.930	E+	0
284	124th Ave SE	Coal Creek Park	0.845	D+	0	0.986	E-	1	1.027	F	1	1.021	F	1
		Area wide average ->	0.754	C	0	0.782	C	0	0.817	D+	0	0.815	D+	0
	LOS Threshold	0.950												
	Allowance	5			1			1			1			1

Total Intersections Exceeding Threshold	5	5	7	5

Concurrency Modeling

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Report Proofreading and Comments

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Bellevue Land Use Data

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Bellevue Traffic Count Data

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Non-Eastside Regional Trip Productions and Attractions

Larry Blain, Principal Planner, Puget Sound Regional Council (Regional Travel Demand Model)

Bellevue GIS Maps

Zorba Conlen, GIS Analyst, Business Systems, Transportation Department, City of Bellevue

CONTACT INFORMATION

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