Dowling Associates, Inc.
Transportation Engineering • Planning • Research • Education

October 1, 2008

Edmund F. Sotelo
City Manager
City of Oxnard
300 West Third Street, 4th Floor
Oxnard, CA 93030

Subject: Traffic Impacts of Measure "V" – The Oxnard Traffic Initiative Final Report P08075

Dear Mr. Sotelo:

The attached report presents our assessment of the likely traffic impacts of Measure "V" the Oxnard Traffic Initiative. We have evaluated the likely impacts on the city's procedures for conducting traffic impact analyses as well as the likely impacts on the city's intersections themselves.

Our conclusions are briefly highlighted below and explained in more detail in the attached report.

1. The initiative will slow down but will not prevent traffic conditions from worsening in the City of Oxnard. The number of unsatisfactory intersections in twenty years under the initiative will be about the same, if not higher, than for the current General Plan. This is because:

    a. The initiative does not mitigate any intersections. The City would have to find alternative methods for funding needed road improvements.

    b. The initiative does not stop growth. Some growth will happen within the City (as exempt projects) and some growth will happen elsewhere but will still impact city streets.

2. There would be many more unsatisfactory intersections with the initiative than under the draft updated General Plan (Alternative B - Mitigated).

3. The City of Oxnard has made great progress over the last few years in reducing the number of intersections that fail to meet the level of service "C" standard, reducing the number of unsatisfactory intersections from 19 to 3 in the last 2 years. However because those 3 intersections continue to fail to meet the initiative's level of service "C" standard, even a complete cessation of all growth in the city would not achieve the initiative's LOS standard.

4. The initiative increases the number of currently unsatisfactory intersections from 3 to 8 because it introduces a new Highway Capacity Manual LOS standard.

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5. Because the City cannot realistically mitigate all of the unsatisfactory intersections without the assistance of new development or without unacceptable impacts to adjacent businesses and residents, developers of large projects will face the certainty of having to go through a general election for project approval.

6. An aggressive road and intersection widening program will be required to achieve and then maintain the level of service "C" standards called for in the initiative. Businesses and homes fronting on critical intersections in the City will be significantly affected by the required road widenings.

7. The smaller development projects that the initiative exempts from a vote of the electorate will tend to be projects that are more auto intensive than larger developments. The vehicle trip generation rates per unit of development are highest for small residential and commercial developments.

8. Transit-oriented villages, which require higher density development to support superior transit service, cannot be built within the initiative's LOS standards. These types of development could only be built by the appropriate educational or religious non-profit company (because these companies are exempt under the initiative) or will require a vote of the people. The costs and uncertainty of this process for the typical for-profit company would discourage these kinds of development in Oxnard. Compliance with state initiatives to reduce green house gas emissions through sustainable communities strategies (AB32 and SB 375 for example) will be more difficult.

9. Compliance with state laws, which supersede Measure V, such as AB32 (Greenhouse Gas Reduction), Regional Housing Needs Assessment (RHNA), and SB 375 will be more difficult and could expose the City to legal and/or judicial action that overrides local land use authority and forces compliance with state law.

10. The costs of preparing traffic impact studies for new development and the cost to city staff reviewing these studies will more than double, because every intersection will need to be analyzed twice, once for volume/capacity ratio, a second time for delay. In addition, the geographic coverage of every study, regardless of size of the project, will be essentially city-wide.

11. The traffic report and the EIR for the City's current General Plan update effort will need to be entirely redone adding in the intersection delay computations called for in the initiative. New mitigations will be needed to meet the dual LOS "C" v/c and delay standards of the initiative.

These conclusions are further explained in the attached report. Please contact me at 510-839-1742 x120 if you have any questions.

Sincerely,

Dowling Associates, Inc.

Richard Dowling, Ph.D., P.E.

Principal

Attachments: Report
C:\Work\proj\proj2008\p08075 oxnard traffic init\report\traffic impacts of initiative5.doc

Traffic Impacts of Measure "V" – Oxnard Traffic Initiative

This report presents an assessment of the likely impacts of Measure "V", the Oxnard Traffic Initiative, on traffic conditions within the City of Oxnard.

1. SUMMARY OF INITIATIVE

The Oxnard Traffic Initiative mandates a level of service (LOS) "C" standard for all intersections in the City of Oxnard. All intersections within 5 miles of a proposed development project must operate at LOS C prior to project approval[1] by the City and they must be forecast to operate at LOS C one year after build out and full occupancy of the development project. Since the city is roughly 10 miles across, essentially most every intersection within the city must meet these requirements for any development anywhere in the city.[2]

The level of service at each intersection must be computed two ways: once using the City's current method of computing the volume/capacity (v/c) ratio of the intersection, the second using a different method that produces average delay for the intersection. Both the v/c ratio and the delay must meet the initiative's LOS C standard.

The initiative applies to "all intersections", not just signalized intersections.

The initiative provides for approval of developments failing to meet the LOS standard through a developer funded general election. A majority vote would be sufficient to override the LOS standard in the initiative.

The initiative exempts several types of development projects (Section 5):

- Very small residential and commercial development projects
- Public schools
- Religious facilities
- Any project sponsored by an educational non-profit organization
- Any hospitals or medical facilities.

[1] Section 2 of the initiative suggests that the objective of the initiative is that the intersections must operate satisfactorily for one year prior to project approval, but section 5(3), which implements the initiative, does not include this requirement.

[2] A fine point is what are the city's obligations under this initiative for non-city intersections within the 5 mile radius? Must the city mitigate Port Hueneme, County, and Caltrans intersections as well as its own intersections? The City Attorney's opinion is that it does not impose on the City such an obligation. However, any development in an adjacent city impacting Oxnard intersections would have to be mitigated to LOS "C" before the City could approve new developments (unless exempted through a vote or otherwise)

- Any project within the City Urban Restriction Boundary necessary to meet the City's commitment in its December 2000 Housing Element for specific housing categories.

The city initiative cannot apply to developments located in other jurisdictions.

2. EXISTING CONDITIONS

According to the URS report, Traffic Circulation Study, City Of Oxnard, 2020 General Plan Update / EIR (April 23, 2008), nineteen out of the 119 signalized intersections they evaluated within the City failed to meet the City's volume/capacity (v/c) ratio LOS "C" standard during either or both the AM and PM peak hours in 2005.

However, between 2005 and 2007 the Santa Clara River Highway 101 bridge, the Oxnard Blvd./US 101 interchange, and sewer line construction, which had disrupted traffic on Ventura an Gonzales Roads were completed. In addition, several intersection improvements were completed. Consequently, when URS revisited the 19 critical intersections and conducted new counts and level of service analyses, they found that only 3 intersections still failed to meet the City's LOS "C" v/c standard in 2007 (see Exhibit 1).

The Rose Ranch Commercial Project, if it were approved by the City, would mitigate the intersection of Rose and Gonzales to v/c level of service standard "C" or better (Rose Ranch Commercial Project SEIR, Rincon Consultants, July 2008).

3. WHAT WOULD IT TAKE TO GET ALL INTERSECTIONS TO LOS "C"?

The initiative requires that all intersections be operating at a dual LOS "C" (v/c and delay) before the City can begin to contemplate non-exempt development applications. The intersection volume/capacity (v/c) ratio is computed according to the Intersection Capacity Utilization (ICU) method.

Exhibit 1 compares the ICU V/C based LOS to the HCM delay-based LOS. As can be seen in the table, the delay based LOS is often, but not always more severe than the ICU V/C LOS currently used by the City of Oxnard. In late 2007, there were 3 intersections failing to meet the City's ICU standard of LOS C, all in the PM peak hour. However, if the HCM delay-based method were used to estimate LOS, then there was one intersection failing to meet the Measure V standard during the AM peak hour, and eight intersections failing to meet the Measure V standard during the PM peak hour in 2007.

If, as required by the initiative, all intersections must meet the worst of both LOS standards, then the result will be a significant increase in the amount of road improvements and adjacent property acquisitions to meet the dual LOS "C" standard. Many of the intersections found to be meeting the City's current LOS "C" standard in 2007 would no longer meet the redefined dual v/c and delay LOS "C" standard. Assessing the extra mitigations would require re-doing the entire URS study for the General Plan update.

Exhibit 1: Existing Intersection Operations ICU V/C LOS versus HCM Delay LOS (2007)

	Scenario:	Existing Conditions (Sep 2007)							
	LOS Method:	ICU				HCM			
	Peak:	AM		PM		AM		PM	
City	INTERSECTIONS	v/c	LOS	v/c	LOS	secs	LOS	secs	LOS
1	Harbor Boulevard & Fifth Street	0.72	C	0.55	A	7	A	6	A
2	Lombard Street & Gonzales Road	0.41	A	0.53	A	11	B	13	B
3	Ventura Road & Gonzales Road	0.57	A	0.66	B	11	B	28	C
4	Victoria Avenue & Gonzales Road	0.59	A	0.80	C	34	C	39	D
5	U.S.101 SB Ramps & Del Norte Bl	0.49	A	0.70	C	5	A	6	A
6	U.S.101NB Ramps & Del Norte Bl	0.44	A	0.57	A	7	A	10	B
7	C Street & Gonzales Road	0.51	A	0.74	C	35	C	38	D
8	H Street & Gonzales Road	0.55	A	0.70	C	19	B	29	C
9	Rice Avenue & Fifth Street (SR-34)	0.64	B	0.77	C	21	C	30	C
10	Rose Avenue & Third Street	0.39	A	0.49	A	8	A	9	A
11	Rose Avenue & Auto Center Drive	0.46	A	0.72	C	16	B	32	C
12	Rose Avenue & Camino Del Sol	0.69	B	0.73	C	27	C	27	C
13	Rose Avenue & Channel Islands Bl	0.52	A	0.72	C	18	B	32	C
14	Santa Clara & Auto Center Dr	0.60	A	0.82	D	28	C	52	D
14	Santa Clara Ave & Central Avenue	0.41	A	0.51	A	16	B	14	B
16	Oxnard Bl (SR-1) & Pleasant Valley Rd	0.68	B	0.76	C	13	B	33	C
17	Vineyard Ave (SR-232) & Myrtle Street	0.55	A	0.69	B	13	B	18	B
18	Rose Avenue & Fifth St (SR-34)	0.68	B	0.69	B	25	C	25	C
19	Rose Ave & Oxnard Bl (SR-1)	0.40	A	0.64	B	13	B	17	B
20	Rose Avenue & Wooley Road	0.53	A	0.66	B	20	B	26	C
21	Fifth Street (SR-34) & Del Norte Bl	0.47	A	0.76	C	9	A	25	C
22	Harbor Boulevard & Gonzales Road	0.76	C	0.76	C	8	A	11	B
23	Oxnard Bl (SR-1) & Saviers Rd & Wooley Rd	0.65	B	0.87	D	79	E	92	F
24	Victoria Avenue & Doris Avenue	0.74	C	0.76	C	14	B	17	B
25	Victoria Avenue & Teal Club Road	0.74	C	0.77	C	8	A	11	B
26	Vineyard Ave (SR-232) & Oxnard Bl (SR-1)	0.59	A	0.76	C	31	C	59	E
27	Dupont Ave & Channel Islands Bl	0.34	A	0.78	C	9	A	21	C
28	Rice Avenue & Gonzales Road	0.58	A	0.65	B	15	B	22	C
29	Rose Avenue & First Street	0.67	B	0.75	C	11	B	16	B
30	Rose Avenue & Gonzales Road	0.64	B	0.84	D	31	C	53	D
31	Ventura Road & Fifth Street	0.56	A	0.80	C	21	C	36	D
32	Victoria Avenue & Wooley Road	0.50	A	0.51	A	22	C	25	C
33	Vineyard Av (SR-232) & Esplanade Dr	0.56	A	0.69	B	17	B	46	D
34	Patterson Road & Doris Avenue	0.20	A	0.24	A	13	B	15	B
	Intersections Worse Than "C"		0		3		1		8

Sources:

ICU Results: URS report, Traffic Circulation Study, City Of Oxnard, 2020 General Plan Update / EIR (April 23, 2008) and City of Oxnard Public Works Department.

HCM Results: City of Oxnard Public Works Department, Spreadsheet, September 25, 2008.

4. WHAT WILL IT BE LIKE IN 2020 WITHOUT THE INITIATIVE?

According to the URS traffic circulation study for the General Plan Update, the current 2020 General Plan (adopted in 1990), would allow 22 intersections to fail to meet the City's LOS "C" v/c standard at 2020 Buildout (see Exhibit 2). Alternatives A, B, and C to the Updated General Plan, which promote higher density uses at urban transit-oriented villages, would cause between 25 and 45 intersections to fail to meet the LOS "C" v/c standard at Buildout.

A mitigated version of Alternative "B" (Compact Concentric Infill with Workforce Housing outside the City Urban Restriction Boundary), would reduce the number of unsatisfactory intersections in 2020 to five). Twenty-five intersections would need to be widened to accomplish this (see Table 7.3-1 of URS report). Wooley Road and Del Norte Road would need to be widened to 6 lanes (see Table 7.4-1 of URS report).

No feasible mitigations were found by URS for the intersections of:

- Oxnard-Saviers & Wooley
- C Street & Wooley
- Rose & Third

The Five Points intersection of Oxnard-Saviers & Wooley would operate at LOS "F" during both the AM and PM peak hours under the Mitigated Alternative "B" of the General Plan Update. The other two intersections, C Street & Wooley, and Rose & Third, would operate at LOS D.

URS determined that the intersection of Rice and Gonzales could be feasibly mitigated only to LOS "D" not "C".

Exhibit 2: Current 2020 General plan, Updated Alternative B, Measure V

		Current 2020 GP		Updated GP Alt B		2027 With Measure V			
Intersection		AM	PM	AM	PM	AM	PM	AM	PM
Int #	Name	ICU LOS	ICU LOS	ICU LOS	ICU LOS	ICU LOS	ICU LOS	HCM LOS	HCM LOS
1	C St & 3rd St	C	D	B	C				
2	C St & 5th St	A	C	A	C				
3	C St & Channel Islands	A	C	A	C				
4	C St & Gonzales	A	E	A	C	B	E	D	E
5	C St & Pleasant Valley	A	A	A	A				
6	C St & Wooley	A	D	B	D				
7	Del Norte & Camino Del Sol	A	A	A	A				
8	Del Norte & Gonzales	A	C	A	C				
9	Del Norte & SR-34 (5th St.)	A	C	A	C	B	E	B	D
10	Del Norte & Sturgis	A	A	A	A				
11	Del Norte & US101 NB Ramps	B	B	B	B	A	C	B	C
12	Del Norte & US101 SB Ramps	A	A	A	A	B	D	A	B
13	Dupont & Channel Islands	A	A	A	A	A	F	B	C
14	H St & Gonzales	C	D	C	C	C	E	C	E
15	H St & Vineyard	A	A	A	A				
16	Harbor & 5th St.	A	A	A	A	E	B	C	A
17	Harbor & Channel Islands	A	A	A	A				
18	Harbor & Gonzales	A	A	A	A	E	E	C	C
19	Harbor & Wooley	A	A	A	B				
20	Hobson/J St & Wooley	A	C	A	C				
21	J St & Channel Islands	B	B	A	B				
22	J St & Hueneme	A	A	A	A				
23	J St & Pleasant Valley	A	A	A	A				
24	Lombard & 5th St.	B	C	A	B				
25	Lombard & Gonzales	A	A	A	A	A	B	B	B
26	Oxnard & 2nd St.	A	C	A	C				
27	Oxnard & 5th St.	B	C	A	C				
28	Oxnard & Camino Del Sol	A	C	A	C				
29	Oxnard & Channel Islands	A	B	A	B				
30	Oxnard & Colonia	A	A	A	A				
31	Oxnard & Esplanade	A	B	A	B				
32	Oxnard & Gonzales	B	D	B	C				
33	Oxnard & Pleasant Valley	B	C	B	C	D	E	C	F
34	Oxnard & Statham	A	A	A	A				
35	Oxnard & Town Center	A	A	A	A				
36	Oxnard & US101 NB Ramps	A	A	A	A				
37	Oxnard & US101 SB Ramps	A	A	A	A				
38	Oxnard & Vineyard	B	C	B	C	C	E	D	F
39	Oxnard-Saviers & Wooley	E	F	F	F	D	F	F	F
41	Pacific & Wooley	A	A	A	A				
42	Patterson & 5th St	A	A	A	A				
43	Patterson & Channel Islands	A	A	A	A				
44	Patterson & Doris	A	A	A	A	A	A	B	B
45	Patterson & Gonzales	A	A	A	A				
46	Patterson & Hemlock	A	A	A	A				
47	Patterson & Teal Club	A	A	A	A				
48	Patterson & Wooley	A	A	A	B				
49	Pleasant Valley & Bard	A	A	A	A				
50	Rice & Channel Islands	A	E	A	A				
51	Rice & Gonzales	F	F	C	D	C	D	C	C

Exhibit 2 (Continued)

		Current 2020 GP		Updated GP Alt B		2027 With Measure V			
Intersection		AM	PM	AM	PM	AM	PM	AM	PM
Int #	Name	ICU LOS	ICU LOS	ICU LOS	ICU LOS	ICU LOS	ICU LOS	HCM LOS	HCM LOS
52	Rice & Hueneme	A	A	A	A				
53	Rice & US101 SB Ramps	A	A	A	A				
54	Rice & Wooley	A	C	A	C				
55	Rice & Camino Del Sol*	--	--	--	--				
56	Rice NB Ramps & Camino Del Sol	A	A	A	A				
57	Rice SB Ramps & Camino Del Sol	A	A	A	A				
58	Rose & 5th	C	F	--	--				
59	Rose & Auto Center	A	D	A	C	A	E	C	F
60	Rose & Bard	C	B	C	B				
61	Rose & Camino del Sol	B	C	B	C	D	E	D	E
62	Rose & Channel Islands	C	E	C	C	B	E	C	E
63	Rose & Emerson	A	B	A	B				
64	Rose & Gonzales	D	E	C	C	D	F	D	F
65	Rose & Hueneme	C	E	C	A				
66	Rose & Lockwood	C	D	B	C				
67	Rose & Oxnard	A	D	A	C	A	D	B	C
68	Rose & Pleasant Valley	D	E	C	D				
69	Rose & Third	A	D	A	D	A	B	B	B
70	Rose & US101 NB Ramps	A	C	A	C				
71	Rose & US101 SB Ramps	A	A	B	B				
72	Rose & Wooley	A	D	B	C	B	D	C	D
73	Santa Clara & Auto Center	B	E	A	C	C	F	D	F
74	Saviers & Channel Islands	C	D	C	C				
75	Saviers & Hueneme	A	A	A	A				
76	Saviers & Pleasant Valley	A	A	A	B				
77	SR-1/Rice NB & Pleasant Vly	A	C	A	C				
78	Statham & Channel Islands	A	C	A	C				
79	Ventura & 5th St	A	C	A	C				
80	Ventura & Channel Islands	B	D	A	C				
81	Ventura & Doris	A	A	A	B				
82	Ventura & Gonzales	A	A	A	A	C	D	E	D
83	Ventura & Hemlock	A	A	A	A				
84	Ventura & Hueneme	C	C	B	C				
85	Ventura & Pleasant Valley	B	B	B	B				
86	Ventura & Teal Club/2nd St	A	A	A	A				
87	Ventura & Town Center	A	A	A	A				
88	Ventura & Vineyard	A	A	A	A				
89	Ventura & Wagon Wheel	A	A	A	A				
90	Ventura & Wooley	A	C	A	C				
91	Victoria & 5th St	C	A	C	B				
92	Victoria & Channel Islands	A	B	B	C				
93	Victoria & Doris	C	B	C	B	E	E	D	D
94	Victoria & Gonzales	D	C	B	C	C	F	D	E
95	Victoria & Hemlock	A	A	A	A				
96	Victoria & Teal Club	B	B	A	B	E	E	B	C
97	Victoria & Wooley	C	A	C	A	B	B	C	C
98	Vineyard & Esplanade	C	D	B	C				
99	Vineyard & US101 NB Ramps	A	B	A	B				
100	Vineyard & US101 SB Ramps	A	A	A	A				
101	Vineyard & Ventura/Myrtle	A	A	A	A	C	D	C	C
	Total Ints Failing LOS C	2	8	1	3	4	10	3	6

Sources for Exhibit 2:

URS report, Traffic Circulation Study, City Of Oxnard, 2020 General Plan Update / EIR (April 23, 2008) and City of Oxnard Public Works Department.

City of Oxnard Public Works Department, Spreadsheet, September 25, 2008.

5. WHAT WILL IT BE LIKE IN 2020 WITH THE INITIATIVE?

Thirty-four of the 101 intersection evaluated in the General Plan Update were re-evaluated based on growth forecasts likely to occur if Measure V were approved.

It was assumed that traffic growth would occur at the rate of 1.5% per year, similar to historic population growth rate for the City. This is a conservative assumption in that it does not take into account that traffic has historically grown at a rate faster than the population. The growth was straight line extrapolated out 20 years, without compounding. While less growth may occur within the City because of the limitations imposed by Measure V, growth in adjacent jurisdictions would likely be larger to compensate for the lower rate within the City.

No capacity improvements to city streets were assumed to occur under Measure V because small developments do not have the resources to build major road improvements. Small developments would continue to pay traffic impact fees under Measure V, but because impact fees cannot legally pay for 100% of the costs of improvements and cannot be borrowed against (the uncertain revenue stream cannot be bonded), the City would still need to identify alternative road improvement funds to make up the difference and would have to wait until most all of the development came in before it would have sufficient impact fee revenues to pay for road improvements.

The results are shown in the 4 rightmost columns of Exhibit 2. Both ICU LOS and Highway Capacity Manual (HCM) LOS results are shown. Out of the 34 intersections evaluated 22 would fail to meet LOS "C" standards during the PM peak hour under Measure V.

6. TRIP GENERATION OF LARGE AND SMALL DEVELOPMENTS

Small land developments, whether residential or commercial, typically have higher trip generation rates per dwelling unit and per square foot floor area than larger developments. This is because some of the traffic can be internalized within a large development. This is especially true for shopping centers and downtown retail districts. Small shopping centers with fewer shops require the customer to get in and out of their car a lot more to complete their daily shopping needs, while a large shopping center enables the shopper to complete more of their shopping needs walking within one large center.

The Institute of Transportation Engineers (ITE) Trip Generation Handbook, 7th edition, was used to compare the vehicle-trip-ends generated by one large 100 dwelling unit single family residential development and twenty-five 4-dwelling unit single family residential developments. The results are shown in Exhibit 3. The smaller residential developments generate 29% more vehicle trips on a daily basis than the equivalent large residential development.

A similar comparison was made of a single 100,000 square feet of new commercial retail space or ten 9,999 square foot commercial developments. The results, also given in Exhibit

3, show that a series of small retail commercial developments generate 123% more daily vehicle trips than the equivalent large retail commercial development.

Exhibit 3: Daily Trip Generation of Large and Small Developments

Residential

Residential Single-Family Detached (ITE #210) ***weekday trips***

Regression Eq. Ln(T) = 0.92Ln(x) + 2.71
x = dwelling units $R^2 = 0.96$

Option	Number	DU	Rate	Daily Trip Ends
1 x 100 units:	1	100	10.398	1,040
25 x 4 units:	25	4	13.452	1,345

Commercial Retail

Shopping Center (ITE #820) ***weekday trips***

Regression Eq. Ln(T) = 0.65Ln(x) + 5.83
x = 1000's of Square Feet $R^2 = 0.78$

Option	Number	Square Feet	Rate	Daily Trip Ends
1 x 100,000 sq.ft:	1	100,000	0.068	6,791
10 x 9,999 sq.ft:	10	9,999	0.152	15,202

7. WHAT WILL IT BE LIKE BETWEEN NOW AND 2020 WITH THE INITIATIVE?

Under current regulations, a development project can be approved even if there are existing traffic problems, as long as the developer commits to mitigate the problem to the City's satisfaction.

The initiative would require that any LOS problems be fixed first before further development is even "contemplated" by the City (see Section 3(5), Paragraph A of the initiative). Section 2, paragraph C states that the objective of the initiative is for the problem to be fixed "at all times of the preceding year".

Thus, the City could only consider exempt development projects under the initiative until such times as all of the intersection LOS problems are fixed everywhere in the City. All other development projects would have to go to an election for approval.

8. REFERENCES

City of Oxnard, Planning Division. http://developmentservices.cityofoxnard.org//Department.aspx?DepartmentID=7&DivisionID=76&ResourceID=365. *General Plan 2020*. Adopted October 7, 1990, as amended through November 2004.

City of Oxnard, http://www.westplanning.com/oxnard/library.htm. *Background Report*. June 2006.

City of Oxnard as prepared by URS. *Traffic Circulation Study: 2020 General Plan Update / EIR*. April 23, 2008.

Flynn, Tim and William L. Terry. *The Oxnard Traffic Initiative*. January 18, 2008.

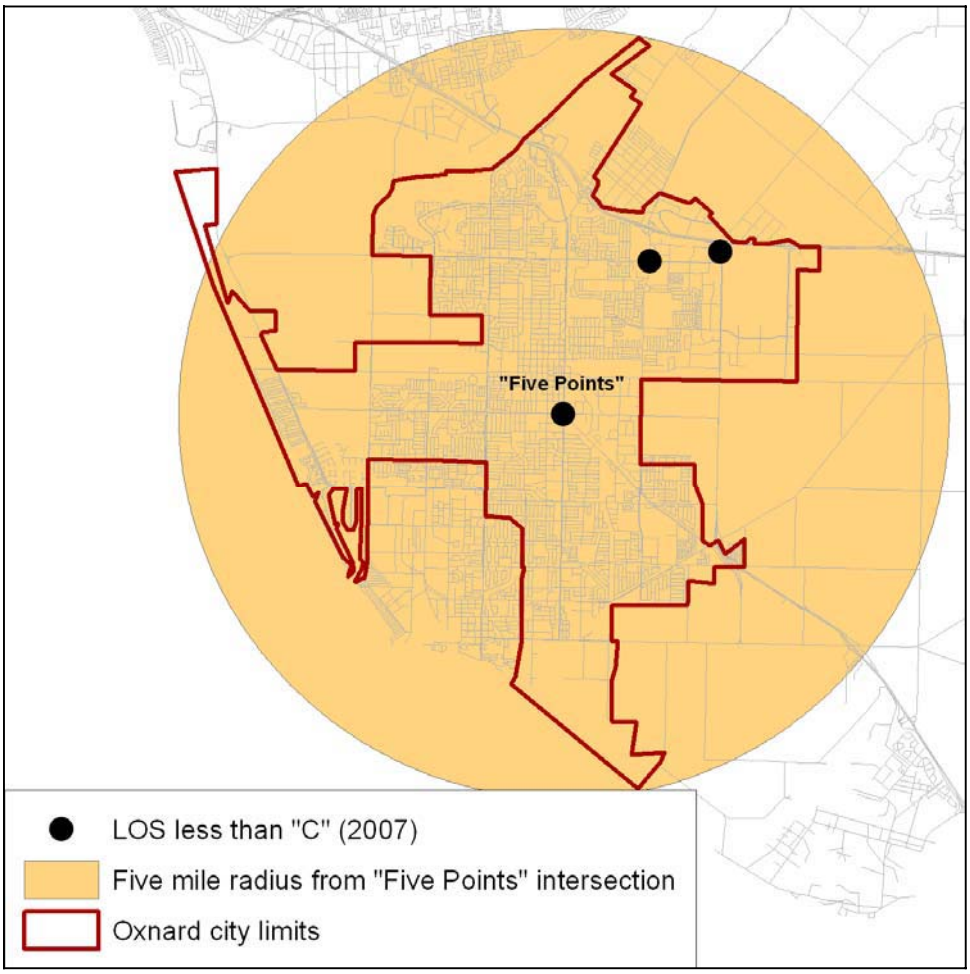
Institute of Traffic Engineers. *Trip Generation, 7th Edition, Volume 2 of 3*. 2003.

Appendices

9. APPENDIX A: THE CITY AND THE FIVE MILE RADIUS

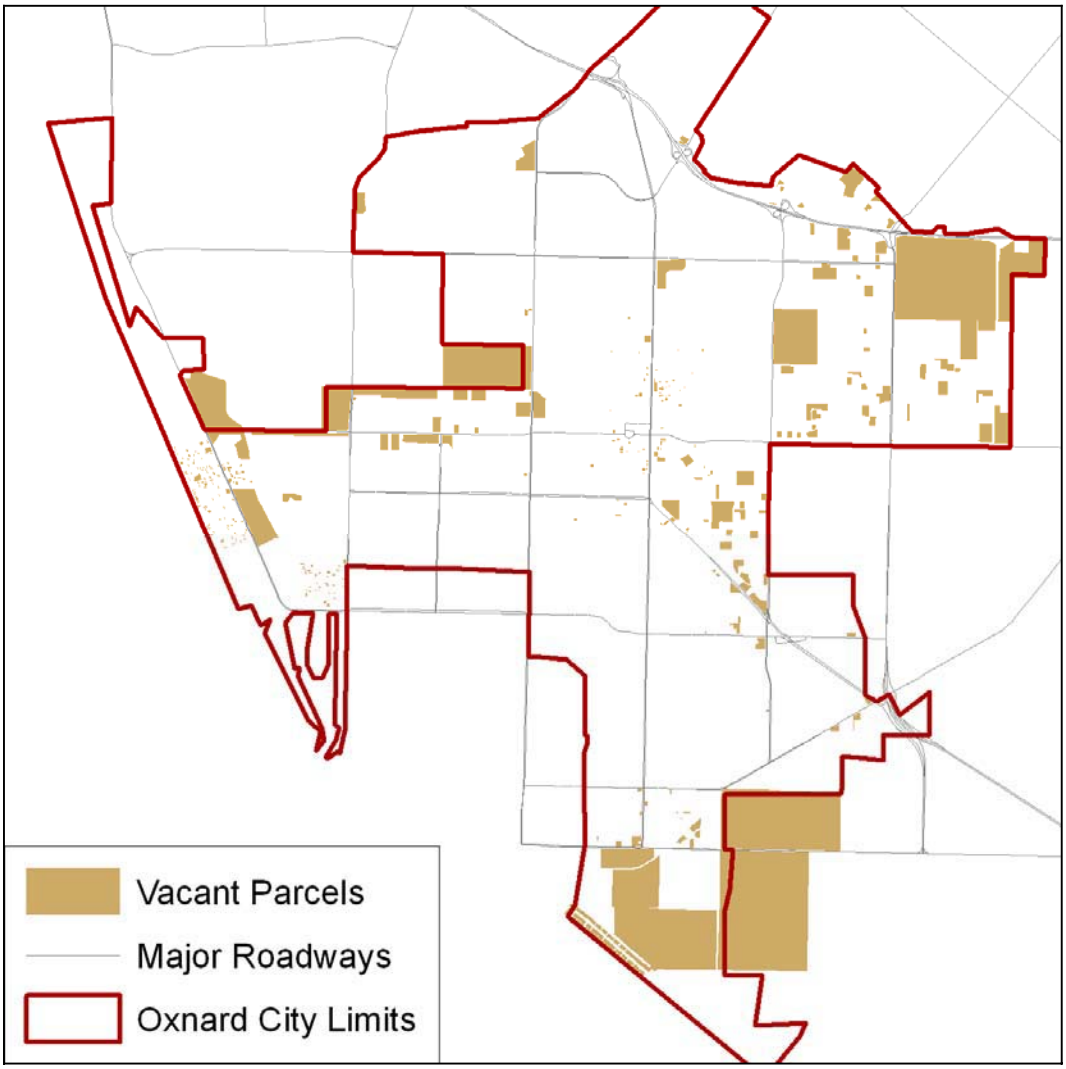
The Initiative will essentially affect the entire City of Oxnard. This impact is largely due to the requirement that all intersections within five miles of a proposed development be consistently operating at LOS "C" or better for one year prior to the development application. The figure below shows how the five mile radius requirement of the Initiative can impact development in the City of Oxnard if just a single intersection in the center of the City operates below LOS "C". Given the physical dimensions of the City, any intersection operating below LOS "C" would preclude any considerable developments from being approved by the local Planning Commission and City Council in the majority of the City area, as can be deduced from the figure.

Figure 1. Impact of "Five Mile Radius" on Development



Source: Data adapted from Census 2000 Tiger GIS files

Figure 2. Vacant Parcels In/Near the City of Oxnard



Source: Data adapted from City of Oxnard vacant parcel database, Census 2000 Tiger GIS files

10. APPENDIX B: CURRENT PLANS TO MITIGATE DEFICIENT INTERSECTIONS

The traffic counts performed in 2007 by the City of Oxnard found the following three intersections to be operating below LOS "C":

- Oxnard Blvd / Saviors Road at Wooley Rd ("Five Points")
- Rose Ave at Gonzales Rd
- US-101 at Rice Ave (Specifically, Santa Clara/Rice at Auto Center)

The US-101 at Rice Ave location is programmed to be improved under State Proposition 1B; the pre-construction planning is already in progress (e.g., design, land acquisition) however construction has not yet started.

Improvements for the intersection of Rose Ave at Gonzales Rd are being evaluated by the City.[3]

As the "Five Points" intersection at Oxnard Blvd (SR 1) / Saviers Road and Wooley Road (highlighted in the figure) has consistently operated below LOS "C" from the time that the current General Plan was adopted in 1990 through the present, this intersection on its own would preclude any considerable developments from being approved by the local Planning Commission and City Council. The improvements for this specific intersection are estimated at greater than $40 million and must be coordinated with Caltrans..[4]

[3] Discussion with Jason Samonte, City of Oxnard Traffic Engineer, on August 28, 2008.
[4] Discussion with Matthew Winegar, City of Oxnard Development Service Director, on August 27, 2008.

11. APPENDIX C: DELAY VERSUS ICU V/C LEVEL OF SERVICE

Level of service (LOS) at a signalized intersection is an indicator of the driver's perception of the ease with which he or she can pass through an intersection. It is measured using a letter grade system going from LOS "A", the best level of service, to LOS "F", the worst level of service.

ICU Method

All cities in Ventura County, including the City of Oxnard, currently use the Intersection Capacity Utilization (ICU) method to estimate LOS for traffic impacts and to determine appropriate mitigations. It is a variation of the planning method first elaborated in the Transportation Research Board, "Interim Materials on Highway Capacity," Circular 212, issued in 1980. The ICU method is preferred by many agencies in Southern California because it is straightforward to apply, easy to check, and applicable to 90% of the intersections in the region.

The ICU method is designed to be applied to signalized intersections only. It treats an intersection as if all traffic has to pass through a single critical point. The critical point has a capacity of 1600 vehicles per hour per lane. The critical left turn and through movements at the intersection are divided by the number of lanes available for each movement and summed to obtain the critical volume. The critical volume divided by 1600 gives the percent capacity utilization. A lookup table, summarized below, is then used to convert the percent capacity utilization to a letter level of service grade.

ICU Level of Service Table

Level of Service	Volume/Capacity Ratio
LOS A	0 – 0.60
LOS B	0.61 – 0.70
LOS C	0.71 – 0.80
LOS D	0.81 – 0.90
LOS E	0.91 – 1.00
LOS F	1.01 or above

The more lanes that is able to feed traffic through the critical point, the greater the traffic capacity of the intersection. In fact, that is the only way in the ICU method to mitigate an intersection capacity utilization problem, add more lanes. The ICU method is designed for suburban intersections with separate left turn lanes and left turn arrows (protected phases) for all left turns, standard lane widths, relatively level grades, and little or no interference from pedestrians, bicycles, buses, or parked cars. The ICU method tends to over estimate the capacity of older non-suburban intersections with non-standard designs.

Although the intersection evaluation methodology is not specified in the Initiative, the levels of service presented are consistent with the ICU LOS table above.

HCM Method

The Highway Capacity Manual (HCM) signal delay method was developed in 1985 and updated in 1994, 1997, and 2000 to estimate delay and level of service for a broader range of intersection operating conditions than the ICU method is designed to address. The computed delay is a function of the signal timing, lane widths, as well as the number of pedestrians, bicycles, trucks, and buses. The computations are complex enough that it is not realistic to implement the HCM signal delay method in a spreadsheet. Commercially available software must be used. A lookup table, summarized below, is used to convert the predicted mean delay per vehicle to a letter level of service grade.

HCM Signalized Level of Service Table

Level of Service	Traffic Delay (secs.)
LOS A	Less than 10
LOS B	10 – 20
LOS C	20 – 35
LOS D	35 – 55
LOS E	55 – 80
LOS F	More than 80

The HCM method is particularly sensitive to signal timing. Signal timing is a key input required by the method. A low volume street can have an LOS of "F" if the signal timing is very conservative. A high volume street can have an LOS of "D" or "E", even if the volume/capacity ratio slightly exceeds 1.00, if the signal timing is particularly good.

Although ICU is the prevalent method for agencies in Ventura County, the Initiative also presents intersection level of service thresholds based on traffic delay. The methodology to calculate intersection delay is not specified in the Initiative; however, the levels of service definitions are consistent with those of the HCM criteria for signalized intersections summarized above.

Comparison of ICU and HCM

The levels of service thresholds for signalized intersection for the ICU and HCM methods do not correspond directly. The HCM signalized delay method generally results in equal or poorer levels of service compared to the same intersection evaluated using the ICU method. However, it is not uncommon for the HCM method to yield better results than the ICU method since it takes into account and is sensitive to more variables affecting capacity and level of service. As a result, an intersection shown to be deficient based on level of service calculations using the ICU method can be shown to operate acceptably using the HCM method. This lack of consistency could affect the determination of project traffic impacts and mitigation measures.

Unsignalized Intersections

The Initiative acknowledges calculations for signalized and unsignalized intersections are different due to the variation in traffic control, but does not provide a methodology to evaluate unsignalized intersections. One common approach for the evaluation of unsignalized intersections is the methodology outlined in the Highway Capacity Manual 2000. Using this method, the level of service at unsignalized intersections is determined by the weighted average delay for all vehicles entering the intersection. For intersections with a stop control on the minor approach only, the delay and LOS for the worst-case stop-controlled movement is reported in addition to the average delay and LOS for the intersection as a whole. The table below presents the average delay criteria used to determine the level of service at unsignalized intersections.

HCM Unsignalized Level of Service Table

Level of Service	Average Delay (secs.)
LOS A	Less than 10
LOS B	10 – 15
LOS C	15 – 25
LOS D	25 – 35
LOS E	35 – 50
LOS F	More than 50

12. APPENDIX D: ICU COMPUTATIONS – 2007

(separate document)

13. APPENDIX E: ICU COMPUTATIONS – 2027

(separate document)

14. APPENDIX F: HCM COMPUTATIONS – 2007

(separate document)

15. APPENDIX G: HCM COMPUTATIONS – 2027

(separate document)