Exhibit B4
Newport TSP Amendments
File No. 2-CP-11

Newport Transportation System Plan Update - Alternate Mobility Standards
Final Technical Memorandum #12 Analysis of South Beach Land Use Scenarios

Prepared for

Oregon Department of Transportation
Region 2 Office
455 Airport Road SE
Salem, OR 97301

City of Newport
169 SW Coast Highway
Newport, Oregon 97365

March 2011

CITATION

This project is partially funded by a grant from the Transportation and Growth Management (TGM) Program, a joint program of the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development. This TGM grant is financed, in part, by federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), local government, and State of Oregon funds.

The contents of this document do not necessarily reflect views or policies of the State of Oregon.

Parametrix. 2011. Newport Transportation System Plan Update - Alternate Mobility Standards

Final Technical Memorandum #12 Analysis of South Beach Land Use Scenarios. Prepared by Parametrix, Portland, Oregon. March 2011.

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

Prepared by Shelley Oylear

Checked by Anne Sylvester, PTE

Approved by Anne Sylvester, PTE

TABLE OF CONTENTS

1. INTRODUCTION 1-1
1.1 REPORT PURPOSE AND CONTEXT 1-1
1.2 SUMMARY OF FINDINGS AND CONCLUSIONS 1-2
Trip Generation Estimates for Each Land Use Scenario 1-2
Performance Measures 1-3
Traffic Operations Key Findings 1-3
Duration of Congestion 1-4

2. ANALYSIS METHODOLOGY AND ASSUMPTIONS 2-1
2.1 OVERVIEW OF ANALYSIS METHODOLOGY 2-1
2.2 2030 ROADWAY NETWORK ASSUMPTIONS 2-1
2.3 DEVELOPMENT OF 2030 BACKGROUND TRAFFIC VOLUMES 2-2
2.4 DEVELOPMENT ASSUMPTIONS AND TRIP GENERATION ESTIMATES 2-5
Land Use Scenario #1 – Newport Population Growth 2-5
Land Use Scenario #2 – Environmentally Constrained Growth 2-8
2.5 PERFORMANCE MEASURES 2-10
Calculation of Yaquina Bridge Capacity 2-11
Roadway Segment Capacity 2-11
Current Operational Standards 2-11

3. 2030 30 HV TRAFFIC OPERATIONAL ANALYSIS 3-1
3.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH 3-1
Intersection Operations Analysis 3-1
Traffic Queuing 3-2
Roadway Segment Operations 3-4
Other Measures of Effectiveness 3-4
Effect of Adding Road Connection from 50th to 62nd 3-5
3.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH 3-5
Intersection Operations Analysis 3-5
Traffic Queuing 3-6
Roadway Segment Operations 3-8
Other Measures of Effectiveness 3-8
Effect of Adding Road Connection from 50th to 62nd 3-9

4. 2030 AVERAGE ANNUAL TRAFFIC OPERATIONAL ANALYSIS 4-1
4.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH 4-1
Intersection Operations Analysis 4-1
Traffic Queuing 4-2
Roadway Segment Operations 4-3

TABLE OF CONTENTS (CONTINUED)

Other Measures of Effectiveness 4-4
Effect of Adding Road Connection from 50th to 62nd 4-5
4.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH 4-5
Intersection Operations Analysis 4-5
Traffic Queuing 4-6
Roadway Segment Operations 4-8
Other Measures of Effectiveness 4-8
Effect of Adding Road Connection from 50th to 62nd 4-9

5. 2030 OFF-SEASON TRAFFIC OPERATIONAL ANALYSIS 5-1
5.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH 5-1
Intersection Operations Analysis 5-1
Traffic Queuing 5-2
Roadway Segment Operations 5-3
Other Measures of Effectiveness 5-4
Effect of Adding Road Connection from 50th to 62nd 5-4
5.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH 5-5
Intersection Operations Analysis 5-5
Traffic Queuing 5-6
Roadway Segment Operations 5-7
Other Measures of Effectiveness 5-8
Effect of Adding Road Connection from 50th to 62nd 5-8

6. DURATION OF CONGESTION 6-1
6.1 METHODOLOGY 6-1
6.2 CONDITIONS WITH AVERAGE ANNUAL TRAFFIC VOLUMES 6-2
Land Use Scenario #1 – Newport Population Growth 6-2
Land Use Scenario #2 – Environmentally-Constrained Growth 6-3
Other Measures of Effectiveness 6-5
6.3 CONDITIONS WITH OFF-SEASON TRAFFIC VOLUMES 6-6
Land Use Scenario #1 – Newport Population Growth 6-6
Land Use Scenario #2 – Environmentally-Constrained Growth 6-7
Other Measures of Effectiveness 6-9

LIST OF FIGURES

Figure 1-1. South Beach Transportation Analysis Zones 1-8
Figure 2-1. South Beach Future Road Network and Study Intersections 2-3
Figure 2-2. South Beach Transportation Analysis Zones 2-4

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

Table 1-1. 2030 Land Use Scenario 1 – Traffic Operations Comparison 1-9
Table 1-2. 2030 Land Use Scenario 2 Operations Comparison 1-10
Table 1-3. Summary of Duration of Congestion Evaluation –Average Annual Conditions 1-11
Table 1-4. Summary of Duration of Congestion Evaluation – Off-Season Conditions. 1-12
Table 2-1. Land Use Scenario #1 – Newport Population Growth 2-6
Table 2-2. Land Use Scenario #2 – Environmentally Constrained Growth 2-8
Table 3-1. 2030 30 HV Intersection Operations Summary with Land Use Scenario #1 3-1
Table 3-2. 2030 30 HV Intersection Queuing with Land Use Scenario #1 3-2
Table 3-3. US 101 Roadway Segment Analysis for 2030 30 HV with Scenario #1 3-4
Table 3-4. US 101 Travel Time and Speeds for 2030 30 HV with Land Use Scenario #1 3-4
Table 3-5. US 101 Unserved Vehicles for 2030 30 HV with Land Use Scenario #1 3-5
Table 3-6. 2030 30 HV Intersection Operations Summary with Land Use Scenario #2 3-6
Table 3-7. 2030 30 HV Intersection Queuing with Land Use Scenario #2 3-7
Table 3-8. US 101 Roadway Segment Analysis for 2030 30 HV with Scenario #2 3-8
Table 3-9. US 101 Travel Time and Speed for 2030 30 HV with Land Use Scenario #2 3-8
Table 3-10. US 101 Unserved Vehicles for 2030 30 HV with Land Use Scenario #2 3-9
Table 4-1. 2030 AAV Intersection Operations Summary with Land Use Scenario #1 ... 4-1
Table 4-2. 2030 AAV Intersection Queuing with Land Use Scenario #1 4-2
Table 4-3. US 101 Roadway Segment Analysis for 2030 AAV with Land Use Scenario #1 4-4
Table 4-4. US 101 Travel Time and Speed for 2030 AAV with Land Use Scenario #1 4-4
Table 4-5. US 101 Unserved Vehicles for 2030 AAV with Land Use Scenario #1 4-5
Table 4-6. 2030 AAV Intersection Operations Summary with Land Use Scenario #2 ... 4-6
Table 4-7. 2030 AAV Intersection Queuing with Land Use Scenario #2 4-6
Table 4-8. US 101 Roadway Segment Analysis for 2030 AAV with Land Use Scenario #2 4-8
Table 4-9. US 101 Travel Time and Speed for 2030 AAV with Land Use Scenario #2 4-8
Table 4-10. US 101 Unserved Vehicles for 2030 AAV with Land Use Scenario #2 4-9

TABLE OF CONTENTS (CONTINUED)

Table 5-1. 2030 Off-Season Intersection Operations Summary with Scenario #1 5-1
Table 5-2. 2030 Off-Season Intersection Queuing with Land Use Scenario #1 5-2
Table 5-3. US 101 Roadway Segment Analysis for 2030 Off-Season with Land Use Scenario #1 5-4
Table 5-4. US 101 Travel Time and Speed for 2030 Off-Season with Scenario #1 5-4
Table 5-5. US 101 Unserved Vehicles for 2030 Off-Season with Land Use Scenario #1 5-4
Table 5-6. 2030 Off-Season Intersection Operations Summary with Scenario #2 5-5
Table 5-7. 2030 Off-Season Intersection Queuing with Land Use Scenario #2 5-6
Table 5-8. US 101 Roadway Segment Analysis for 2030 Off-Season with Land Use Scenario #2 5-7
Table 5-9. US 101 Travel Time and Speed for 2030 Off-Season with Scenario #2 5-8
Table 5-10. US 101 Unserved Vehicles for 2030 Off-Season with Land Use Scenario #2 5-8
Table 6-1. Summary of Duration of Congestion Evaluation – Average Annual Conditions 6-4
Table 6-2. US 101 Travel Time and Speed for 2030 Average Annual Conditions 6-5
Table 6-3. US 101 Unserved Vehicles for 2030 Average Annual Volumes 6-6
Table 6-4. Summary of Duration of Congestion Evaluation – Off-Season Conditions... 6-8
Table 6-5. US 101 Travel Time and Speed for 2030 Off-Season Conditions 6-9
Table 6-6. US 101 Unserved Vehicles for 2030 Off-Season Volumes 6-10

APPENDICES

APPENDIX A 2030 Traffic Volume and Baseline Network Development
APPENDIX B Yaquina Bay Bridge Capacity Calculation
APPENDIX C 2030 Traffic Volumes and Traffic Operations Analysis for 30 HV Conditions and Land Use Scenario #1
APPENDIX D 2030 Volumes and Traffic Operations Analysis for 30 HV Conditions and Land Use Scenario #2
APPENDIX E 2030 Volumes and Traffic Operations Analysis for Average Annual Conditions and Land Use Scenario #1
APPENDIX F 2030 Volumes and Traffic Operations Analysis for Average Annual Conditions and Land Use Scenario #2
APPENDIX G 2030 Volumes and Traffic Operations Analysis for Off-Season Conditions and Land Use Scenario #1
APPENDIX H 2030 Volumes and Traffic Operations Analysis for Off-Season Conditions and Land Use Scenario #2

TABLE OF CONTENTS (CONTINUED)

APPENDIX I Duration of Congestion Analysis with Average Annual Volumes - Land Use Scenario #1

APPENDIX J Duration of Congestion Analysis for Average Annual Conditions - Land Use Scenario #2

APPENDIX K Duration of Congestion Analysis for Off-Season Conditions - Land Use Scenario 1

APPENDIX L Duration of Congestion Analysis for Off-Season Conditions - Land Use Scenario 2

ACRONYMS AND TERMS

30 HV	30th Highest Hourly Traffic Volumes (experienced during the summertime weekday peak hour)
AAV	Average Annual Volume (average of PM peak hours over the entire year)
ATR	Automatic Traffic Recorder
HCM	Highway Capacity Manual
ODOT	Oregon Department of Transportation
Off-Season	Refers to traffic volumes and operations typically experienced during the weekday PM peak hour from September through May, excluding the summertime peak season, Fridays, holidays and Spring Break week.
OHP	Oregon Highway Plan
PHF	Peak Hour Factor
Summertime	Refers to traffic volumes and operations typically experienced during the weekday PM peak hour from June through August excluding Fridays and holidays.
Synchro	HCM compatible traffic analysis software for intersections
TAZ	Transportation Analysis Zone
TGM	Transportation and Growth Management
TPAU	Transportation Planning and Analysis Unit
TSP	Transportation System Plan
UGB	Urban Growth Boundary
V/C	Volume-to-Capacity (ratio)
VPHPL	Vehicles per Hour per Lane

1. INTRODUCTION

1.1 REPORT PURPOSE AND CONTEXT

This report is one of several that will be prepared to inform the development of alternate mobility standards for US 101 in the South Beach study area. The development of these standards is based on the findings of earlier technical memoranda prepared for the Newport Transportation System Plan (TSP) Update which indicate that the Oregon Highway Plan's (OHP) mobility standards could not be met along US 101 during the planning period. As indicated in the memoranda, the combination of background traffic growth (e.g., through traffic) and anticipated development within the South Beach area would result in peak period and peak seasonal traffic volumes that could not be accommodated on US 101 without additional Yaquina Bay Bridge capacity and substantial highway improvements in South Beach.

The purpose of this report is to document the analysis of 2030 peak period traffic volumes on a roadway network for South Beach that includes a variety of improvements that were identified through earlier analyses. This analysis is focused on two land use scenarios for three time periods including: 30 HV (30th highest hourly volume which occurs during the weekday PM peak summer months), AAV (Average Annual Volumes which reflect an average weekday PM peak hour volume over the entire year, and Off-Season. Analysis results are presented in a series of mobility measures one or more of which can contribute to the discussion of establishing alternate mobility standards for the South Beach area.

Included in this report are the following:

- Documentation of the methodology and assumptions used to analyze 2030 peak period traffic volumes including assumed roadway network improvements and trip generation for the South Beach area.
- A summary of anticipated 2030 traffic operations for study area intersections and roadway segments for 30 HV, average annual, off-season time periods.

This report is divided into six chapters, the first of which is this Introduction.

Chapter 2 presents a discussion of the analysis methodology and assumptions inherent in the evaluation of land use scenarios and time periods evaluated for 2030 conditions. Included is a summary of the performance measures that will be addressed in the analysis, identification of current operational standards for signalized and unsignalized intersections along US 101 in South Beach, roadway network assumptions for 2030 (which include the provision of four through lanes along the highway with left and right turning lanes as appropriate), development of 2030 peak hour background traffic volumes, and trip generation and distribution for the land use scenarios.

Chapter 3 presents the results of traffic operational analysis for the 2030-30 HV for the two land use scenarios along US 101 using the updated 2030 roadway network. Results for each of the performance measures identified in Chapter 2 are included for both scenarios.

Chapter 4 presents the results of traffic operational analysis for the 2030 AAV for the two land use scenarios.

Chapter 5 presents the results of traffic operational analysis for the 2030 Off-Season Volumes for the two land use scenarios.

Chapter 6 summarizes findings related to the duration of congestion over a 16-hour period in 2030 under conditions with either land use scenario and average annual weekday conditions.

1.2 SUMMARY OF FINDINGS AND CONCLUSIONS

Trip Generation Estimates for Each Land Use Scenario

Land Use Scenario #1

The variety of the land uses assumed in the South Beach study area for this scenario are consistent with zoning designations and permitted uses, and were tied to the projected population growth of the City of Newport. This scenario assumes that 50 percent of the population growth anticipated in Newport by 2030 will occur in South Beach with the remainder occurring generally north of the Yaquina Bay Bridge. The types of development assumed for South Beach are consistent with the uses called for in the Newport Comprehensive Plan, including single family residential, condominiums/townhouses, industrial park, retail, research and development, community college and a state park with campgrounds.

Land Use Scenario #1 is expected to generate 4,317 PM peak hour trip ends, with about 45 percent of the trips inbound and 55 percent outbound. Sub-area A, by the South Beach Campus Village development, would generate the largest percentage of the total PM peak hour trips, about 27 percent. Development activity assumed along both sides of US 101, Sub-areas B and C, would generate about 23 percent of the total trip ends. Sub-area F, located west of US 101 and generally between 32nd and 40th Streets, is expected to generate 11 percent. The remaining areas depicted in Figure 1-1, sub-areas C, G, H, I and J, are each expected to generate less than 10 percent of the total trip ends. Together these areas represent about 26 percent of total trip ends.

Land Use Scenario #2

Land Use Scenario #2 is built upon the development assumptions prepared for Scenario #1 but also incorporates potential development constraints associated with wetland resources in the study area. Generally these constraints exist along both sides of US 101 behind existing development from approximately 32nd Street to 62nd Street. The types of the land uses are assumed in each of the sub-areas are consistent with Comprehensive Plan designations and permitted uses but less total development is assumed to occur. Development includes single family residential, condominiums/townhouses, industrial park, retail, research and development, community college and a state park with campgrounds.

This land use scenario is anticipated to generate fewer total trips than Scenario #1--3901 trip ends rather than 4317 trip ends. While inbound trips still represent 45 percent of the total trips (and outbound 55 percent), the trip ends in each of the sub-areas cause each sub-area to represent a different percentage of the total trips than presented for Scenario #1. Sub-area A generates the same number of trip ends, but its share of the total trip ends increases to about 30 percent. Areas B and C include changes in the expected extent of development that reduce the number of trip ends for the areas and reduce the share of total trip ends. While the number of trip ends in Areas F and D remain the same, their share of the total trips increases because of reductions in other areas.

Performance Measures

To provide a more complete understanding of the extent and nature of future traffic congestion through South Beach and to offer useful comparisons among land use and network alternatives, a variety of performance measures have been identified. These have been calculated to determine the nature, type, location and duration of congestion for each scenario and time period analyzed and include the following:

- Volume-to-capacity ratios at intersections developed using the Synchro analysis software.
- 95th percentile traffic queues using Synchro output for both signalized and unsignalized intersections. Traffic queue estimates are not based on simulations and, as a result, they reflect the treatment of each signal as if it was in an isolated location rather than part of a system of traffic signals. The interactions between signals and their affects on traffic queuing are not reflected in the results presented in this report.
- Signal progression assessment focusing on green band width during peak hours.
- Travel time on US 101 in northbound and southbound directions for three roadway segments – Hurbert Street to 35th Street, 35th Street to 50th Street, and 50th Street to 62nd Street.
- Average travel speeds on US 101 in northbound and southbound directions for three roadway segments – Hurbert Street to 35th Street, 35th Street to 50th Street, and 50th Street to 62nd Street.
- Unserved vehicles (that cannot enter the Synchro network due to extensive congestion and, thus, are not included in the analysis).
- Duration of congestion – Number of hours that roadway capacity will be exceeded during projected 2030 average annual weekdays. The methodology used to calculate duration of congestion along US 101 in South Beach is more fully described in Chapter 6 along with analysis results.

Traffic Operations Key Findings

The results of analysis for each performance measure, land use scenario and time period are presented in detail in the later chapters of this technical memorandum. This executive summary highlights some of the key findings including both traffic operations results and estimates related to the duration of congestion beyond the PM peak hour. Key findings are as follows:

- Major roadway improvements would be needed along US 101 including such elements as widening of US 101 south of Abalone Street to provide four through lanes, and signalization of the intersections of 35th, 40th and 50th Streets with multiple turning lanes as needed.
- Even with these improvements, a significant increase in congestion along US 101 is anticipated over current conditions with either Land Use Scenario. No intersection would operate without one or more significantly congested movements and delays are anticipated along the length of the highway through South Beach, particularly approaching the Yaquina Bay Bridge with its limited 2-lane capacity.
- Traffic congestion will be at its most severe during the summertime peak season (represented by 30 HV). Tables 1-1 and 1-2 present the results of intersection

operations analysis for this time period and indicate that all three signalized intersections would operate at v/c > 1.00. Many of the side street movements at the unsignalized intersections would experience significant delays with a v/c of 2.00 or greater in many locations. Approaching the Yaquina Bay Bridge (e.g., north of 35th Street) north and southbound through movements are also significantly congested.

- Traffic congestion based on Average Annual traffic volumes would also experience significant congestion. This time period includes both the summertime peak and the remainder of the year.
- Traffic congestion during the Off-Season peak period (typically from September through May) would be less than the 30 HV or Average Annual, but significant congestion problems would still be experienced.

Traffic operations analyses for each time period are presented in Chapters 3, 4 and 5, respectively for both Land Use Scenarios.

Duration of Congestion

To provide greater understanding of the magnitude of expected 2030 congestion along US 101, an investigation was conducted to determine whether the worst impacts were limited to the PM peak hour and/or a few hours on either shoulder of the peak, or whether the congestion would be more pervasive. The analysis of duration of congestion attempts to identify the length of time over a 16-hour period on a typical Average Annual or Off-Season weekday when the study area highway and intersections would exceed the applicable OHP mobility standards for each location. Key findings from this analysis are presented in Table 1-3 and 1-4 and are summarized below. It should be noted that the analysis in this section differs slightly from the analysis in the preceding section in that Peak Hour Factors (PHFs) were adjusted from 0.85 to 1.00 to reflect the expectation that congestion would be sufficiently heavy to minimize traffic peaking within the peak hour. A peak hour factor is typically applied to traffic volume data to adjust for the common experience of a higher short peak (e.g., approximately 15 to 30 minutes) within a peak hour. Operations analysis is based on that peak within the peak.

Analysis worksheets for Average Annual are included in Appendix I and J for Scenarios 1 and 2, respectively. Worksheets for Off-Season are included in Appendix K and L for Scenarios 1 and 2, respectively.

Average Annual Weekday Conditions

Land Use Scenario #1

With full build-out of this scenario, intersection operations from north to south are expected to be as follows:

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 11 or 12 hours, respectively, out of each typical 2030 Average Annual weekday. With a 19 percent reduction in approach volumes, the two near intersections would operate in excess of their mobility standard of V/C > 0.85 for US 101 and V/C > 0.90 for side street traffic for 11 hours each typical weekday.
- For the unsignalized intersection of US 101 with 32nd Street, operations would exceed the applicable mobility standard for an estimated seven hours out of each weekday. With a 19 percent reduction in approach volumes, this intersection is

expected to meet its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic).

- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.96 during the weekday PM peak hour in comparison to its standard of V/C > 0.85. Operations would exceed this standard for an estimated four hours each weekday. Through an iterative process that included all three signalized intersections along US 101 in South Beach, it was determined that a 19 percent reduction in total approach volumes would be needed to meet the applicable mobility standards for each.
- The signalized intersection of US 101 with 40th Street is also expected to operate at V/C = 0.96 during the PM peak hour. This intersection would exceed its applicable standard of V/C > 0.75 for approximately seven hours each weekday. With a 19 percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.
- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.82 during the PM peak hour. This intersection would exceed its V/C > 0.75 standard for approximately two hours during each weekday. With a 19 percent reduction in total approach traffic volumes this intersection would meet its applicable mobility standard.
- For the unsignalized intersection of US 101 with 62nd Street, operations would exceed applicable mobility standards for an estimated seven hours out of each weekday. With a 19 percent reduction in approach volumes, this intersection is expected to meet its relevant mobility standard (V/C > 0.75 for traffic on US 101 and V/C > 0.80 for side street traffic).

It should be noted that none of these intersections operates in isolation from the others and that the anticipated traffic queuing from the bridge will likely have a significant impact on northbound traffic operations through much of the study area.

Land Use Scenario #2

With full build-out of this scenario, intersection operations from north to south are expected to be as follows:

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 12 hours out of each typical 2030 Average Annual weekday. With a 14 percent reduction in total approach traffic, some improvement would occur but the standard would still be exceeded for up to 11 hours for each typical weekday.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards for up to seven hours each weekday. With a 14 percent reduction in approach volume, this intersection would exceed its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for an estimated one hour during each typical 2030 Average Annual weekday.
- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.92 during the weekday PM peak hour in comparison to its standard of V/C > 0.85. Operations are expected to exceed this standard for an estimated four hours out of each weekday. Through an iterative process that included all three signalized

intersections along US 101 in South Beach, it was determined that a 14 percent reduction in total approach volumes would be needed to meet the applicable mobility standards for each.

- The signalized intersection of US 101 with 40th Street is expected to operate at V/C = 0.88 during the weekday PM peak hour. This intersection would exceed its applicable standard of V/C > 0.75 for approximately six hours each weekday. With a 14 percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.
- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.78 during the weekday PM peak hour. This intersection would exceed its V/C > 0.75 standard for only one hour during each weekday. With a 14 percent reduction in total approach traffic volumes, this intersection would meet its applicable mobility standard.
- At the unsignalized intersection with 62nd Street, the applicable standard for side streets of V/C > 0.80 would be exceeded for four hours each weekday. With a 14 percent reduction in approach volume this intersection is expected to meet its mobility standard for each typical 2030 Average Annual weekday.

As with Scenario #1, it should be noted that none of these intersections operates in isolation from the others and that the anticipated traffic queuing from the bridge will likely have a significant impact on northbound traffic operations through much of the study area.

Off-Season Weekday Conditions

Land Use Scenario #1

With full build-out of this scenario, intersection operations from north to south are expected to be as follows:

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 11 hours out of each typical 2030 Off-Season weekday. The eight percent reduction in approach volumes that benefits the signalized intersections would not materially affect operations at these two intersections.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards for an estimated two hours each weekday. With an eight percent reduction in approach volumes, this intersection would exceed its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for only one hour each weekday.
- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.85 during the weekday PM peak hour which meets its existing mobility standard.
- The signalized intersection of US 101 with 40th Street is expected to operate at V/C = 0.82 during the weekday PM peak hour. This intersection would exceed its applicable standard of V/C > 0.75 for approximately three hours each weekday. With an eight percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.

- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.72 during the weekday PM peak hour which is less than its existing mobility standard of V/C > 0.75.
- For the unsignalized intersection of US 101 with 62nd Street, operations would exceed applicable mobility standards for side streets of V/C > 0.80 for an estimated one hour out of each weekday. With an eight percent reduction in approach volumes, this intersection would meet its applicable standard.

Land Use Scenario #2

With full build-out of this scenario, intersection operations from north to south are expected to be as follows:

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would exceed their applicable mobility standards for 11 hours out of each typical 2030 Off-Season weekday.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for an estimated one hour each weekday.
- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.83 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.85.
- The signalized intersection of US 101 with 40th Street, is expected to operate at V/C = 0.75 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.75.
- The signalized intersection of US 101 with 50th Street, is expected to operate at V/C = 0.70 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.75.
- For the unsignalized intersection of US 101 with 62nd Street, the applicable standard for side streets of V/C > 0.80 would also be exceeded for one hour each weekday.

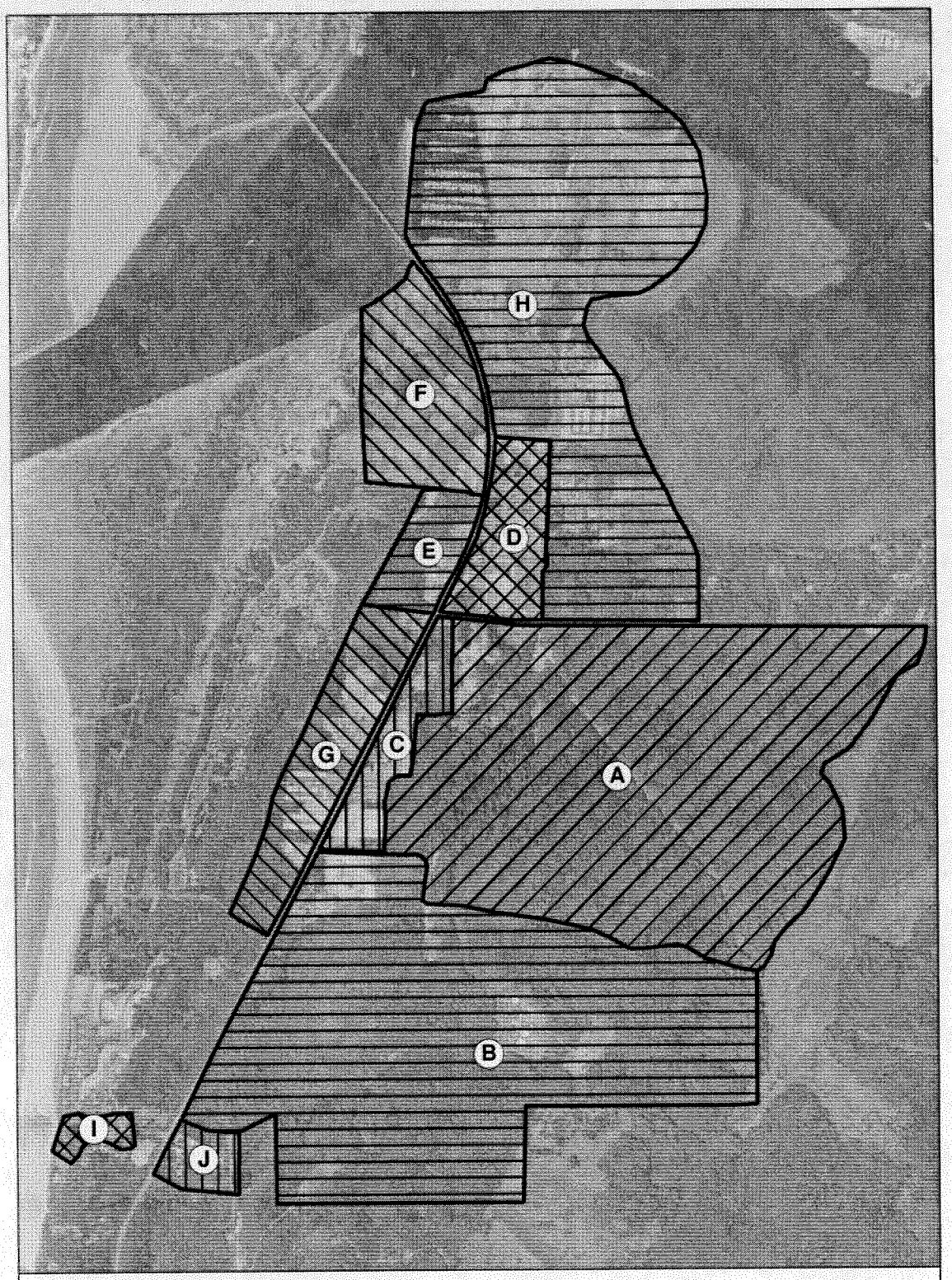


Figure 1-1: South Beach Future Transportation Analysis Zones

A
B
C
D
E
F
G
H
I
J

0 1,000 2,000 Feet

Geographic Data Standards:
Projected Coordinate System:
Oregon State Plane South

Data Source(s):
USDA, ESRI, Parametrix

Contact Information:
Parametrix
700 NE Multnomah
Suite 1000
Portland, OR 97232-2131
(503) 232-2400

This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

Analysis by Greg Harvey; Analysis Date: Feb-2007; Plot Date: October 6, 2009; File Name: SouthBeachwest_Outline.MXD

Table 1-1. 2030 Land Use Scenario 1 – Traffic Operations Comparison with Standard Peak Hour Factors

		OHP V/C Standard	2030 30 HV		2030 AA		2030 Off-Season	
			V/C Ratio	Delay (sec/veh)	V/C Ratio	Delay (sec/veh)	V/C Ratio	Delay (sec/veh)
Signalized Intersections								
US 101 & 35th Street		0.85	1.19	116.1	1.00	36.6	0.90	16.6
US 101 & 40th Street		0.75	1.24	126.6	1.04	58.8	0.94	37.8
US 101 & 50th Street		0.75	1.04	31.9	0.88	18.6	0.77	13.4
Unsignalized Intersections	***Critical Movement/Control***							
US 101 & Pacific Way	*Northbound Thru*	0.85	2.10	0	1.77	0	1.58	0
	Northbound Right	0.85	0.08	0	0.07	0	0.06	0
	Southbound Thru	0.85	2.04	0	1.70	0	1.52	0
US 101 & Abalone Street	*Northbound Thru*	0.85	1.09	0	0.92	0	0.82	0
	Southbound Thru	0.85	1.88	0	1.57	0	1.40	0
	Southbound Right	0.85	0.16	0	0.13	0	0.12	0
	Eastbound Right	0.90	31.96	N/A	11.34	N/A	6.18	N/A
US 101 & 32nd Street	*Northbound Thru*	0.85	0.82	0	0.69	0	0.62	0
	Northbound Right	0.85	0.04	0	0.04	0	0.03	0
	Southbound Thru-Right	0.85	1.31	0	1.10	0	0.98	0
	Eastbound Right	0.90	0.79	135.7	0.42	52.7	0.29	36.4
	Westbound Right	0.90	2.71	>200.0	2.25	>200.0	1.73	>200.0
US 101 & 62nd Street	*Northbound Left*	0.75	0.34	42.8	0.17	25.3	0.14	20.7
	Northbound Thru-Right	0.75	0.86	0	0.71	0	0.63	0
	Southbound Left	075	0.04	20.9	0.03	16.3	0.01	14.3
	Southbound Thru	0.75	0.78	0	0.65	0	0.58	0
	Southbound Right	0.75	0.05	0	0.04	0	0.04	0
	Eastbound Left	0.80	4.86	N/A	2.07	>200.0	1.32	>200.0
	Eastbound Thru-Right	0.80	0.24	37.4	0.14	25.7	0.10	21.3
	Westbound Left	0.80	0.97	>200.0	0.33	102.8	0.24	67.9
	Westbound Thru-Right	0.80	0.06	23.1	0.04	18.5	0.02	16.3

Note: N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Entire intersection or a specific movement that would operate in an over-capacity condition.

Entire intersection or a specific movement that would exceed the OHP standard but would operate at less than capacity conditions.

Table 1-2. 2030 Land Use Scenario 2 Operations Comparison with Standard Peak Hour Factors

		OHP V/C Standard	2030 30 HV		2030 AA		2030 Off-Season	
			V/C Ratio	Delay (sec/veh)	V/C Ratio	Delay (sec/veh)	V/C Ratio	Delay (sec/veh)
Signalized Intersections								
US 101 & 35th Street		0.85	1.15	89.3	0.97	24.5	0.88	23.0
US 101 & 40th Street		0.75	1.18	85.5	0.99	42.7	0.85	27.4
US 101 & 50th Street		0.75	0.99	23.9	0.83	16.9	0.74	11.4
Unsignalized Intersections	***Critical Movement/Control***							
US 101 & Pacific Way	*Northbound Thru*	0.85	1.99	0	1.68	0	1.50	0
	Northbound Right	0.85	0.08	0	0.07	0	0.06	0
	Southbound Thru	0.85	1.97	0	1.64	0	1.46	0
US 101 & Abalone Street	*Northbound Thru*	0.85	1.04	0	0.88	0	0.78	0
	Southbound Thru	0.85	1.80	0	1.51	0	1.35	0
	Southbound Right	0.85	0.16	0	0.13	0	0.12	0
	Eastbound Right	0.90	27.49	N/A	9.93	N/A	5.73	N/A
US 101 & 32nd Street	*Northbound Thru*	0.85	0.77	0	0.65	0	0.58	0
	Northbound Right	0.85	0.05	0	0.04	0	0.04	0
	Southbound Thru-Right	0.85	1.27	0	1.06	0	0.95	0
	Eastbound Right	0.90	0.73	113.8	0.39	47.5	0.28	33.9
	Westbound Right	0.90	2.73	>200.0	2.01	>200.0	1.33	182.6
US 101 & 62nd Street	*Northbound Left*	0.75	0.31	39.3	0.16	24.2	0.13	19.8
	Northbound Thru-Right	0.75	0.80	0	0.67	0	0.60	0
	Southbound Left	075	0.04	19.2	0.03	15.3	0.01	13.6
	Southbound Thru	0.75	0.76	0	0.64	0	0.57	0
	Southbound Right	0.75	0.05	0	0.04	0	0.04	0
	Eastbound Left	0.80	4.32	N/A	1.91	>200.0	1.22	>200.0
	Eastbound Thru-Right	0.80	0.23	35.1	0.14	24.7	0.09	20.6
	Westbound Left	0.80	0.40	193.7	0.19	77.8	0.07	51.4
	Westbound Thru-Right	0.80	0.05	21.5	0.04	17.5	0.02	15.6

Note: N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Entire intersection or a specific movement that would operate in an over-capacity condition.

Entire intersection or a specific movement that would exceed the OHP standard but would operate at less than capacity conditions.

Table 1-3. Summary of Duration of Congestion Evaluation –Average Annual Conditions with Adjusted Peak Hour Factors(Note #1)

Intersection	Critical Movement	OHP V/C Standard	Land Use Scenario #1			Land Use Scenario #2		
			Full Development		With 19% Reduction in Traffic (1)	Full Development)		With 14% Reduction in Traffic (2)
			Peak V/C	Congested Hours (4)	Congested Hours (4)	Peak V/C	Congested Hours (4)	Congested Hours (4)
Signalized Intersections								
US 101 & 35th Street	All	0.85	0.96	4 hours	0 hours	0.92	4 hours	0 hours
US 101 & 40th Street	All	0.75	0.96	7 hours	0 hours	0.88	6 hours	0 hours
US 101 & 50th Street	All	0.75	0.82	2 hours	0 hours	0.78	1 hour	0 hours
Unsignalized Intersections (3)								
US 101 & Pacific Way	NB Thru	0.85	1.68			1.60		
	NB Right	0.85	0.06	11 hours	11 hours	0.06	12 hours	11 hours
	SB Thru	0.85	1.62			1.56		
US 101 & Abalone Street	NB Thru	0.85	0.87			0.83		
	SB Thru	0.85	1.49	12 hours	11 hours	1.44	12 hours	11 hours
	SB Right	0.85	0.13			0.13		
	EB Right	0.90	7.75			6.84		
US 101 & 32nd Street	NB Thru	0.85	0.66			0.62		
	NB Right	0.85	0.04			0.04		
	SB Thru/Right	0.85	1.04	7 hours	0 hours	1.01	7 hours	1 hour
	EB Right	0.90	0.32			0.30		
	WB Right	0.90	1.70			1.60		
US 101 & 62nd Street	NB Left	0.75	0.15			0.14		
	NB Thru/Right	0.75	0.67			0.64		
	SB Left	0.75	0.03			0.03		
	SB Thru	0.75	0.62	7 hours	0 hours	0.61	4 hours	0 hours
	SB Right	0.75	0.04			0.04		
	EB Left	0.80	1.49			1.38		
	EB Thru/Right	0.80	0.11			0.11		
	WB Left	0.80	0.24			0.14		
	WB Thru/Right	0.80	0.03			0.03		

Entire intersection or a specific movement that would operate in an over-capacity condition.
Entire intersection or a specific movement that would exceed the OHP standard but would operate at less than capacity conditions.

Note 1: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Chapters 2, 4 and 5 (PHF=0.85).
Note 2: Intersection performance is measured at the relevant V/C standard. For stop-controlled intersections, the side street standard was used as the basis for estimating when an intersection would exceed its performance standard.
(1) 19% reduction from Full Development to meet OHP standards.
(2) 14% reduction from Full Development to meet OHP standards.
(3) Congested hours for stop-controlled intersections refers to worst side street movement
(4) "Congested Hours" refers to the number of hours that an intersection would exceed the OHP V/C performance standard.

Table 1-4. Summary of Duration of Congestion Evaluation – Off-Season Conditions with Adjusted Peak Hour Factors (Note #1)

			Land Use Scenario #1			Land Use Scenario #2	
			Full Development		With 8% Reduction in Traffic (1)	Full Development)	
Intersection	Critical Movement	OHP Standard	Peak V/C	Congested Hours (3)	Congested Hours (3)	Peak V/C	Congested Hours (3)
Signalized Intersections							
US 101 & 35th Street	All	0.85	0.85	0 hours	0 hours	**0.83**	0 hours
US 101 & 40th Street	All	0.75	0.82	3 hours	0 hours	**0.75**	0 hours
US 101 & 50th Street	All	0.75	**0.72**	0 hours	0 hours	**0.70**	0 hours
Unsignalized Intersections (2)							
US 101 & Pacific Way	NB Thru	0.85	1.50	11 hours	11 hours	1.43	11 hours
	NB Right	0.85	0.06			006	
	SB Thru	0.85	1.44			1.39	
US 101 & Abalone Street	NB Thru	0.85	**0.78**	11 hours	11 hours	0.74	11 hours
	SB Thru	0.85	1.33			1.28	
	SB Right	0.85	0.11			0.11	
	EB Right	0.90	>2.00			>2.00	
US 101 & 32nd Street	NB Thru	0.85	0.59	2 hours	1 hour	0.55	1 hour
	NB Right	0.85	0.03			0.04	
	SB Thru/Right	0.85	0.96			0.90	
	EB Right	0.90	0.23			0.21	
	WB Right	0.90	1.24			1.01	
US 101 & 62nd Street	NB Left	0.75	0.12	1 hour	0 hours	0.11	1 hour
	NB Thru/Right	0.75	0.60			0.57	
	SB Left	0.75	0.01			0.01	
	SB Thru	0.75	0.55			0.54	
	SB Right	0.75	0.04			0.04	
	EB Left	0.80	0.97			0.90	
	EB Thru/Right	0.80	0.08			0.07	
	WB Left	0.80	0.17			0.05	
	WB Thru/Right	0.80	0.01			0.01	

Intersections that would operate in an over-capacity condition.
Intersections that would exceed the OHP standard but would operate at less than capacity conditions.

Note 1: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Table 1-3 and Chapters 2, 4 and 5 (PHF=0.85).
Note 2: Intersection performance is measured at the relevant V/C standard. For stop-controlled intersections, the side street standard was used as the basis for estimating when an intersection would exceed its performance standard.
(1) 8% reduction from Full Development to meet OHP standards.
(2) Congested hours for stop-controlled intersections refers to worst side street movement
(3) "Congested Hours" refers to the number of hours that an intersection would exceed the OHP V/C performance standard.

2. ANALYSIS METHODOLOGY AND ASSUMPTIONS

2.1 OVERVIEW OF ANALYSIS METHODOLOGY

The analysis of 2030 traffic volumes associated with community growth in the South Beach area of the City of Newport is based on a multi-step process that includes the following:

1. Update of assumptions related to the existing roadway network to reflect, at a minimum, earlier findings concerning the need for highway improvements through the South Beach area to accommodate both background traffic growth and South Beach development.
2. Development of background traffic volumes along US 101 for 2030 conditions during three time periods – the summer seasonal peak hour (30th highest hourly volume or 30 HV), average annual weekday peak hour (AAV), and off-seasonal weekday peak hour (typically representing an average of volumes occurring from September through May).
3. Development of trip generation and distribution assumptions for the South Beach area based on the two land use scenarios. These scenarios are:
    a. Newport Population Growth – which reflects the anticipated population growth for the community as a whole over the planning period of which approximately 50 percent has been assumed to occur in South Beach.
    b. Environmentally Constrained – which recognizes the presence of extensive wetlands in the South Beach area which may limit growth and development opportunities.
4. Identification of performance measures and assumptions related to the capacity of the Yaquina Bay Bridge and non-bridge segments of US 101 through South Beach.
5. Documentation of key findings and conclusions related to each land use scenario and time period.

2.2 2030 ROADWAY NETWORK ASSUMPTIONS

For purposes of the evaluation of alternate mobility standards, the study area focuses on US 101 in Newport and includes all of South Beach extending north of the Yaquina Bay Bridge to Hurbert Street and south to 62nd Street. Analysis of traffic operations for the land use scenarios and seasonal time periods was conducted using a modified Synchro traffic operations model that includes the following specific network features.

- Capacity of the Yaquina Bay Bridge remains unchanged from today.
- Two through lanes in each direction are assumed on US 101 southbound from the intersection with Abalone Street through the intersection with 62nd Street, and on US 101 northbound from south of 62nd Street to the intersection with Pacific Way where the outside lane would become a right-turn only drop lane. US 101 from the Yaquina Bay Bridge to 40th Street is assumed to be built as an urban roadway section.
- The intersection of US 101 with Pacific Avenue will accommodate only northbound right turns in and not out.
- The intersection of US 101 with Ferry Slip Road is assumed to be closed.

- The intersection of US 101 with 32nd Street is assumed to be converted from serving all-way traffic to serve only right-in/right-out traffic. This intersection is currently signalized, but the signal is assumed to be relocated to the intersection of US 101 and 35th Street.
- The intersection of US 101 with 35th Street has been added to the original network and is assumed to be signalized. The signal was relocated from the existing intersection of US 101 with 32nd Street. The signal is assumed to function as actuated and coordinated. Intersection is assumed to have four approach legs, each with separate left, right, and through lanes.
- The intersection of US 101 with 40th Street is assumed to be signalized with four approach legs, each with separate left, right, and through lanes. A second southbound left turn lane is also assumed as this improvement would be necessary to meet the needs of projected volumes for this movement which would exceed 500 peak hour vehicles. The signal is assumed to function as actuated and coordinated.
- The intersection of US 101 with 50th Street is assumed to be realigned to serve as the fourth, easterly leg of the existing intersection with the entrance to South Beach State Park. This intersection is assumed to be signalized and to include separate left, right, and thru lanes on the north/south approaches. Separate left and through/right lanes are assumed for the side streets.
- The intersection of US 101 with 62nd Avenue is assumed to include separate left, right and through lanes in the southbound direction of US 101 and to include separate left and through lanes in the northbound direction. Left turn and through/right approaches are assumed for the side streets which are stop-controlled.
- An alternative will be considered that includes a north/south internal street between 50th and 62nd Streets would be located along old railroad right-of-way. The effect of this alternative on traffic operations at the intersections of US 101 with 50th and 62nd Streets will be addressed.

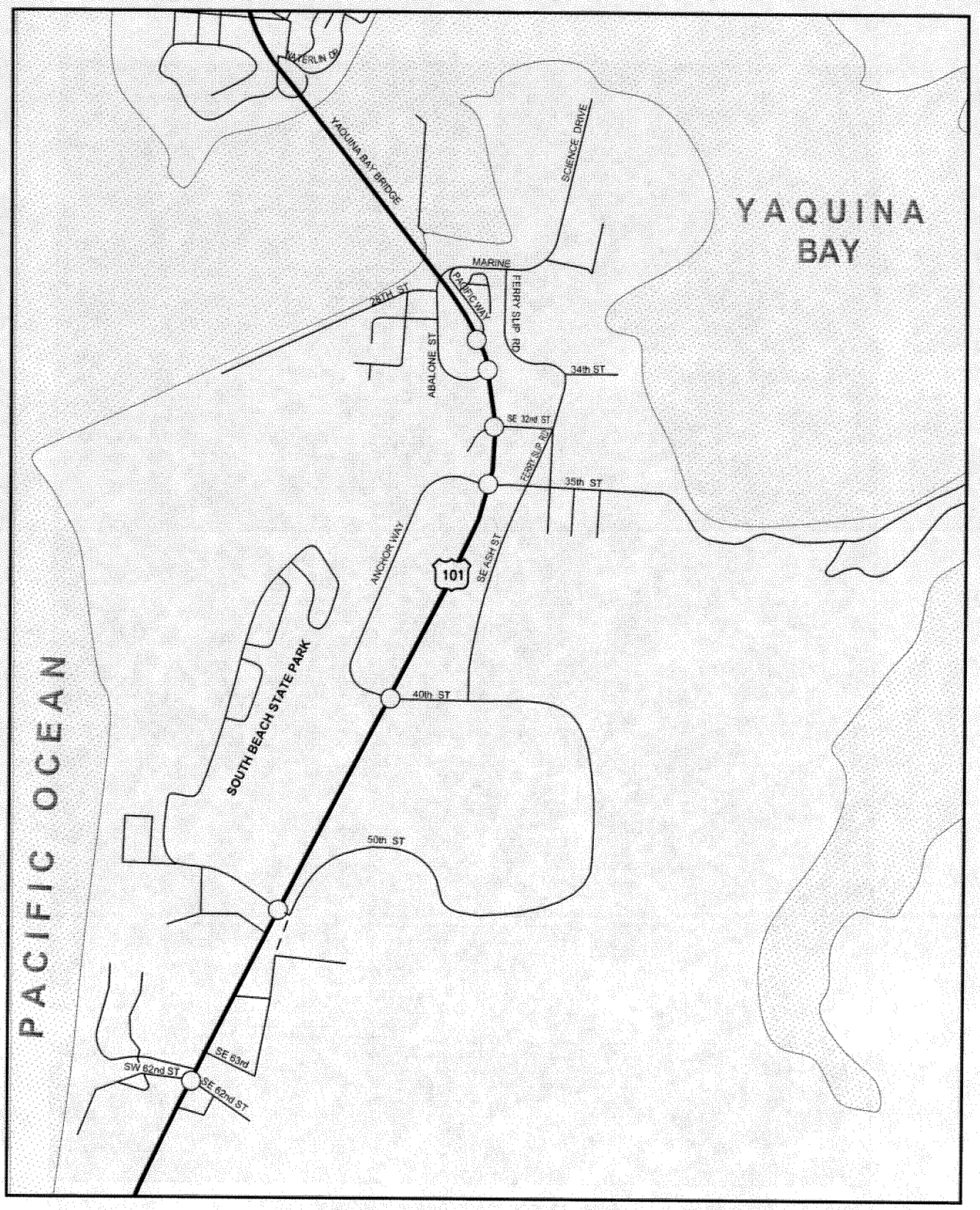
Figure 2-1 presents a map of the South Beach study area, illustrating the baseline roadway network and study area intersections.

2.3 DEVELOPMENT OF 2030 BACKGROUND TRAFFIC VOLUMES

Prior traffic analysis that supports the findings and recommendations of the Newport TSP Update is based on a 2026 planning horizon year. For the analysis and development of alternate mobility standards, the planning horizon year was extended to 2030 by applying an annualized background traffic growth rate of 1.7 percent for all through traffic along US 101. Through traffic is assumed to represent traffic passing through the study area without stopping at or utilizing any services within the study area.

Three design hours were also identified for 2030 that would be used to assess the impacts of background and community growth on transportation system performance. These time periods include:

- 30th Highest Hourly Volume (30 HV) which is considered to represent a summertime weekday PM peak hour, the high travel season for the Oregon Coast.



N

NOT TO SCALE

LEGEND

○ STUDY INTERSECTIONS

Figure 2-1
2030 Base Network and Study Intersections

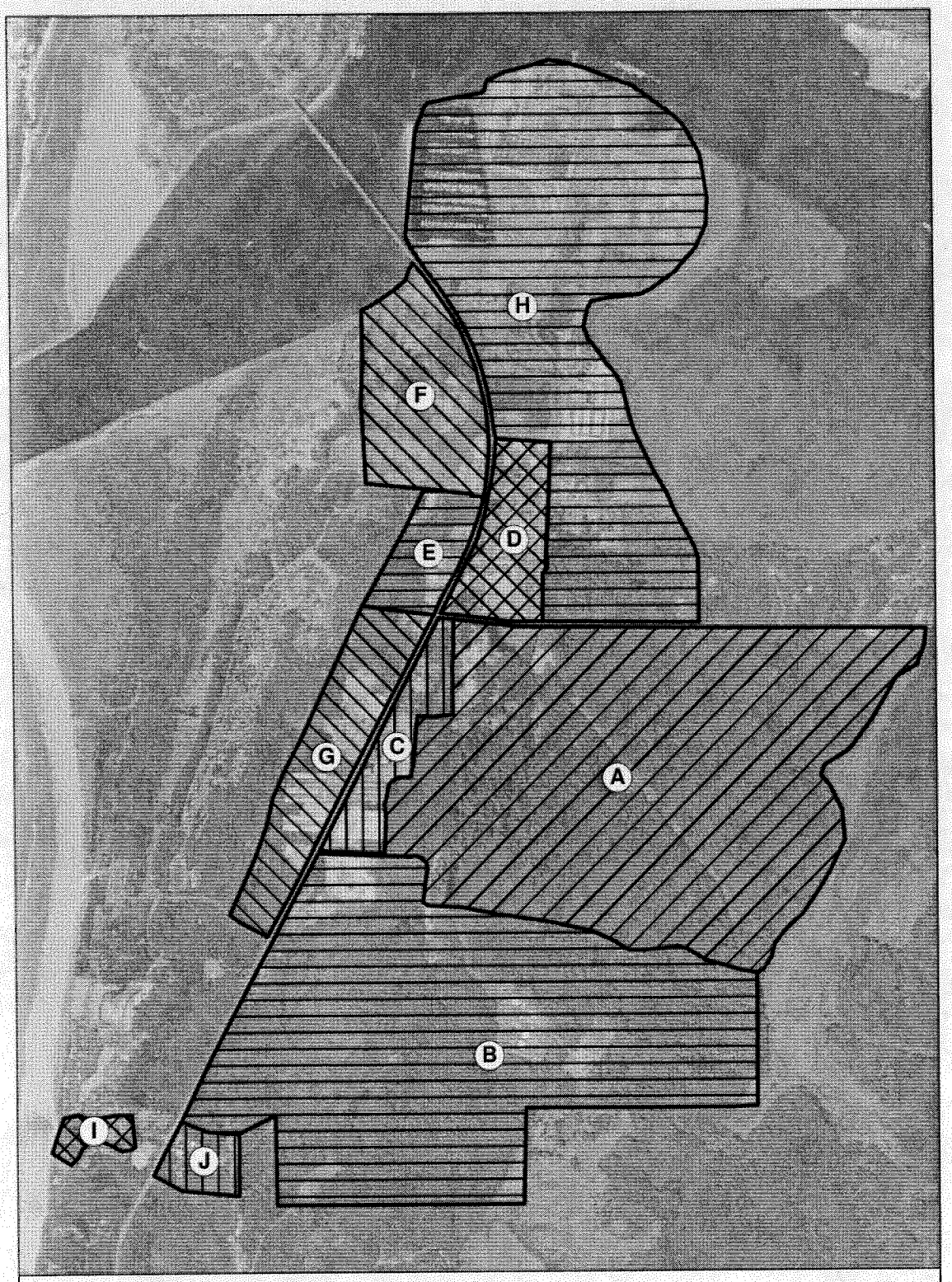


Figure 2-2: South Beach Future Transportation Analysis Zones

A
B
C
D
E
F
G
H
I
J

0 1,000 2,000 Feet

Geographic Data Standards:
Projected Coordinate System:
Oregon State Plane South

Data Source(s):
USDA, ESRI, Parametrix

Contact Information:
Parametrix
700 NE Multnomah
Suite 1000
Portland, OR 97232-2131
(503) 233-2400

This product is for informational purposes and may not have been prepared for legal, engineering or surveying purposes. Users of this information should review or consult the primary data and information source to ascertain the usability of this information.

Analysis by Craig Hainey; Analysis Date: Feb-2007; Plot Date: October 9, 2007; File Name: SouthBeachPoint_Option MXD

- Average Annual Volume (AAV) which provides a baseline against which highway improvement needs can be assessed reflecting the entire year including both seasonal peaks (June through August) and off-seasonal peaks (September through May).
- Off-Season which averages traffic volumes occurring along US 101 during the period between September and May, typical the lowest travel season on the Oregon Coast.

The identification of 30 HV, AAV and Off-Season was based on the 2007 summary trend data from the automatic traffic recorder (ATR) located in north Newport (# 21-009). The 30 HV is considered to represent a weekday PM peak hour during the high travel season for the coast (summertime), while the AAV represents the average weekday PM peak hour volume over the entire year, and the Off-Season the weekday PM peak hour during the non-summertime period.

Typically, the study area's 30 HV is 17 percent higher than the AAV, and 26 percent higher than the Off-Season. The AAV is 9 percent higher than the Off-Season. Data and discussion supporting the identification of the 30 HV, the AAV, and Off-Season is included in Appendix A. However, it should be noted that each of these time periods represent unconstrained travel demand. It is unlikely that this level of traffic would occur in reality due to capacity constraints along US 101 including the Yaquina Bay Bridge.

2.4 DEVELOPMENT ASSUMPTIONS AND TRIP GENERATION ESTIMATES

This section presents a summary of the assumed land use growth in South Beach over the planning period. Land uses are identified by type and location for both scenarios.

Land Use Scenario #1 – Newport Population Growth

For the purpose of forecasting future growth in South Beach, the study area was divided into ten sub-areas or Transportation Analysis Zones (TAZs). The sub-areas were established based on information provided by the City of Newport and from other transportation studies that had previously been conducted for development in the South Beach area. The purpose of that analysis was to support an urban growth boundary (UGB) adjustment and to consider specific information about anticipated land uses (e.g., land development expectations by type and size and property access characteristics). TAZ boundaries are presented in Figure 2-2.

The variety of the land uses assumed in each of the sub-areas are consistent with zoning designations and permitted uses, and were based on an agreed reasonable scenario that is tied to the projected population growth of the City of Newport. This scenario assumes that 50 percent of the population growth anticipated in Newport by 2030 will occur in South Beach with the remainder occurring generally north of the Yaquina Bay Bridge.

The types of development assumed for South Beach include single family residential, condominiums/townhouses, industrial park, retail, research and development, community college and a park. See Technical Memorandum #6 for a detailed discussion of the land use assumptions.

Table 2-1 presents a summary of the South Beach land development assumptions and the estimated weekday PM peak hour trips associated with that development. As noted in the table, Land Use Scenario #1 is expected to generate a total of just over 4,300 PM peak hour trip ends, with 1,923 inbound and 2,394 outbound. Over 1,100 PM peak hour trip ends are expected to be generated by the South Beach Campus Village development which includes a large residential component and a community college. Development in TAZs B and C including anticipated redevelopment along US 101 to increase development density would

generate nearly 1,000 PM peak hour trips. Other TAZs with significant traffic-generating development would include TAZ D (including hotel and retail uses) and TAZ F (with retail and condominium/townhouse development).

Table 2-1. Land Use Scenario #1 – Newport Population Growth

Area A (Campus Village)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Single Family Residence	210	260	Dwellings	160	94	254
Condominium/Townhouse	230	261	Dwellings	88	44	132
Community College	550	1,000	Students	95	221	316
Retail	820	100,000	Sq. Feet	300	326	626
County Park (2)	412	78.1	Acres	16	30	46
Gross Trips				659	715	1,374
Internal Trip Reduction (15%)				(99)	(107)	(206)
Net Trips				**560**	**608**	**1,168**

Area B and C				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	142,350	Sq. Feet	32	120	152
Commercial (1)		142,350	Sq. Feet			
Retail	820	71,175	Sq. Feet	240	260	500
Retail adjacent to US 101 (3)	820	71,175	Sq. Feet	240	260	500
Gross Trips				512	640	1,152
Internal Trip Reduction (10%)	(All Retail)			(48)	(52)	(100)
Pass-by Reduction (20%)	(Retail Adjacent to US 101 only)			(26)	(29)	(55)
Net Trips				**438**	**559**	**997**

Area D				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Hotel (2)	310	150	Rooms	47	42	89
Retail (3)	820	90,000	Sq. Feet	280	304	584
Gross Trips				327	346	673
Internal Trip Reduction (10%)				(33)	(35)	(68)
Pass-by Reduction (20%)				(59)	(62)	(121)
Net Trips				**235**	**249**	**485**

Area E				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	10,000	Sq. Feet	10	39	49
Retail adjacent to US 101 (3)	820	10,000	Sq. Feet	66	71	137
Gross Trips				76	110	186
Pass-by Reduction (20%)	(All Retail)			(13)	(14)	(27)
Net Trips				**63**	**96**	**159**

Area F				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Retail (3)	820	100,000	Sq. Feet	300	326	626
Condominium/Townhouse	230	120	Dwellings	47	23	70
Gross Trips				347	349	696
Internal Trip Reduction (10%)	(All Uses)			(35)	(35)	(70)
Pass-by Reduction (20%)	(Retail Adjacent to US 101 only)			(33)	(36)	(69)
Net Trips				**279**	**278**	**557**

Table 2-1 Continued. Land Use Scenario #1 – Newport Population Growth

Area G (west of US 101)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	50,000	Sq. Feet	17	64	81
Retail (3)		50,000	Sq. Feet	190	206	396
Campground/RV Park	416	55	Sites	14	6	20
Gross Trips				221	276	497
Internal Trip Reduction (10%)	(All Uses)			(22)	(28)	(50)
Pass-by Reduction (20%)	(All Retail)			(42)	(45)	(87)
Net Trips				**157**	**203**	**360**
Area H (incl. OCA & HMSC)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Research and Development (4)	760	250,000	Sq. Feet	41	230	270
General Office	710	42	Employees	3	16	19
Retail	820	10,000	Sq. Feet	66	71	137
Gross Trips				110	317	426
Internal Trip Reduction (10%)	(Retail & Office Uses)			(7)	(9)	(16)
Net Trips				**103**	**308**	**410**
Area I (Southshore PD)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Hotel (2)	310	65	Rooms	20	18	38
Retail	820	13,000	Sq. Feet	78	85	163
Gross Trips				98	103	201
Internal Trip Reduction (10%)	(All Uses)			(10)	(10)	(20)
Net Trips				**88**	**93**	**181**
Area J -Planned Reduction (5)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Retail		20,000	Sq. Feet	104	113	217
Single Family Residence	210	3	Dwellings	3	2	5
Gross Trips				107	115	222
Internal Trip Reduction (10%)	(All Uses)			(11)	(11)	(22)
Net Trips				**96**	**104**	**200**
PM Peak Trip Summary				**In**	**Out**	**Total**
Gross Trips				**2,457**	**2,971**	**5,428**
Total Internal				**(265)**	**(287)**	**(552)**
Total Pass-by				**(173)**	**(186)**	**(359)**
Area J Reductions				**(96)**	**(104)**	**(200)**
Net Total Trips				**1,923**	**2,394**	**4,317**

Notes:
1 Approximately half of the industrial acreage is assumed to develop into commercial uses.
2 ITE Trip Generation rate used.
3 Commercial is assumed adjacent to Hwy 101 and subject to Pass-by rate 20% reduction.
4 This is primarily laboratory and classroom use related to Hatfield Marine Science Center (HMSC) and the Oregon Coast Aquarium. Includes 45, 000 sq ft for NOAA, 45, 000 sq ft for Port of Newport, and 160,000 for HMSC.
5 As documented in the Newport Airport Master Plan, the Airport intends to acquire this area and abandon the existing uses to increase air safety.

The estimate of student enrollment information for the Oregon Coast Community College was based on enrollment data obtained from the college for Spring and Summer 2008. A comparison was made of enrollment during a typical weekday during the regular school season and during the summer session. To determine the typical weekday, the lowest (Friday; zero enrollment) and the highest (Tuesday, 57%) enrollment days were eliminated and the remaining days were averaged for both regular and summer sessions. The comparison indicates that summertime enrollment is 27 percent of the regular term enrollment. For both of land use scenarios, a student enrollment of 1,000 students was assumed for 2030. This estimate was included in the trip generation forecasts prepared for average annual and offseason time periods. For the summertime peak (30 HV), 270 students (or 27 percent of the regular term enrollment) was used to estimate trips for this time period under both land use scenarios. The total trip difference between the regular and summer student enrollment amounts to 138 trips or 118 net trips for TAZ A.

Land Use Scenario #2 – Environmentally Constrained Growth

Land Use Scenario #2 is built upon the development assumptions prepared for Scenario #1 but also incorporates potential development constraints associated with wetland resources in the study area. The variety of the land uses are assumed in each of the sub-areas are still consistent with zoning designations and permitted uses. Development includes single family residential, condominiums/townhouses, industrial park, retail, research and development, community college and a park.

Table 2-2 presents a summary of the South Beach land development assumptions for Scenario #2, and the estimated weekday PM peak hour trips associated with that development. As noted in the table, Scenario #2 is expected to generate a total of approximately 3,900 PM peak hour trip ends, with 1,755 inbound and 2,150 outbound. Over 1,100 PM peak hour trip ends are expected to be generated by the South Beach Campus Village development which includes a large residential component and a community college. Development in TAZs B and C including anticipated redevelopment along US 101 to increase development density would generate nearly 800 PM peak hour trips. Other TAZs with significant traffic-generating development would include TAZ D (including hotel and retail uses) and TAZ F (with retail and condominium/townhouse development).

Table 2-2. Land Use Scenario #2 – Environmentally Constrained Growth

Area A (Campus Village)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Single Family Residence	210	260	Dwellings	160	94	254
Condominium/Townhouse	230	261	Dwellings	88	44	132
Community College	550	1,000	Students	95	221	316
Retail	820	100,000	Sq. Feet	300	326	626
County Park (2)	412	78.1	Acres	16	30	46
Gross Trips				659	715	1,374
Internal Trip Reduction (15%)				(99)	(107)	(206)
Net Trips				**560**	**608**	**1,168**

Table 2-2 Continued. Land Use Scenario #2 – Environmentally Constrained Growth

Area B and C				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	100,000	Sq. Feet	25	94	119
Commercial (1)		100,000	Sq. Feet			
Retail	820	75,000	Sq. Feet	249	269	518
Retail adjacent to US 101 (3)	820	25,000	Sq. Feet	120	130	250
Gross Trips				394	493	887
Internal Trip Reduction (10%)	(All Retail)			(37)	(40)	(77)
Pass-by Reduction (20%)	(Retail Adjacent to US 101 only)			(13)	(14)	(27)
Net Trips				**344**	**439**	**783**
Area D				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Hotel (2)	310	150	Rooms	47	42	89
Retail (3)	820	90,000	Sq. Feet	280	304	584
Gross Trips				327	346	673
Internal Trip Reduction (10%)				(33)	(35)	(68)
Pass-by Reduction (20%) (5)				(59)	(62)	(121)
Net Trips				**235**	**249**	**484**
Area E				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	10,000	Sq. Feet	10	39	49
Retail adjacent to US 101 (3)	820	10,000	Sq. Feet	66	71	137
Gross Trips				76	110	186
Pass-by Reduction (20%)	(All Retail)			(13)	(14)	(27)
Net Trips				**63**	**96**	**159**
Area F				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Retail (3)	820	100,000	Sq. Feet	300	326	626
Condominium/Townhouse	230	120	Dwellings	47	23	70
Gross Trips				347	349	696
Internal Trip Reduction (10%)	(All Uses)			(35)	(35)	(70)
Pass-by Reduction (20%)	(Retail Adjacent to US 101 only)			(33)	(36)	(69)
Net Trips				**279**	**278**	**557**
Area G (west of US 101)				**PM Peak Trips**		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Industrial Park	130	32,500	Sq. Feet	14	53	67
Retail (3)		17,500	Sq. Feet	95	103	198
Campground/RV Park	416	55	Sites	14	6	20
Gross Trips				123	162	285
Internal Trip Reduction (10%)	(All Uses)			(12)	(16)	(28)
Pass-by Reduction (20%)	(All Retail)			(21)	(23)	(44)
Net Trips				**90**	**123**	**213**

Table 2-2 Continued. Land Use Scenario #2 – Environmentally Constrained Growth

Area H (incl. OCA & HMSC)				PM Peak Trips		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Research and Development (4)	760	200,000	Sq. Feet	32	184	216
General Office	710	42	Employees	3	16	19
Retail	820	10,000	Sq. Feet	66	71	137
Gross Trips				101	271	372
Internal Trip Reduction (10%)	(Retail & Office Uses)			(7)	(9)	(16)
Net Trips				**94**	**262**	**356**

Area I (Southshore PD)				PM Peak Trips		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Hotel (2)	310	65	Rooms	20	18	38
Retail	820	13,000	Sq. Feet	78	85	163
Gross Trips				98	103	201
Internal Trip Reduction (10%)	(All Uses)			(10)	(10)	(20)
Net Trips				**88**	**93**	**181**

Area J -Planned Reduction (5)				PM Peak Trips		
Land Use Assumed	**ITE Code**	**Count**	**Units**	**In**	**Out**	**Total**
Retail		20,000	Sq. Feet	104	113	217
Single Family Residence	210	3	Dwellings	3	2	5
Gross Trips				107	115	222
Internal Trip Reduction (10%)	(All Uses)			(11)	(11)	(22)
Net Trips				**96**	**104**	**200**

PM Peak Trip Summary	**In**	**Out**	**Total**
Gross Trips	**2,232**	**2,662**	**4,896**
Total Internal	**(244)**	**(263)**	**(507)**
Total Pass-by	**(139)**	**(149)**	**(289)**
Area J Reductions	**(96)**	**(104)**	**(200)**
Net Total Trips	**1,753**	**2,148**	**3,901**

Notes:
1 Approximately half of the industrial acreage is assumed to develop into commercial uses.
2 ITE Trip Generation rate used.
3 Commercial is assumed adjacent to Hwy 101 and subject to Pass-by rate 20% reduction.
4 This is primarily laboratory and classroom use related to Hatfield Marine Science Center (HMSC) and the Oregon Coast Aquarium. Includes 45, 000 sq ft for NOAA, and 155,000 for HMSC.
5 As documented in the Newport Airport Master Plan, the Airport intends to acquire this area and abandon the existing uses to increase air safety.

2.5 PERFORMANCE MEASURES

Based on review of the analysis process and findings for the South Beach roadway network under seasonal, average annual, and off-season conditions, it became apparent that in many locations traffic congestion during peak hours will significantly exceed available intersection capacity. To provide a more complete understanding of the extent and nature of future traffic congestion through South Beach and to offer useful comparisons among land use and network alternatives, a variety of performance measures have been identified. These have been calculated to determine the nature, type, location and duration of congestion for each scenario and time period analyzed and include the following:

- Volume-to-capacity (V/C) ratios at intersections developed using the Synchro analysis software.
- 95th percentile traffic queues using Synchro output for both signalized and unsignalized intersections.
- Signal progression assessment focusing on green band width during peak hours.
- Travel time on US 101 in northbound and southbound directions for three roadway segments – Hurbert Street to 35th Street, 35th Street to 50th Street, and 50th Street to 62nd Street.
- Average travel speeds on US 101 in northbound and southbound directions for three roadway segments – Hurbert Street to 35th Street, 35th Street to 50th Street, and 50th Street to 62nd Street.
- Unserved vehicles (that cannot enter the Synchro network due to extensive congestion and, thus, are not included in the analysis)
- Duration of congestion – Number of hours that roadway capacity will be exceeded during projected 2030 average annual weekdays. The methodology used to calculate duration of congestion along US 101 in South Beach is more fully described in Chapter 6 along with analysis results.

Calculation of Yaquina Bridge Capacity

The capacity of the Yaquina Bridge is limited and, to some extent, will meter some of the traffic entering and leaving the South Beach area. The capacity of the Yaquina Bay Bridge was calculated based on a combination of the 1994 and 2000 HCM Rolling Terrain Methodology as summarized in Appendix B. The result indicates that the capacity on the bridge is about 1,300 vehicles per hour per lane (vphpl). The analysis performed does not calculate the controlling affect of bridge capacity on roadway segment operations, so results are likely to understate performance under future conditions.

Roadway Segment Capacity

South of the bridge, roadway capacity is influenced more by the operation of signalized intersections and the provision of separate storage space for left and some right-turning vehicles than is the capacity of the Yaquina Bay Bridge. While intersection operations largely control overall roadway operations in this area, for sketch planning purposes an estimate of roadway segment capacity was prepared. This estimate is derived from the saturation flow rates for through movements on US 101 at the signalized intersections. Analysis determined that a planning level capacity value of 1,750 vehicles per hour per lane would be appropriate to use on US 101 through the South Beach area (typically south of 35th Street to the southern end of the study area). Regardless of this value, it should be noted that the analysis in this report will largely focus on signalized intersections as the controlling factor affecting the through movement of traffic and not on this planning level capacity value.

Current Operational Standards

As adopted in the 1999 OHP, ODOT uses V/C ratios to measure state highway performance rather than intersection or roadway levels of service. A V/C ratio expresses the relationship between traffic volumes and the roadway or intersection's theoretical capacity. Various V/C

thresholds are applied to all state highways based on functional classification of these facilities.

US 101 in the South Beach area is classified as a Statewide Highway. The peak hour, maximum V/C standards for US 101 signalized intersections inside the UGB boundary is as follows

- 0.85 with speed limit of ≤ 35 mph (Yaquina Bay Bridge to just north of 40th Street)
- 0.75 with speed limit of ≥ 45 mph (40th Street south to the City Limits)

For unsignalized intersections the V/C standards along US 101 are:

- 0.85 with speed limit of < 35 mph (Yaquina Bay Bridge to just north of 40th Street) for the highway mainline, 0.90 for side streets
- 0.75 with speed limit of ≥ 45 mph (40th Street south to the City Limits) for the highway mainline, 0.80 for side streets

3. 2030 30 HV TRAFFIC OPERATIONAL ANALYSIS

This chapter summarizes the analysis of the 2030 30 HV volumes at study area intersections and roadway segments and presents findings with respect to traffic operations in the South Beach area. Two land use scenarios are included in this analysis – Land Use Scenario #1 and Land Use Scenario #2. Scenario #1 represents South Beach growth based on serving approximately half of the total population growth projected for the Newport UGB by 2030. Scenario #2 is derived from Scenario #1 but also incorporates a reduction in developable land due to the presence of extensive wetlands in the study area.

3.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH

Intersection Operations Analysis

The analysis of traffic operations was conducted using a Synchro traffic model developed specifically for the study area intersections. This model includes field-verified geometrics and other relevant physical data for each intersection updated to reflect an assumed 2030 roadway network as described in Chapter 2. Analysis procedures to develop this model generally followed guidelines in the ODOT Transportation Planning and Analysis Unit (TPAU) *Analysis Procedures Manual* (2008). This model was used to assess traffic operations for the forecasted 2030 30 HV volumes found in Appendix C. Intersection analysis worksheets are also included in Appendix C.

Table 3-1 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #1 and assumed a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay.

Table 3-1. 2030 30 HV Intersection Operations Summary with Land Use Scenario #1

			2030 HV	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**1.19**	**116.1**
US 101 & 40th Street		0.75	**1.24**	**126.6**
US 101 & 50th Street/S. Beach State Park		0.75	**1.04**	**31.9**
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**2.10**	**0**
	Northbound Right	0.85	0.08	0
	Southbound Thru	0.85	**2.04**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	**1.09**	**0**
	Southbound Thru	0.85	**1.88**	**0**
	Southbound Right	0.85	0.16	0
	Eastbound Right	0.90	**31.96**	**N/A**
US 101 & 32nd Street	*Northbound Thru*	0.85	0.82	0
	Northbound Right	0.85	0.04	0
	Southbound Thru-Right	0.85	**1.31**	**0**
	Eastbound Right	0.90	0.79	135.7
	Westbound Right	0.90	**2.71**	**>200.0**

Table 3-1 Continued. 2030 30 HV Intersection Operations Summary with Land Use Scenario #1

			2030 HV	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & 62nd Street	*Northbound Left*	0.75	0.34	42.8
	Northbound Thru-Right	0.75	**0.85**	0
	Southbound Left	0.75	0.04	20.9
	Southbound Thru	0.75	**0.78**	0
	Southbound Right	0.75	0.05	0
	Eastbound Left	0.80	**4.86**	**N/A**
	Eastbound Thru-Right	0.80	0.24	37.4
	Westbound Left	0.80	**0.97**	**>200.0**
	Westbound Thru-Right	0.80	0.06	23.1

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Widening of US 101 to five-lanes is assumed to begin at the intersection of Abalone Street and proceed southward.
Note 4: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Based on 2030 30 HV volumes, the South Beach study area intersections along US 101 would generally experience excessive delays and operate above acceptable V/C standards. The traffic signals do meter traffic to some extent, providing periodic gaps in the traffic stream for side street operations. However, the thru traffic volumes projected along US 101 are sufficient to cause long delay for the right out movements at the intersections of US 101 with Abalone and 32nd Streets, and the east and westbound left turn movements at 62nd Street. Preliminary signal warrants for minimum vehicular traffic and interruption of continuous flow were evaluated for the intersection of US 101 and 62nd Street. The analysis indicates that this intersection would not meet either warrant. Worksheets are included in Appendix C.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix C and are summarized in Table 3-2.

Table 3-2. 2030 30 HV Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	100
	Westbound Right	*	2,125
US 101 & 35th Street	*Northbound Thru*		200
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		275
	Southbound Left	TWCLT	125

Table 3-2 Continued. 2030 30 HV Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 35th Street Cont.	*Southbound Right*	175	25
	Eastbound Thru		50
	Eastbound Left	120	**150**
	Eastbound Right	155	50
	Westbound Thru		50
	Westbound Left	120	**200**
	Westbound Right	155	100
US 101 & 40th Street	*Northbound Thru*		1,150
	Northbound Left	215	50
	Northbound Right	215	25
	Southbound Thru		750
	Southbound Left	TWCLT	200
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	100
	Eastbound Right	155	25
	Westbound Thru		50
	Westbound Left	120	**350**
	Westbound Right	155	**600**
US 101 & 50th Street/State Park	*Northbound Thru*		1025
	Northbound Left	TWCLT	100
	Northbound Right	320	25
	Southbound Thru		100
	Southbound Left	215	75
	Southbound Right	155	25
	Eastbound Left	120	**150**
	Eastbound Thru/Right		50
	Westbound Thru/Right		100
	Westbound Left	120	100
US 101 & 62nd Street	*Northbound Left*	TWCLT	50
	Southbound Right	150	25
	Southbound Left	TWCLT	25
	Eastbound Left	120	**N/A**
	Eastbound Thru-Right		25
	Westbound Left	120	75
	Westbound Thru/Right		25

Notes:
30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.
Lengths rounded to nearest 25 feet.
NA: Indicates that projected volumes sufficiently exceeded capacity such that Synchro cannot calculate a value.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 3-2 indicate that in the future, some of the intersections will exceed the available vehicle storage for a specific movement. The left turn movements on most of the minor street approaches are expected to exceed capacity. The westbound right out movement at the intersection of US 101 and 32nd Street has an excessive queue in the single lane approach. The northbound thru movements at the signalized intersections also have lengthy queues due to the high volumes of traffic.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach area. There are limitations to the HCM V/C calculations for two way highways in that it considers only highway segments with speeds of 45 mph and greater. Multi-lane highway V/C cannot be calculated for locations with 35 or 45 mph speeds as is the case along US 101 in most of South Beach. Thus, the analysis in Table 3-3 is based on an assumed roadway segment capacity of 1,300 vphpl for the Yaquina Bay Bridge and along the immediate roadway approaches which it influences, transitioning to 1,750 vphpl for the highway segments south of 35th Street. The results of this analysis are presented in Table 3-3.

Table 3-3. US 101 Roadway Segment Analysis for 2030 30 HV with Scenario #1

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hubert Street to 35th Street	35 mph	2.70	2.48
35th Street to 50th Street	35 & 45 mph	0.64	0.88
50th Street to 62nd Street	55 mph	0.61	0.75

Note 1: The calculation represents the ratio of projected segment volume to calculated lane capacity.
Note 2: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.

As indicated in the table, the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic operations on US 101 south of the bridge causing significant delays. Worksheets are included in Appendix C.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. The results of the simulation are summarized in Table 3-4 below and documented in Appendix C.

Table 3-4. US 101 Travel Time and Speeds for 2030 30 HV with Land Use Scenario #1

Scenarios	Travel Time (min)		Average Travel Speed (mph)	
	Northbound	Southbound	Northbound	Southbound
US 101 Totals	**23.9**	**23.9**	**8.7**	**7.3**
Hurbert Street to 35th Street	16.6	13.1	6.2	0.7
35th Street to 40th Street	2.6	6.0	6.5	17.1
40th Street to 50th Street	3.5	3.0	12.9	5.5
50th Street to 62nd Street	1.2	1.6	33.9	28.4

Note: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour. Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 3-4, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and relatively high travel times.

Table 3-5 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis. If these volumes were included, the performance measures discussed in Tables 3-1 through 3-4 above would likely indicate a higher level of congestion than is shown.

Table 3-5. US 101 Unserved Vehicles for 2030 30 HV with Land Use Scenario #1

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	3,069
Entering US 101 southbound at Hurbert Street	3,682

Note: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour. Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

The effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street. Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The potential for diverting north/south vehicle trips away from US 101 would likely be small. As many of the projected land uses at the south end of the study area (near 62nd Street) are similar to those further north, a minimal amount of trip interaction is anticipated. Additionally, to enhance clear zone protection around the Newport Airport, some existing development on the east side of the highway near 62nd Street will be eliminated and new development will be restricted. The reduction of traffic using the US 101 intersections of 40th, 50th, and 62nd Streets as a result of trips diverting to a new connector road is not expected to alter the volume/capacity ratios anticipated at these intersections under Scenario 1 with 30HV traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

3.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH

Intersection Operations Analysis

The analysis of traffic operations was conducted using a Synchro traffic model developed specifically for the study area intersections as described earlier in this chapter. 2030 PM peak hour intersection volumes and traffic operations worksheets for this scenario are included in Appendix D.

Table 3-6 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #2 and assumed a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay.

Table 3-6. 2030 30 HV Intersection Operations Summary with Land Use Scenario #2

			2030 HV	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**1.15**	**89.3**
US 101 & 40th Street		0.75	**1.18**	**85.5**
US 101 & 50th Street/S. Beach State Park		0.75	**0.99**	**23.9**
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**1.99**	**0**
	Northbound Right	0.85	0.08	0
	Southbound Thru	0.85	**1.97**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	**1.04**	**0**
	Southbound Thru	0.85	**1.80**	**0**
	Southbound Right	0.85	0.16	0
	Eastbound Right	0.90	**27.49**	**N/A**
US 101 & 32nd Street	*Northbound Thru*	0.85	0.77	0
	Northbound Right	0.85	0.05	0
	Southbound Thru-Right	0.85	**1.27**	**0**
	Eastbound Right	0.90	0.73	113.8
	Westbound Right	0.90	**2.73**	**>200.0**
US 101 & 62nd Street	*Northbound Left*	0.75	0.31	39.3
	Northbound Thru-Right	0.75	**0.80**	0
	Southbound Left	0.75	0.04	19.2
	Southbound Thru	0.75	**0.76**	0
US 101 & 62nd Street Cont.	*Southbound Right*	0.75	0.05	0
	Eastbound Left	0.80	**4.32**	**N/A**
	Eastbound Thru-Right	0.80	0.23	35.1
	Westbound Left	0.80	0.40	193.7
	Westbound Thru-Right	0.80	0.05	21.5

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Widening of US 101 to five-lanes would begin at the intersection of Abalone Street and proceed southward.
Note 4: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Based on 2030 30 HV volumes, the South Beach study area intersections along US 101 would generally experience excessive delays and operate above acceptable V/C standards. The traffic signals do meter traffic to some extent, providing periodic gaps in the traffic stream for side street operations. However, the thru traffic volumes projected along US 101 are sufficient to cause long delay for the right out movements at the intersections of US 101 with Abalone and 32nd Streets, and the eastbound left turn movements at 62nd Street. Preliminary signal warrants for minimum vehicular traffic and interruption of continuous flow were evaluated for the intersection of US 101 and 62nd Street. The analysis indicates that this intersection would not meet either warrant. Worksheets are included in Appendix D.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix D and are summarized in Table 3-7.

Table 3-7. 2030 30 HV Intersection Queuing with Land Use Scenario #2

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	100
	Westbound Right	*	2,150
US 101 & 35th Street	*Northbound Thru*		925
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		275
	Southbound Left	TWCLT	125
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	**150**
	Eastbound Right	155	50
	Westbound Thru		50
	Westbound Left	120	**200**
	Westbound Right	155	100
US 101 & 40th Street	*Northbound Thru*		1,050
	Northbound Left	215	25
	Northbound Right	215	25
	Southbound Thru		375
	Southbound Left	TWCLT	175
	Southbound Right	175	25
	Eastbound Thru		25
	Eastbound Left	120	100
	Eastbound Right	155	25
	Westbound Thru		25
	Westbound Left	120	**325**
	Westbound Right	155	**550**
US 101 & 50th Street/State Park	*Northbound Thru*		800
	Northbound Left	TWCLT	100
	Northbound Right	320	25
	Southbound Thru		100
	Southbound Left	215	75
	Southbound Right	155	25
	Eastbound Left	120	**150**
	Eastbound Thru/Right		50
	Westbound Thru/Right		75
	Westbound Left	120	75
US 101 & 62nd Street	*Northbound Left*	TWCLT	50
	Southbound Right	150	0
	Southbound Left	TWCLT	25
	Eastbound Left	120	**N/A**
	Eastbound Thru-Right		25
	Westbound Left	120	50
	Westbound Thru/Right		25

Notes:
30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.
Lengths rounded to nearest 25 feet.
NA: Indicates that projected volumes sufficiently exceeded capacity such that Synchro cannot calculate a value.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 3-7 indicate that in the future, some of the intersections will exceed the available vehicle storage for a movement. The left turn movements on several of the minor street approaches exceed capacity. The westbound right out movement at 32nd Street has an excessive queue in the single lane approach. The northbound thru movements at the signalized intersections also have lengthy queues due to the high volume of traffic.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach Area. The results of this analysis are presented in Table 3-8. Worksheets are included in Appendix D.

Table 3-8. US 101 Roadway Segment Analysis for 2030 30 HV with Scenario #2

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hubert Street to 35th Street	35 mph	2.58	2.40
35th Street to 50th Street	35 & 45 mph	0.61	0.85
50th Street to 62nd Street	55 mph	0.58	0.73

Note 1: The calculation represents the ratio of projected segment volume to calculated lane capacity.
Note 2: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour.

As noted under the discussion of Table 3-5 earlier in this chapter, there are limitations to the calculation of V/C ratios using the HCM for two way highways with speeds below 45 mph. Accordingly, an alternative methodology was used that is based on assumed roadway capacity for specific segments of US 101. The results are included in Table 3-8 and indicate that the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic operations on US 101 south of the bridge causing significant delays.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. Results are summarized in Table 3-9 below and documented in Appendix D.

Table 3-9. US 101 Travel Time and Speed for 2030 30 HV with Land Use Scenario #2

Scenarios	Travel Time (min)		Average Travel Speed (mph)	
	Northbound	Southbound	Northbound	Southbound
US 101 Totals	**21.9**	**22.1**	**9.4**	**7.9**
Hurbert Street to 35th Street	16.6	13.2	6.2	0.7
35th Street to 40th Street	1.9	5.7	8.6	18.1
40th Street to 50th Street	2.2	1.8	20.3	9.3
50th Street to 62nd Street	1.1	1.3	36.5	33.7

Note: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour. Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 3-9, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and increased travel times.

Table 3-10 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 3-10. US 101 Unserved Vehicles for 2030 30 HV with Land Use Scenario #2

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	2,666
Entering US 101 southbound at Hurbert Street	3,188

Note: 30 HV means 30th highest hourly volume and represents the summertime weekday PM peak hour. Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

Similar to the discussion presented under Scenario 1, the effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street. Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The reduction in traffic volumes diverted from US 101 is expected to be small and to not alter the volume/capacity ratios anticipated at the intersections of US 101 interchanges at 40th, 50th, and 62nd Streets under Scenario 2 with 30HV traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

4. 2030 AVERAGE ANNUAL TRAFFIC OPERATIONAL ANALYSIS

This chapter summarizes the analysis of the 2030 Average Annual volumes (AAV) at study area intersections and roadway segments and presents findings with respect to traffic operations in the South Beach study area. Performance measures for this analysis are the same as those identified and discussed in Chapter 3.

4.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH

Intersection Operations Analysis

As with the analysis of 30 HV traffic, the analysis of 2030 AAV traffic was conducted using a Synchro traffic model developed specifically for the study area intersections. This model includes field-verified geometrics and other relevant physical data for each intersection updated to reflect an assumed 2030 roadway network as described in Chapter 2. 2030 PM peak hour intersection turning movement volumes and intersection analysis worksheets are presented in Appendix E.

Table 4-1 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #1 and assuming a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay.

Table 4-1. 2030 AAV Intersection Operations Summary with Land Use Scenario #1

			2030 Annual Avg.	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**1.00**	**36.6**
US 101 & 40th Street		0.75	**1.04**	**58.8**
US 101 & 50th Street/S. Beach State Park		0.75	**0.88**	**18.6**
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**1.77**	**0**
	Northbound Right	0.85	0.07	0
	Southbound Thru	0.85	**1.70**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	**0.92**	**0**
	Southbound Thru	0.85	**1.57**	**0**
	Southbound Right	0.85	0.13	0
	Eastbound Right	0.90	**11.34**	**N/A**
US 101 & 32nd Street	*Northbound Thru*	0.85	0.69	0
	Northbound Right	0.85	0.04	0
	Southbound Thru-Right	0.85	**1.10**	**0**
	Eastbound Right	0.90	0.42	52.7
	Westbound Right	0.90	**2.25**	**>200.0**
US 101 & 62nd Street	*Northbound Left*	0.75	0.17	25.3
	Northbound Thru-Right	0.75	0.71	0
	Southbound Left	0.75	0.03	16.3
	Southbound Thru	0.75	0.65	0
	Southbound Right	0.75	0.04	0
	Eastbound Left	0.80	**2.07**	**>200.0**

Table 4-1 Cont. 2030 AAV Intersection Operations Summary with Land Use Scenario #1

			2030 Annual Avg.	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & 62nd Street Cont.	*Eastbound Thru-Right*	0.80	0.14	25.7
	Westbound Left	0.80	0.33	102.8
	Westbound Thru-Right	0.80	0.04	18.5

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Widening of US 101 to five-lanes is assumed to begin at the intersection of Abalone Street and proceed southward.
Note 4: AAV means Average Annual Volumes.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Based on 2030 Average Annual volumes, the South Beach study area intersections along US 101 would generally experience excessive delays and operate above acceptable V/C standards. The traffic signals do meter traffic to some extent, providing periodic gaps in the traffic stream for side street operations. However, the thru traffic volumes projected along US 101 are sufficient to cause long delay for the right out movements at the intersections of US 101 with Abalone and 32nd Streets, and the eastbound left turn movements at 62nd Street. Preliminary signal warrants for minimum vehicular traffic and interruption of continuous flow were evaluated for the intersection of US 101 and 62nd Street. The analysis indicates that this intersection would not meet either warrant. Worksheets are included in Appendix E.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix E and are summarized in Table 4-2.

Table 4-2. 2030 AAV Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	50
	Westbound Right	*	1,600
US 101 & 35th Street	*Northbound Thru*		250
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		275
	Southbound Left	TWCLT	125
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	**125**
	Eastbound Right	155	25
	Westbound Thru		50
	Westbound Left	120	150
	Westbound Right	155	50

Table 4-2 Continued. 2030 AAV Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 40th Street	*Northbound Thru*		900
	Northbound Left	215	50
	Northbound Right	215	25
	Southbound Thru		700
	Southbound Left	TWCLT	225
	Southbound Right	175	25
	Eastbound Thru		25
	Eastbound Left	120	75
	Eastbound Right	155	25
	Westbound Thru		25
	Westbound Left	120	**300**
	Westbound Right	155	**525**
US 101 & 50th Street/State Park	*Northbound Thru*		575
	Northbound Left	TWCLT	75
	Northbound Right	320	25
	Southbound Thru		125
	Southbound Left	215	100
	Southbound Right	155	0
	Eastbound Left	120	100
	Eastbound Thru/Right		50
	Westbound Thru/Right		50
	Westbound Left	120	100
US 101 & 62nd Street	*Northbound Left*	TWCLT	25
	Southbound Right	150	0
	Southbound Left	TWCLT	25
	Eastbound Left	120	**225**
	Eastbound Thru-Right		25
	Westbound Left	120	25
	Westbound Thru/Right		25

Notes:
AAV means Average Annual Volumes.
Lengths rounded to nearest 25 feet.
Unsignalized intersections estimated using Synchro.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 4-2 indicate that in the future, some of the intersections will exceed the available vehicle storage for a movement. The left turn movements on some of the minor street approaches exceed capacity. The westbound right out movement at 32nd Street has an excessive queue in the single lane approach. The westbound right turns at US 101 and 40th Street also exceed the available storage space.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach area. The results of this analysis are presented in Table 4-3.

Table 4-3. US 101 Roadway Segment Analysis for 2030 AAV with Land Use Scenario #1

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hurbert Street to 35th Street	35 mph	2.28	2.08
35th Street to 50th Street	35 & 45 mph	0.5 3	0.73
50th Street to 62nd Street	55 mph	0.51	0.62

Note 1: The calculation represents the ratio of projected segment volume to calculated lane capacity.
Note 2: AAV means Average Annual Volumes.

The analysis is Table 4-3 is based on an assumed roadway segment capacity of 1,300 vphpl for the Yaquina Bay Bridge and influence area, and 1,750 vphpl for the highway segments south of 35th Street. The table indicates that the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic operations on US 101 south of the bridge causing significant delays. Worksheets are included in Appendix E.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. The results of the simulation are summarized in Table 4-4 below and documented in Appendix E.

Table 4-4. US 101 Travel Time and Speed for 2030 AAV with Land Use Scenario #1

Scenarios	Travel Time (min)		Average Travel Speed (mph)	
	Northbound	Southbound	Northbound	Southbound
US 101 Totals	**16.9**	**15.9**	**12.2**	**11.1**
Hurbert Street to 35th Street	12.7	9.4	8.2	1.0
35th Street to 40th Street	1.2	4.3	13.5	24.5
40th Street to 50th Street	1.9	1.2	23.2	13.5
50th Street to 62nd Street	1.0	0.9	41.4	49.0

Note: AAV means Average Annual Volumes.
Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 4-4, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and increased travel times.

Table 4-5 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 4-5. US 101 Unserved Vehicles for 2030 AAV with Land Use Scenario #1

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	1,748
Entering US 101 southbound at Hurbert Street	1,842

Note: AAV means Average Annual Volumes.
Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

Similar to the discussion presented under Scenario 1 for 30 HV, the effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street. Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The reduction in traffic volumes diverted from US 101 is expected to be small and to not alter the volume/capacity ratios anticipated at the intersections of US 101 interchanges at 40th, 50th, and 62nd Streets under Scenario 1 with AAV traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

4.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH

Intersection Operations Analysis

The analysis of traffic operations was conducted using a Synchro traffic model developed specifically for the study area intersections as described earlier in this chapter. Table 4-6 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #2 and assuming a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay. 2030 PM peak hour intersection volumes and traffic operations worksheets for this scenario are included in Appendix F.

Based on 2030 Average Annual volumes, all three of the signalized intersections generally experience excessive delays and operate above acceptable V/C standards. Northbound and southbound through traffic on US 101, generally north of 40th Street, is also expected to exceeds the capacity of a 5-lane cross section. Additionally, the high traffic volumes on US 101 in the South Beach area would result in insufficient gaps to accommodate westbound right turns at 32nd Street and eastbound left turns at 62nd Street.

Table 4-6. 2030 AAV Intersection Operations Summary with Land Use Scenario #2

			2030 Annual Avg.	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**0.99**	**24.5**
US 101 & 40th Street		0.75	**1.00**	**42.7**
US 101 & 50th Street/S. Beach State Park		0.75	**0.82**	**16.9**
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**1.68**	**0**
	Northbound Right	0.85	0.07	0
	Southbound Thru	0.85	**1.64**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	0.88	0
	Southbound Thru	0.85	**1.51**	**0**
	Southbound Right	0.85	0.13	0
	Eastbound Right	0.90	**9.93**	**N/A**
US 101 & 32nd Street	*Northbound Thru*	0.85	0.65	0
	Northbound Right	0.85	0.04	0
	Southbound Thru-Right	0.85	**1.06**	**0**
	Eastbound Right	0.90	0.39	47.5
	Westbound Right	0.90	**2.01**	**>200.0**
US 101 & 62nd Street	*Northbound Left*	0.75	0.16	24.2
	Northbound Thru-Right	0.75	0.67	0
	Southbound Left	0.75	0.03	15.3
	Southbound Thru	0.75	0.64	0
	Southbound Right	0.75	0.04	0
	Eastbound Left	0.80	**1.91**	**>200.0**
	Eastbound Thru-Right	0.80	0.14	24.7
	Westbound Left	0.80	0.19	77.8
	Westbound Thru-Right	0.80	0.04	17.5

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Widening of US 101 to five-lanes is assumed to begin at the intersection of Abalone Street and proceed southward.
Note 4: AAV means Average Annual Volumes.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix F and are summarized in Table 4-7.

Table 4-7. 2030 AAV Intersection Queuing with Land Use Scenario #2

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	50
	Westbound Right	*	1,425

Table 4-7 Continued. 2030 AAV Intersection Queuing with Land Use Scenario #2

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 35th Street	*Northbound Thru*		925
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		225
	Southbound Left	TWCLT	125
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	**125**
	Eastbound Right	155	25
	Westbound Thru		50
	Westbound Left	120	**150**
	Westbound Right	155	50
US 101 & 40th Street	*Northbound Thru*		800
	Northbound Left	215	25
	Northbound Right	215	25
	Southbound Thru		450
	Southbound Left	TWCLT	200
	Southbound Right	175	25
U	*Eastbound Thru*		25
	Eastbound Left	120	75
	Eastbound Right	155	25
	Westbound Thru		25
	Westbound Left	120	**275**
	Westbound Right	155	**450**
US 101 & 50th Street/State Park	*Northbound Thru*		550
	Northbound Left	TWCLT	75
	Northbound Right	320	25
	Southbound Thru		125
	Southbound Left	215	75
	Southbound Right	155	0
	Eastbound Left	120	100
	Eastbound Thru/Right		50
	Westbound Thru/Right		50
	Westbound Left	120	75
US 101 & 62nd Street	*Northbound Left*	TWCLT	25
	Southbound Right	150	0
	Southbound Left	TWCLT	25
	Eastbound Left	120	**225**
	Eastbound Thru-Right		25
	Westbound Left	120	25
	Westbound Thru/Right		25

Notes:
AAV means Average Annual Volumes.
Lengths rounded to nearest 25 feet.
Unsignalized intersections estimated using Synchro.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 4-7 indicate that in the future, some of the intersections will exceed the available vehicle storage for a movement. The left turn movements on several of the minor street approaches exceed capacity. The westbound right out movement at 32nd Street has an excessive queue in the single lane approach. The westbound right turns at US 101 and 40th Street also exceed the available storage space.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach area. The results of this analysis are presented in Table 4-8.

The table indicates that the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic operations on US 101 south of the bridge causing significant delays. Worksheets are included in Appendix F.

Table 4-8. US 101 Roadway Segment Analysis for 2030 AAV with Land Use Scenario #2

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hurbert Street to 35th Street	35 mph	2.18	2.01
35th Street to 50th Street	35 & 45 mph	0.51	0.71
50th Street to 62nd Street	55 mph	0.49	0.61

Note 1: The calculation represents the ratio of projected segment volume to calculated lane capacity.
Note 2: AAVV means Average Annual Volumes.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. The results of the simulation are summarized in Table 4-9 below and documented in Appendix F.

Table 4-9. US 101 Travel Time and Speed for 2030 AAV with Land Use Scenario #2

Scenarios	Travel Time (min)		Average Travel Speed (mph)	
	Northbound	Southbound	Northbound	Southbound
US 101 Totals	**16.1**	**15.1**	**12.8**	**11.6**
Hurbert Street to 35th Street	12.7	9.4	8.2	1.0
35th Street to 40th Street	0.9	3.9	17.5	26.1
40th Street to 50th Street	1.5	0.8	29.5	21.5
50th Street to 62nd Street	0.9	0.9	42.7	48.8

Note: AAV means Average Annual Volumes.
Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 4-9, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and increased travel times. South of 50th Street the average travel speed is nearer the posted speed of 55 mph.

Table 4-10 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 4-10. US 101 Unserved Vehicles for 2030 AAV with Land Use Scenario #2

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	1,572
Entering US 101 southbound at Hurbert Street	1,587

Note: AAV means Average Annual Volumes.
Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

Similar to the discussion presented under Scenario 1 for 30 HV, the effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street. Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The reduction in traffic volumes diverted from US 101 is expected to be small and to not alter the volume/capacity ratios anticipated at the intersections of US 101 interchanges at 40th, 50th, and 62nd Streets under Scenario 2 with AAV traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

5. 2030 OFF-SEASON TRAFFIC OPERATIONAL ANALYSIS

This chapter summarizes the analysis of the 2030 Off-Season volumes at study area intersections and roadway segments and presents findings with respect to traffic operations in the South Beach study area. Performance measures for this analysis are the same as those identified and discussed in Chapters 3 and 4.

5.1 LAND USE SCENARIO #1 – NEWPORT POPULATION GROWTH

Intersection Operations Analysis

As with the analysis of 30 HV and AAV traffic, the analysis of 2030 Off-Season traffic was conducted using a Synchro traffic model developed specifically for the study area intersections. This model includes field-verified geometrics and other relevant physical data for each intersection updated to reflect an assumed 2030 roadway network as described in Chapter 2. 2030 PM peak hour intersection turning movement volumes and intersection analysis worksheets are presented in Appendix G.

Table 5-1 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #1 and assuming a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay.

Table 5-1. 2030 Off-Season Intersection Operations Summary with Scenario #1

			2030 Off-Season	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**0.90**	**16.6**
US 101 & 40th Street		0.75	**0.94**	**37.8**
US 101 & 50th Street/S. Beach State Park		0.75	**0.77**	**13.4**
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**1.58**	**0**
	Northbound Right	0.85	0.06	0
	Southbound Thru	0.85	**1.52**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	0.82	0
	Southbound Thru	0.85	**1.40**	**0**
	Southbound Right	0.85	0.12	0
	Eastbound Right	0.90	**6.18**	N/A
US 101 & 32nd Street	*Northbound Thru*	0.85	0.62	0
	Northbound Right	0.85	0.03	0
	Southbound Thru-Right	0.85	**0.98**	**0**
	Eastbound Right	0.90	0.29	36.4
	Westbound Right	0.90	**1.73**	**>200.0**
US 101 & 62nd Street	*Northbound Left*	0.80	0.14	20.7
	Northbound Thru-Right	0.80	0.63	0
	Southbound Left	0.80	0.01	14.3
	Southbound Thru	0.80	0.58	0
	Southbound Right	0.80	0.04	0
	Eastbound Left	0.80	**1.32**	**>200.0**
	Eastbound Thru-Right	0.80	0.10	21.3

Table 5-1 Cont. 2030 Off-Season Intersection Operations Summary with Scenario #1

			2030 Off-Season	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & 62nd Street Cont.	*Westbound Left*	0.80	0.24	67.9
	Westbound Thru-Right	0.80	0.02	16.3

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Assumes widening of US 101 to five-lanes begins at the intersection of Abalone Street and proceeds south.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Based on 2030 Off-Season volumes, two of the signalized intersections generally experience excessive delays and operate above acceptable V/C standards. The northbound thru traffic on US 101 generally north of 40th Street exceeds the capacity of the 5-lane cross-section. Additionally, the high traffic volumes on US 101 in the South Beach area result in insufficient gaps to accommodate some of the side street turning vehicles at the unsignalized intersections of Abalone Street, 32nd Street and 62nd Street.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix G and are summarized in Table 5-2.

Table 5-2. 2030 Off-Season Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	25
	Westbound Right	*	1,150
US 101 & 35th Street	*Northbound Thru*		250
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		125
	Southbound Left	TWCLT	100
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	100
	Eastbound Right	155	25
	Westbound Thru		50
	Westbound Left	120	**150**
	Westbound Right	155	50
US 101 & 40th Street	*Northbound Thru*		750
	Northbound Left	215	25
	Northbound Right	215	25
	Southbound Thru		550
	Southbound Left	TWCLT	225
	Southbound Right	175	25
	Eastbound Thru		25

Table 5-2 Continued. 2030 Off-Season Intersection Queuing with Land Use Scenario #1

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 40th Street Cont.	*Eastbound Left*	120	75
	Eastbound Right	155	25
	Westbound Thru		25
	Westbound Left	120	**250**
	Westbound Right	155	**400**
US 101 & 50th Street/State Park	*Northbound Thru*		500
	Northbound Left	TWCLT	50
	Northbound Right	320	25
	Southbound Thru		325
	Southbound Left	215	75
	Southbound Right	155	25
	Eastbound Left	120	100
	Eastbound Thru/Right		50
	Westbound Thru/Right		50
	Westbound Left	120	75
US 101 & 62nd Street	*Northbound Left*	TWCLT	25
	Southbound Right	150	0
	Southbound Left	TWCLT	25
	Eastbound Left	120	**175**
	Eastbound Thru-Right		25
	Westbound Left	120	25
	Westbound Thru/Right		25

Notes:
Lengths rounded to nearest 25 feet.
Unsignalized intersections estimated using Synchro.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 5-2 indicate that in the future, some of the intersections will exceed the available vehicle storage for a specific movement. The left turn movements on several of the minor street approaches exceed capacity. The westbound right out movement at 32nd Street has an excessive queue in the single lane approach. The westbound right turns at US 101 and 40th Street also exceed the available storage space.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach area. The results of this analysis are presented in Table 5-3.

The analysis in Table 5-3 is based on an assumed roadway segment capacity of 1,300 vphpl for the Yaquina Bay Bridge and influence area, and 1,750 vphpl for the highway segments south of 35th Street. The table indicates that the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic

operations on US 101 south of the bridge causing significant delays. Worksheets are included in Appendix G.

Table 5-3. US 101 Roadway Segment Analysis for 2030 Off-Season with Land Use Scenario #1

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hurbert Street to 35th Street	35 mph	2.03	1.85
35th Street to 50th Street	35 & 45 mph	0.48	0.65
50th Street to 62nd Street	55 mph	0.45	0.56

Note: The calculation represents the ratio of projected segment volume to calculated lane capacity.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. The results of the simulation are summarized in Table 5-4 below and documented in Appendix G.

Table 5-4. US 101 Travel Time and Speed for 2030 Off-Season with Scenario #1

Scenarios	Travel Time (min)		Average Travel Speed (mph)	
	Northbound	Southbound	Northbound	Southbound
US 101 Totals	**13.8**	**12.7**	**15.0**	**13.8**
Hurbert Street to 35th Street	10.5	7.2	9.9	1.4
35th Street to 40th Street	0.7	3.5	23.9	29.3
40th Street to 50th Street	1.6	0.9	27.3	19.5
50th Street to 62nd Street	0.9	1.0	42.3	43.9

Note: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 5-4, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and increased travel times. South of 50th Street the travel speed is nearer to the posted speed of 55 mph.

Table 5-5 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 5-5. US 101 Unserved Vehicles for 2030 Off-Season with Land Use Scenario #1

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	1,186
Entering US 101 southbound at Hurbert Street	1,141

Note: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

Similar to the discussion presented under Scenario 1 for 30 HV, the effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street.

Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The reduction in traffic volumes diverted from US 101 is expected to be small and to not alter the volume/capacity ratios anticipated at the intersections of US 101 interchanges at 40th, 50th, and 62nd Streets under Scenario 1 with Off-Season traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

5.2 LAND USE SCENARIO #2 – ENVIRONMENTALLY CONSTRAINED GROWTH

Intersection Operations Analysis

The analysis of traffic operations was conducted using a Synchro traffic model developed specifically for the study area intersections as described earlier in this chapter. 2030 PM peak hour intersection volumes and traffic operations worksheets for this scenario are included in Appendix H.

Table 5-6 summarizes analysis results for the 2030 30 HV network with Land Use Scenario #2 and assuming a 5-lane US 101 cross-section in the South Beach study area. Data in this table includes the overall intersection V/C ratios, and average intersection delay.

Table 5-6. 2030 Off-Season Intersection Operations Summary with Scenario #2

			2030 Off-Season	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Signalized Intersections				
US 101 & 35th Street		0.85	**0.88**	**23.0**
US 101 & 40th Street		0.75	**0.85**	**27.4**
US 101 & 50th Street-S. Beach State Park		0.75	0.74	11.4
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & Pacific Way	*Northbound Thru*	0.85	**1.50**	**0**
	Northbound Right	0.85	0.06	0
	Southbound Thru	0.85	**1.46**	**0**
US 101 & Abalone Street	*Northbound Thru*	0.85	0.78	0
	Southbound Thru	0.85	**1.35**	**0**
	Southbound Right	0.85	0.12	0
	Eastbound Right	0.90	**5.73**	**N/A**
US 101 & 32nd Street	*Northbound Thru*	0.85	0.58	0
	Northbound Right	0.85	0.04	0
	Southbound Thru-Right	0.85	**0.95**	**0**
	Eastbound Right	0.90	0.28	33.9
	Westbound Right	0.90	**1.33**	**182.6**
US 101 & 62nd Street	*Northbound Left*	0.80	0.13	19.8
	Northbound Thru-Right	0.80	0.60	0
	Southbound Left	0.80	0.01	13.6
	Southbound Thru	0.80	0.57	0
	Southbound Right	0.80	0.04	0

Table 5-6 Cont. 2030 Off-Season Intersection Operations Summary with Scenario #2

			2030 Off-Season	
		V/C Standard	V/C Ratio	Delay (sec/veh)
Unsignalized Intersections	**Critical Movement/Control**			
US 101 & 62nd Street Cont.	*Eastbound Left*	0.80	**1.22**	**>200.0**
	Eastbound Thru-Right	0.80	0.09	20.6
	Westbound Left	0.80	0.07	51.4
	Westbound Thru-Right	0.80	0.02	15.6

Note 1: V/C ratio is a ratio between traffic volumes and the roadway or intersection's capacity.
Note 2: "Delay" refers to the delay experienced for the specific intersection traffic movement listed.
Note 3: Widening of US 101 to five-lanes is assumed to begin at the intersection of Abalone Street and proceed southward.
Bold numbers indicate that applicable ODOT Volume/capacity performance measure would be exceeded.
N/A indicates that projected volumes sufficiently exceed capacity such that Synchro cannot calculate a value.

Based on 2030 Off-Season volumes, two of the signalized intersections generally experience excessive delays and operate above acceptable V/C standards. The northbound thru traffic on US 101 north of 40th Street exceeds the capacity of the 5-lane cross-section. Additionally, the high traffic volumes on US 101 in the South Beach area result in insufficient gaps to accommodate right turning traffic at 32nd Street and left turning vehicles at 62nd Street.

Traffic Queuing

For purposes of this report, the 95th percentile vehicle queue length has been used to identify where potential traffic queuing problems might exist. 95th percentile queues as calculated by Synchro are based on the anticipated arrival patterns, duration of interruptions, and the ability of the intersection to recover from momentary heavy arrival rates. Queuing analysis worksheets are included in Appendix H and are summarized in Table 5-7.

Table 5-7. 2030 Off-Season Intersection Queuing with Land Use Scenario #2

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 32nd Street (RIRO)	*Northbound Right*	100	25
	Eastbound Right	*	25
	Westbound Right	*	875
US 101 & 35th Street	*Northbound Thru*		225
	Northbound Left	TWCLT	50
	Northbound Right	175	25
	Southbound Thru		250
	Southbound Left	TWCLT	125
	Southbound Right	175	25
	Eastbound Thru		50
	Eastbound Left	120	100
	Eastbound Right	155	25
	Westbound Thru		50
	Westbound Left	120	**150**
	Westbound Right	155	50
US 101 & 40th Street	*Northbound Thru*		450
	Northbound Left	215	25
	Northbound Right	215	25
	Southbound Thru		550
	Southbound Left	TWCLT	200
	Southbound Right	175	25
	Eastbound Thru		25

Table 5-7 Cont. 2030 Off-Season Intersection Queuing with Land Use Scenario #2

Intersection	Turn Lane	Existing/Assumed Storage (ft)	Estimate 95th Percentile Queue (ft)
US 101 & 40th Street Cont.	*Eastbound Left*	120	75
	Eastbound Right	155	25
	Westbound Thru		25
	Westbound Left	120	**225**
	Westbound Right	155	**350**
US 101 & 50th Street/State Park	*Northbound Thru*		425
	Northbound Left	TWCLT	50
	Northbound Right	320	25
	Southbound Thru		100
	Southbound Left	215	75
	Southbound Right	155	25
	Eastbound Left	120	100
	Eastbound Thru/Right		50
	Westbound Thru/Right		50
	Westbound Left	120	50
US 101 & 62nd Street	*Northbound Left*	TWCLT	25
	Southbound Right	150	0
	Southbound Left	TWCLT	25
	Eastbound Left	120	**150**
	Eastbound Thru-Right		25
	Westbound Left	120	25
	Westbound Thru/Right		25

Notes:
Lengths rounded to nearest 25 feet.
Unsignalized intersections estimated using Synchro.
TWCLT: Two way center left turn lane
* Single Lane Approach
Bold number indicates that available vehicle storage space is expected to be exceeded.
Queue lengths are from Synchro analysis results and do not reflect queues calculated from a simulation model that accounts for interactions among intersections.

Traffic queuing results in Table 5-7 indicate that in the future, some of the intersections will exceed the projected vehicle storage for a movement. The left turn movements on several of the minor street approaches exceed capacity. The westbound right out movement at 32nd Street has an excessive queue in the single lane approach. The westbound right turns at US 101 and 40th Street also exceed the available storage space.

Roadway Segment Operations

To supplement the analysis of the intersection traffic operations, an assessment was conducted of several highway segments to determine how well US 101 would function as a highway in the South Beach area. The results of this analysis are presented in Table 5-8.

Table 5-8. US 101 Roadway Segment Analysis for 2030 Off-Season with Land Use Scenario #2

Segment	Speed Limit (mph)	Volume/Capacity Ratio	
		Northbound	Southbound
Hurbert to 35th Street	35 mph	1.94	1.79
35th Street to 50th Street	35 & 45 mph	0.45	0.63
50th Street to 62nd Street	55 mph	0.43	0.54

Note: The calculation represents the ratio of projected segment volume to calculated lane capacity.

The table indicates that the segment of US 101 affected by the constrained cross-section on the Yaquina Bay Bridge would see volumes that significantly exceed the theoretical capacities of this segment. South of 35th Street, the five-lane cross-section proposed for US 101 would have sufficient capacity to accommodate projected traffic (when measured using planning level capacity values) if it were not for the effects of traffic queuing to/from the bridge. These queues are expected to heavily influence actual traffic operations on US 101 south of the bridge causing significant delays. Worksheets are included in Appendix H.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. The results of the simulation are summarized in Table 5-9 below and documented in Appendix H.

Table 5-9. US 101 Travel Time and Speed for 2030 Off-Season with Scenario #2

	Travel Time (min)		Average Travel Speed (mph)	
Scenarios	**Northbound**	**Southbound**	**Northbound**	**Southbound**
US 101 Totals	**13.4**	**12.5**	**15.4**	**14.0**
Hurbert Street to 35th Street	10.5	7.2	9.9	1.4
35th Street to 40th Street	0.7	3.6	24.9	28.9
40th Street to 50th Street	1.3	0.8	33.2	21.1
50th Street to 62nd Street	0.9	0.9	44.9	50.5

Note: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

As indicated in Table 5-9, all segments of US 101 from the Yaquina Bay Bridge south through the South Beach study area would experience low travel speeds and increased travel times. South of 50th Street the average travel speed is nearer the posted speed of 55 mph.

Table 5-10 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 5-10. US 101 Unserved Vehicles for 2030 Off-Season with Land Use Scenario #2

Location	Number of Unserved Vehicles
Entering US 101 northbound at 62nd Street	1,191
Entering US 101 southbound at Hurbert Street	1,141

Note: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Effect of Adding Road Connection from 50th to 62nd

Similar to the discussion presented under Scenario 1 for 30 HV, the effects of adding a road connection between 50th and 62nd Streets parallel to and east of US 101 can be assessed in several ways. First, would be the potential for reducing traffic volumes along US 101 by diverting north/south traffic from the area near 62nd Street to areas further north such as South Beach Village and commercial areas along the east side of US 101 south of 40th Street. Second, the addition of a road connection could provide an attractive alternative to the provision of direct property access to/from the highway. This would also benefit traffic operations along US 101.

The reduction in traffic volumes diverted from US 101 is expected to be small and to not alter the volume/capacity ratios anticipated at the intersections of US 101 interchanges at 40th, 50th, and 62nd Streets under Scenario 2 with Off-Season traffic levels.

A more significant benefit of this connector road might be its ability to provide direct property access from existing and potential future development along the east side of US 101 north of 62nd Street. By offering a "backage" connection to these properties, direct access to/from the highway could be reduced or eliminated, thus enhancing both safety and traffic operations.

6. DURATION OF CONGESTION

As noted in Chapter 2 an additional performance measure has been identified to aid in the development of alternate mobility standard for US 101 in South Beach. This measure is duration of congestion and was used to explore options for both increasing the acceptable V/C mobility threshold, and for determining the length of time during a typical average annual weekday when that standard might be exceeded or allow to be exceeded. The methodology used to calculate duration of congestion and the results of analysis for 2030 average annual and off-season conditions with the two land use scenarios are discussed in this chapter.

6.1 METHODOLOGY

Calculation of the duration of congestion for the study area intersections included a multi-step process as described below:

1. *Identify the peak analysis hour for 2030 average annual or off-season conditions.* Review of recent traffic counts taken over the past few years at several locations along US 101 in South Beach indicates that the PM peak hour (which is also the peak hour of a typical weekday) occurs between 4 and 5 PM. It is assumed that this time period continues to represent the weekday peak under average annual or off-season conditions in 2030.
2. *Identify hourly traffic volumes over the course of the 16-hour analysis period for a typical average annual or off-season weekday in 2030.* Using the PM peak hour as a starting point (and assuming that it represents the 100% hour), the percentage of the PM peak that could be experienced in all other hours is based on current experience as evidenced from a variety of recent traffic counts. Counts that were reviewed included roadway tube counts from April 2009 along US 101 north and south of Ferry Slip Road and south of Pacific Way, and a turning movement count taken in April 2005 at the intersection of US 101 and 32nd Street (see Appendix I for a summary table of this data). While the percentages that each of the 16 hours measured represents of the PM peak vary a little from location to location, a general pattern emerges that is useful in developing an estimate of hour 2030 traffic distribution. For purposes of this report, the hourly distribution of traffic was developed using the April 2005 count at the intersection of US 101 at 32nd Street. This count was chosen because it represents conditions that might be more prevalent through the signalized intersections proposed along US 101 in 2030 (e.g., from 35th to 50th) as it is located farther from the Yaquina Bay Bridge influence area than the other counts.
3. *Identify reductions in total approach volumes that would be needed to meet applicable OHP mobility standards.* The 2030 PM peak hour projections for AAV or Off-Season conditions at each intersection with both land use scenarios were evaluated to determine the percent reduction in overall approach volumes that would be needed to meet the OHP standards. It should be noted that, for purposes of assessing the duration of congestion, traffic operations analysis described in this chapter differs slightly from the analysis in earlier chapters in that Peak Hour Factors (PHFs) were adjusted from 0.85 to 1.00. This adjustment reflects the expectation that congestion would be sufficiently heavy to minimize traffic peaking within the peak hour. A peak hour factor is typically applied to traffic volume data to adjust for the common experience of a higher short peak (e.g., 15 to 30 minutes) within a peak hour. Operations analysis is based on that peak within the peak.
4. *Identify intersection capacities at each intersection for both time periods and land use scenarios.* These theoretical capacities were assumed to represent the total approach

volumes at an intersection when it achieved operations approximating the OHP mobility standards. These were determined from the analysis of each intersection based on the relevant trip reduction percentages.

5. *Identify the total number of hours that each intersection would exceed capacity for both time periods and land use scenario, and at each trip reduction level.* To accomplish this calculation, the estimated capacity value for each intersection was compared with the estimated traffic volume for each hour of the 16-hour day under 2030 average annual and off-season conditions with each land use scenario and trip reduction level. Based on this comparison, an estimate was prepared of the number of hours each weekday when traffic operations could be expected to exceed the capacity of the signalized and unsignalized intersections along US 101 in South Beach.

6.2 CONDITIONS WITH AVERAGE ANNUAL TRAFFIC VOLUMES

Land Use Scenario #1 – Newport Population Growth

Estimates of the duration of 2030 average annual weekday congestion were prepared using the methodology described above. Hourly traffic volumes were determined for each intersection and operations analysis was conducted assuming two levels of trip reductions as described above. Turning movement projections for this land use scenario under average annual conditions are included in Appendix I along with a summary of the 16-hour distribution of traffic and the comparison with theoretical intersection capacities that identify total anticipated hours of congestion. Intersection operations spreadsheets for each intersection and trip reduction level are also included in this Appendix.

Table 6-1 summarizes the estimated duration of congestion for the study area intersections for Land Use Scenario #1. Analysis results are described for each intersection, from the north to the south, in the following paragraphs.

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 11 or 12 hours, respectively, out of each typical 2030 Average Annual weekday. With a 19 percent reduction in approach volumes, the two near intersections would operate in excess of their mobility standard of V/C > 0.85 for US 101 and V/C > 0.90 for side street traffic for 11 hours each typical weekday.

- For the unsignalized intersection of US 101 with 32nd Street, operations would exceed the applicable mobility standard for an estimated seven hours out of each weekday. With a 19 percent reduction in approach volumes, this intersection is expected to meet its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic).

- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.96 during the weekday PM peak hour in comparison to its standard of V/C > 0.85. Operations would exceed this standard for an estimated four hours each weekday. Through an iterative process that included all three signalized intersections along US 101 in South Beach, it was determined that a 19 percent reduction in total approach volumes would be needed to meet the applicable mobility standards for each.

- The signalized intersection of US 101 with 40th Street is also expected to operate at V/C = 0.96 during the PM peak hour. This intersection would exceed its applicable

standard of V/C > 0.75 for approximately seven hours each weekday. With a 19 percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.

- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.82 during the PM peak hour. This intersection would exceed its V/C > 0.75 standard for approximately two hours during each weekday. With a 19 percent reduction in total approach traffic volumes this intersection would meet its applicable mobility standard.
- For the unsignalized intersection of US 101 with 62nd Street, operations would exceed applicable mobility standards for an estimated seven hours out of each weekday. With a 19 percent reduction in approach volumes, this intersection is expected to meet its relevant mobility standard (V/C > 0.75 for traffic on US 101 and V/C > 0.80 for side street traffic).

It should be noted that none of these intersections operates in isolation from the others and that the anticipated traffic queuing from the bridge will likely have a significant impact on northbound traffic operations through much of the study area.

Land Use Scenario #2 – Environmentally-Constrained Growth

Turning movement projections for this land use scenario under average annual conditions are included in Appendix J along with a summary of the 16-hour distribution of traffic and the comparison with theoretical intersection capacities that identify total anticipated hours of congestion. Intersection operations spreadsheets for each intersection and trip reduction level are also included in this Appendix.

Table 6-1 also summarizes the estimated duration of congestion for the study area intersections for Land Use Scenario #2. Analysis results are described for each intersection, from the north to the south, in the following paragraphs.

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 12 hours out of each typical 2030 Average Annual weekday. With a 14 percent reduction in total approach traffic, some improvement would occur but the standard would still be exceeded for up to 11 hours for each typical weekday.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards for up to seven hours each weekday. With a 14 percent reduction in approach volume, this intersection would exceed its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for an estimated one hour during each typical 2030 Average Annual weekday.
- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.92 during the weekday PM peak hour in comparison to its standard of V/C > 0.85. Operations are expected to exceed this standard for an estimated four hours out of each weekday. Through an iterative process that included all three signalized intersections along US 101 in South Beach, it was determined that a 14 percent reduction in total approach volumes would be needed to meet the applicable mobility standards for each.

Table 6-1. Summary of Duration of Congestion Evaluation – Average Annual Conditions with Adjusted Peak Hour Factors (Note #1)

			Land Use Scenario #1			Land Use Scenario #2		
			Full Development		With 19% Reduction in Traffic (1)	Full Development)		With 14% Reduction in Traffic (2)
Intersection	Critical Movement	OHP Standard	Peak V/C	Congested Hours (4)	Congested Hours (4)	Peak V/C	Congested Hours (4)	Congested Hours (4)
Signalized Intersections								
US 101 & 35th Street	All	0.85	0.96	4 hours	0 hours	0.92	4 hours	0 hours
US 101 & 40th Street	All	0.75	0.96	7 hours	0 hours	0.88	6 hours	0 hours
US 101 & 50th Street	All	0.75	0.82	2 hours	0 hours	0.78	1 hour	0 hours
Unsignalized Intersections (3)								
US 101 & Pacific Way	NB Thru	0.85	1.68			1.60		
	NB Right	0.85	0.06	11 hours	11 hours	0.06	12 hours	11 hours
	SB Thru	0.85	1.62			1.56		
US 101 & Abalone Street	NB Thru	0.85	0.87			0.83		
	SB Thru	0.85	1.49	12 hours	11 hours	1.44	12 hours	11 hours
	SB Right	0.85	0.13			0.13		
	EB Right	0.90	7.75			6.84		
US 101 & 32nd Street	NB Thru	0.85	0.66			0.62		
	NB Right	0.85	0.04			0.04		
	SB Thru/Right	0.85	1.04	7 hours	0 hours	1.01	7 hours	1 hour
	EB Right	0.90	0.32			0.30		
	WB Right	0.90	1.70			1.60		
US 101 & 62nd Street	NB Left	0.75	0.15			0.14		
	NB Thru/Right	0.75	0.67			0.64		
	SB Left	0.75	0.03			0.03		
	SB Thru	0.75	0.62	7 hours	0 hours	0.61	4 hours	0 hours
	SB Right	0.75	0.04			0.04		
	EB Left	0.80	1.49			1.38		
	EB Thru/Right	0.80	0.11			0.11		
	WB Left	0.80	0.24			0.14		
	WB Thru/Right	0.80	0.03			0.03		

Entire intersection or a specific movement that would operate in an over-capacity condition.
Entire intersection or a specific movement that would exceed the OHP standard but would operate at less than capacity conditions.

Note 1: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Chapters 2, 4 and 5 (PHF=0.85).
Note 2: Intersection performance is measured at the relevant V/C standard. For stop-controlled intersections, the side street standard was used as the basis for estimating when an intersection would exceed its performance standard.
(1) 19% reduction from Full Development to meet OHP standards.
(2) 14% reduction from Full Development to meet OHP standards.
(3) Congested hours for stop-controlled intersections refers to worst side street movement.
(4) "Congested Hours" refers to the number of hours that an intersection would exceed the OHP V/C performance standard.

- The signalized intersection of US 101 with 40th Street is expected to operate at V/C = 0.88 during the weekday PM peak hour. This intersection would exceed its applicable standard of V/C > 0.75 for approximately six hours each weekday. With a 14 percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.
- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.78 during the weekday PM peak hour. This intersection would exceed its V/C > 0.75 standard for only one hour during each weekday. With a 14 percent reduction in total approach traffic volumes, this intersection would meet its applicable mobility standard.
- At the unsignalized intersection with 62nd Street, the applicable standard for side streets of V/C > 0.80 would be exceeded for four hours each weekday. With a 14 percent reduction in approach volume this intersection is expected to meet its mobility standard for each typical 2030 Average Annual weekday.

As with Scenario #1, it should be noted that none of these intersections operates in isolation from the others and that the anticipated traffic queuing from the bridge will likely have a significant impact on northbound traffic operations through much of the study area.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. This analysis differs from that presented in earlier chapters for the reasons documented at the beginning of this chapter – namely the change in peak hour factors assumed in the intersection operations analysis. The results of the simulation are summarized in Table 6-2 below and documented in Appendices I and J for Land Use Scenarios 1 and 2, respectively.

As indicated in Table 6-2, all segments of US 101 from Hurbert Street to 50th Street would experience low travel speeds and increased travel times. South of 50th Street the average travel speed is nearer the posted speed of 55 mph.

Table 6-2. US 101 Travel Time and Speed for 2030 Average Annual Conditions

	Travel Time (min)		Average Travel Speed (mph)	
Scenario and Location	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Scenario 1 – Full Development				
US 101 Totals	**15.8**	**14.7**	**13.1**	**11.9**
Hurbert Street to 35th Street	12.7	9.4	8.1	1.0
35th Street to 40th Street	0.8	3.6	20.4	29.0
40th Street to 50th Street	1.4	0.8	33.0	21.5
50th Street to 62nd Street	0.9	1.0	45.6	46.8
Scenario 1 – 19% Reduction				
US 101 Totals	**15.5**	**14.6**	**13.3**	**12.0**
Hurbert Street to 35th Street	12.7	9.4	8.1	1.0
35th Street to 40th Street	0.6	3.5	27.0	29.4
40th Street to 50th Street	1.3	0.7	34.5	22.8
50th Street to 62nd Street	0.9	0.9	45.6	50.2

Table 6-2 Cont. US 101 Travel Time and Speed for 2030 Average Annual Conditions

	Travel Time (min)		Average Travel Speed (mph)	
Scenario and Location	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Scenario 2 – Full Development				
US 101 Totals	**15.3**	**14.1**	**13.5**	**12.4**
Hurbert Street to 35th Street	12.1	8.8	8.6	1.1
35th Street to 40th Street	0.8	3.5	22.7	29.8
40th Street to 50th Street	1.5	0.8	29.8	22.6
50th Street to 62nd Street	1.0	1.1	42.6	43.5
Scenario 2 – 14% Reduction				
US 101 Totals	**15.0**	**14.0**	**13.7**	**12.5**
Hurbert Street to 35th Street	12.1	8.8	8.5	1.1
35th Street to 40th Street	0.8	3.6	22.3	28.6
40th Street to 50th Street	1.3	0.6	35.8	26.4
50th Street to 62nd Street	0.9	0.9	45.4	51.1

Note 1: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.

Note 2: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Chapters 2, 4 and 5 (PHF=0.85).

Table 6-3 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 6-3. US 101 Unserved Vehicles for 2030 Average Annual Volumes

	Number of Unserved Vehicles	
Scenario and Location	**Full Development**	**Reduced Development**
Scenario 1		
Entering US 101 northbound at 62nd Street	1,536	1,536
Entering US 101 southbound at Hurbert Street	1,479	1,479
Scenario 2		
Entering US 101 northbound at 62nd Street	1.488	1.488
Entering US 101 southbound at Hurbert Street	1.432	1.432

6.3 CONDITIONS WITH OFF-SEASON TRAFFIC VOLUMES

Land Use Scenario #1 – Newport Population Growth

Estimates of the duration of 2030 average annual weekday congestion were prepared using the methodology described above. Hourly traffic volumes were determined for each intersection and operations analysis was conducted assuming three levels of trip reductions as described above. Turning movement projections for this land use scenario under average annual conditions are included in Appendix I along with a summary of the 16-hour distribution of traffic and the comparison with theoretical intersection capacities that identify total anticipated hours of congestion. Intersection operations spreadsheets for each intersection and trip reduction level are also included in this Appendix.

Table 6-4 summarizes the estimated duration of congestion for the study area intersections for Land Use Scenario #1. Analysis results are described for each intersection, from the north to the south, in the following paragraphs.

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would result in operations exceeding applicable mobility standards for 11 hours out of each typical 2030 Off-Season weekday. The eight percent reduction in approach volumes that benefits the signalized intersections would not materially affect operations at these two intersections.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards for an estimated two hours each weekday. With an eight percent reduction in approach volumes, this intersection would exceed its applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for only one hour each weekday.
- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.85 during the weekday PM peak hour which meets its existing mobility standard.
- The signalized intersection of US 101 with 40th Street is expected to operate at V/C = 0.82 during the weekday PM peak hour. This intersection would exceed its applicable standard of V/C > 0.75 for approximately three hours each weekday. With an eight percent reduction in total approach volumes, this intersection would meet its applicable mobility standard.
- The signalized intersection of US 101 with 50th Street is expected to operate at V/C = 0.72 during the weekday PM peak hour which is less than its existing mobility standard of V/C > 0.75.
- For the unsignalized intersection of US 101 with 62nd Street, operations would exceed applicable mobility standards for side streets of V/C > 0.80 for an estimated one hour out of each weekday. With an eight percent reduction in approach volumes, this intersection would meet its applicable standard.

It should be noted that none of these intersections operates in isolation from the others and that the anticipated traffic queuing from the bridge will likely have a significant impact on northbound traffic operations through much of the study area.

Land Use Scenario #2 – Environmentally-Constrained Growth

Turning movement projections for Scenario #2 under off-season conditions are included in Appendix L along with a summary of the 16-hour distribution of traffic and a comparison with theoretical intersection capacities to identify total estimated hours of congestion. Intersection operations worksheets for each intersection are also included in this Appendix.

Table 6-4 summarizes the estimated duration of congestion for the study area intersections for Land Use Scenario #2. Analysis results are described for each intersection, from the north to the south, in the following paragraphs.

- For the unsignalized intersections of US 101 with Pacific Way and Abalone Street, the 2-lane roadway section of the highway leading to/from the Yaquina Bay Bridge would exceed their applicable mobility standards for 11 hours out of each typical 2030 Off-Season weekday.
- For the unsignalized intersection of US 101 with 32nd Street, traffic operations would exceed the applicable mobility standards (V/C >0.85 for traffic on US 101 and V/C > 0.90 for side street traffic) for an estimated one hour each weekday.

Table 6-4. Summary of Duration of Congestion Evaluation – Off-Season Conditions with Adjusted Peak Hour Factors (Note #1)

Intersection	Critical Movement	OHP Standard	Land Use Scenario #1			Land Use Scenario #2	
			Full Development		With 8% Reduction in Traffic (1)	Full Development)	
			Peak V/C	Congested Hours (4)	Congested Hours (4)	Peak V/C	Congested Hours (4)
Signalized Intersections							
US 101 & 35th Street	All	0.85	0.85	0 hours	0 hours	**0.83**	0 hours
US 101 & 40th Street	All	0.75	0.82	3 hours	0 hours	**0.75**	0 hours
US 101 & 50th Street	All	0.75	0.72	0 hours	0 hours	**0.70**	0 hours
Unsignalized Intersections (3)							
US 101 & Pacific Way	NB Thru	0.85	1.50			1.43	
	NB Right	0.85	0.06	11 hours	11 hours	006	11 hours
	SB Thru	0.85	1.44			1.39	
US 101 & Abalone Street	NB Thru	0.85	0.78			0.74	
	SB Thru	0.85	1.33	11 hours	11 hours	1.28	11 hours
	SB Right	0.85	0.11			0.11	
	EB Right	0.90	>2.00			>2.00	
US 101 & 32nd Street	NB Thru	0.85	0.59			0.55	
	NB Right	0.85	0.03			0.04	
	SB Thru/Right	0.85	0.93	2 hours	1 hour	0.90	1 hour
	EB Right	0.90	0.23			0.21	
	WB Right	0.90	1.24			1.01	
US 101 & 62nd Street	NB Left	0.75	0.12			0.11	
	NB Thru/Right	0.75	0.60			0.57	
	SB Left	0.75	0.01			0.01	
	SB Thru	0.75	0.55	1 hour	0 hours	0.54	1 hour
	SB Right	0.75	0.04			0.04	
	EB Left	0.80	0.97			0.90	
	EB Thru/Right	0.80	0.08			0.07	
	WB Left	0.80	0.17			0.05	
	WB Thru/Right	0.80	0.01			0.01	

Entire intersection or a specific movement that would operate in an over-capacity condition.
Entire intersection or a specific movement that would exceed the OHP standard but would operate at less than capacity conditions.

Note 1: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Table 1-3 and Chapters 2, 4 and 5 (PHF=0.85).
Note 2: Intersection performance is measured at the relevant V/C standard. For stop-controlled intersections, the side street standard was used as the basis for estimating when an intersection would exceed its performance standard.

(1) 19% reduction from Full Development to meet OHP standards.
(2) 14% reduction from Full Development to meet OHP standards.
(3) Congested hours for stop-controlled intersections refers to worst side street movement
(4) "Congested Hours" refers to the number of hours that an intersection would exceed the OHP V/C performance standard.

- The signalized intersection of US 101 with 35th Street, is expected to operate at V/C = 0.83 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.85.
- The signalized intersection of US 101 with 40th Street, is expected to operate at V/C = 0.75 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.75.
- The signalized intersection of US 101 with 50th Street, is expected to operate at V/C = 0.70 during the weekday PM peak hour which meets its existing mobility standard of V/C > 0.75.
- For the unsignalized intersection of US 101 with 62nd Street, the applicable standard for side streets of V/C > 0.80 would also be exceeded for one hour each weekday.

Other Measures of Effectiveness

The Synchro model was used to estimate other measures of effectiveness for US 101 including travel time, average travel speed, and unserved vehicles trying to enter the network. This analysis differs from that presented in earlier chapters for the reasons documented at the beginning of this chapter – namely the change in peak hour factors assumed in the intersection operations analysis. The results of the simulation are summarized in Table 6-5 below and documented in Appendices K and L for Land Use Scenarios 1 and 2, respectively.

As indicated in Table 6-5, all segments of UA 101 from Hurbert Street to 50th Street would experience low travel speeds and long travel times. South of 50th Street, the average travel speed is nearer the posted speed of 55 mph.

Table 6-5. US 101 Travel Time and Speed for 2030 Off-Season Conditions

	Travel Time (min)		Average Travel Speed (mph)	
Scenario and Location	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Scenario 1 – Full Development				
US 101 Totals	**12.2**	**11.6**	**17.0**	**15.2**
Hurbert Street to 35th Street	9.1	6.3	11.4	1.6
35th Street to 40th Street	0.7	3.4	26.0	30.2
40th Street to 50th Street	1.5	0.8	30.4	19.8
50th Street to 62nd Street	0.9	1.0	43.0	45.3
Scenario 1 – 8% Reduction				
US 101 Totals	**9.7**	**9.0**	**21.4**	**19.5**
Hurbert Street to 35th Street	6.7	3.8	15.5	2.6
35th Street to 40th Street	0.6	3.4	27.2	30.2
40th Street to 50th Street	1.4	0.8	31.8	20.5
50th Street to 62nd Street	0.9	0.9	43.7	46.6
Scenario 2 – Full Development				
US 101 Totals	**12.0**	**11.6**	**17.2**	**15.2**
Hurbert Street to 35th Street	9.1	6.3	11.3	1.6
35th Street to 40th Street	0.7	3.6	25.6	28.4
40th Street to 50th Street	1.3	0.7	33.9	24.3
50th Street to 62nd Street	0.9	0.9	45.7	50.7

Note 1: Results are based on Synchro output and not from a simulation model that accounts for interaction among intersections.
Note 2: The results of this table are based on different peak hour factor assumptions (PHF=1.00) than the results reported in the tables in Chapters 2, 4 and 5 (PHF=0.85).

Table 6-6 reports the unserved vehicles from the Synchro analysis. The unserved number of vehicles indicates an approximate number of vehicles projected to exceed the capacity of the corridor and, thus, are not included in the analysis.

Table 6-6. US 101 Unserved Vehicles for 2030 Off-Season Volumes

	Number of Unserved Vehicles	
Scenario and Location	**Full Development**	**Reduced Development**
Scenario 1		
Entering US 101 northbound at 62nd Street	1,045	654
Entering US 101 southbound at Hurbert Street	1,042	646
Scenario 2		
Entering US 101 northbound at 62nd Street	1,050	NA
Entering US 101 southbound at Hurbert Street	1,047	NA

APPENDIX A

2030 Traffic Volume and Baseline Network Development

Parametrix ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

700 NE MULTNOMAH, SUITE 1000
PORTLAND, OR 97232-4110
T. 503.233.2400 T. 360.694.5020 F. 503.233.4825
www.parametrix.com

TECHNICAL MEMORANDUM

Date:	July 31, 2009
To:	John DeTar, Doug Norval, Dorothy Upton
From:	Shelley Oylear
Subject:	Task 9 -Base System Network, Volumes and Modeling Assumptions
Project Number:	274-2395-51-Ph 04
Project Name:	Newport TSP Update - Alternative Mobility Standards

---

The following assumptions were used to develop the Base System Network and Volumes for Synchro Modeling. Please review the assumptions and the attached modeling files and volumes in preparation for our conference call on Friday at 10:30 AM.

Volumes

- Starting with Assumes 1.7% annual thru traffic growth on US 101
- Assumes South Beach land use trip generation used in the original TSP update work. See attached table.
- 30 HV represents the seasonal weekday peak hour.
- Annual Average Weekday volumes were obtained by reducing 30 HV by 13% per Final ATR Memo.

Base System Network Assumptions

- Model begins just north of Hurbert Street and extends to just south of SE 62nd Street.
- Hurbert Street intersection added to model. Using volumes from previous modeling and balanced to calibrate with S. Beach model.
- Fall Street intersection added to model. Using volumes from previous modeling and balanced to calibrate with S. Beach model.
- US-101/Ferry Slip Road intersection is closed.
- US-101 at 32nd Street is a right-in/right-out intersection. This intersection is currently signalized, but the signal will be relocated to the 35th Street/US101 intersection.
- US-101 at 35th Street intersection is added and considered as signalized. The signal is being relocated from the 32nd Street/US 101 intersection. Signal assumed to function as actuated and coordinated. Intersection assumed with 4 approaches, each with separate left, right, and thru lanes.
- US-101 at 40th Street is assumed to be a signalized intersection with 4 approaches each with separate left, right, and thru lanes. Signal assumed to function as actuated and coordinated

1969-2009 40th Anniversary

- US-101 at 50th Street is assumed to be an unsignalized 'T' intersection with separate left, right, and thru lanes on each approach.
- The South Beach State Park access is modeled as it currently exists.
- SE 62nd Avenue intersection added to model with existing lane geometry.

Existing turn lane lengths are used except where at new intersections. New turn lanes lengths and tapers are based on the Oregon Highway Design Manual (OHDM) and summarized the table below.

	Left Turn Channelization		Right Turn Channelization	
Design Speed	Minimum Storage Length (ft)	Minimum Taper (14' lane)	Minimum Storage Length (ft)	Minimum Taper (12' lane)
25	120	100	155	100
35	130	110	175	110
45	215	135	215	135
55	320	160	320	160

Note: Taper lengths are rounded up to closest 5 feet. Per figures 9-6 and 9-7 of OHDM (2003).

The functional classification for US 101 from mp 136.25 to 146.5 is Urban Principal Arterial. The OHDM design standard assumed for US 101 is the ODOT 4R/New Urban Standards for Urban Fringe/Suburban Area. US 101 is assumed to remain the same as the existing cross section from Pacific Way north, and a three lane section south of 35th Street.

Speeds on US 101 segments designated as follows:

- Hubert to 40th =35 mph
- 40th to 50th = 45 mph
- 50th to 62nd = 55 mph

Modeling Assumptions

Synchro model previously developed including assumptions that may deviate from ODOT's current Analysis Procedures Manual (APM).

- Truck percentages were calculated from count data and applied to the approaches. Percentages for new intersections were developed by review adjacent intersection data.
- A PHF of 0.95 was used for US 101 approaches and 0.85 for minor street approaches.
- A saturation flow rate of 1750 pcphgl is used.
- ODOT provided signal timing for existing intersections was utilized and optimized. New signalized intersections were coded as actuated and uncoordinated. All intersection timing was optimized.

Parametrix ENGINEERING • PLANNING • ENVIRONMENTAL SCIENCES

700 NE MULTNOMAH, SUITE 1000
PORTLAND, OR 97232-4110
T. 503.233.2400 T. 360.694.5020 F. 503.233.4825
www.parametrix.com

TECHNICAL MEMORANDUM

Date:	July 31, 2009
To:	John DeTar, Derrick Tokos, Doug Norval, Dorothy Upton, Matt Spangler
From:	Shelley Oylear
Subject:	Task 9 -ATR Data Findings for 30 HV and Average Traffic Conditions-Final
Project Number:	274-2395-051-Ph 04
Project Name:	Newport TSP Update - Alternative Mobility Standards

Task 9 of the Newport TSP Update requires that traffic volume data and projections be evaluated for two time periods: the 30th highest hour of traffic (30 HV), and average weekday peak hour traffic. This memorandum attempts to identify when these time periods occur so that they can be used as a basis for further traffic analysis and the development of alternative mobility standards. Data from an ODOT Automatic Traffic Recorder (ATR) located to the north of Newport was reviewed to assist in identifying the days and times when these volumes occur. The following data summary and findings have been compiled for your review.

The 2007 ATR Trend Summary for ATR 21-009, located at on US 101 at the intersection of 25th Street north of most of the City of Newport, was consulted to assess existing traffic conditions. This data indicates that traffic volumes during the months of June through September range from 9 to 25 percent higher than the Annual Average Daily Traffic (AADT). June through September volumes represent a seasonal traffic condition, while the remaining months of October through May represents an off-season traffic condition. From here forward the traffic periods that will be used in developing alternative mobility standards will be referred to as Seasonal Traffic (June-September), and Off-Season Traffic (October-May). Data will also be summarized for Annual (January – December) traffic conditions. The 2007 ATR Trend summaries were used for this assessment as 2008 Trend summaries are not yet available.

To determine the day and time period that is represented by the 30 HV and the average peak hour, data from ATR 21-009 was provided by TPAU for 2008. This data included traffic volume counts by hour for a total of 342 days during that year.

The 30 HV for the Seasonal, Off-Season and Annual time periods are included in Table 1 below. The 50th highest hourly volume (50 HV) was added to the table as an additional reference point for unusual variations in the data. The full lists of data are included in the attached tables following this memorandum.

Table 1: 30 HV and 50 HV Summary

Period	Month	Day of Week	Hour	Total Volume
Annual-30 HV	July	Saturday	15	1994
Annual-50 HV	August	Sunday	14	1966
Seasonal 30 HV	August	Tuesday	16	1993
Seasonal 50 HV	August	Tuesday	19	1958
Off-Season 30 HV	March	Friday	16	1782
Off-Season 50 HV	May	Friday	17	1742

Note: Time based on a 24 hour clock.

Both the Seasonal and Off-Season 30 HV occur on a weekday at 16.00 hours or 4 pm, while the Annual 30 HV occurs on a weekend day during the mid-afternoon.

The 2007 ATR Trend summary data for the Newport ATR indicates that the Seasonal average as percent of ADT is 117 percent, while the Annual average is 100 percent of ADT. Therefore the Seasonal average is 1.17 times the Annual average or 17 percent higher. The Off-Season 30 HV is approximately 9 percent lower than the Annual and Seasonal 30 HV or 26% lower than the Seasonal average.

Because the occurrence of 30 HV and 50 HV as individual hours does not allow the ready identification of a specific time period to be used for transportation analysis, consideration was give to the aggregated top 30 and top 50 highest hourly volumes. The data is summarized in Table 2 which illustrates the number and percentages of times when the aggregated top 30 and 50 HVs occur on a weekday (Monday thru Thursday) versus a weekend (Friday thru Sunday) day.

Table 2: Day of Week Occurrences –Includes Top 30 HV and 50 HV

Time Period	Weekday Peak Hour Occurrences	Weekday Peak Hour Occurrences as Percent of Total	Weekend (Fri-Sun) Peak Hour Occurrences	Weekend (Fri-Sun) Peak Hour Occurrences as Percent of Total
Annual-1st thru 30th HV	6	20%	24	80%
Annual-1st thru 50th HV	20	40%	30	60%
Seasonal 1st thru 30th HV	8	26%	22	74%
Seasonal 1st thru 50th HV	22	44%	28	56%
Off-Season 1st thru 30th HV	11	36%	19	64%
Off-Season 1st thru 50th HV	11	22%	39	78%

Note: Includes all time hours during a typical day. Annual period excludes nationally observed holidays that fall on Monday thru Friday and if it occurs on a Friday, then also excludes the preceding Thursday.

For all the time periods, the peak hour commonly occurred on a weekend day.

Table 3 summarizes occurrences of the top 30 HVs over the course of the year by hour of the day and weekday versus weekend day.

Table 3: Peak Hour Occurrences for Annual Period-Includes Top 30 HV

Hour	Weekday (Mon-Thur)		Weekend (Fri- Sun)	
	Number of Occurrences	Occurrences as Percent of Total	Number of Occurrences	Occurrences as Percent of Total
14	2	7%	2	7%
15	1	3%	6	20%
16	0	0%	4	13%
17	0	0%	6	20%
18	3	10%	5	17%
19	0	0%	1	3%
Total	6	20%	24	80%

Note: Time based on a 24 hour clock. 16 and 17 represent the two hour PM peak period. Annual period excludes nationally observed holidays that fall on Mon-Fri and if it occurs on a Friday, then also excludes the preceding Thursday.

Table 4 summarizes occurrences of the top 30 HVs during the period from June to September by hour of the day and weekday versus weekend day.

Table 4: Peak Hour Occurrences for Seasonal Period-Includes Top 30 HV

Hour	Weekday (Mon-Thur)		Weekend (Fri- Sun)	
	Number of Occurrences	Occurrences as Percent of Total	Number of Occurrences	Occurrences as Percent of Total
14	2	7%	2	7%
15	1	3%	5	17%
16	1	3%	3	10%
17	0	0%	6	20%
18	4	13%	5	17%
19	0	0%	1	3%
Total	8	26%	22	74%

Note: Time based on a 24 hour clock. 16 and 17 represent the two hour PM peak period.

Table 5 summarizes occurrences of the top 30 HVs during the period from October to May by hour of the day and weekday versus weekend day.

Table 5: Peak Hour Occurrences for Off-Season Period-Includes Top 30 HV

Hour	Weekday (Mon-Thur)		Weekend (Fri- Sun)	
	Number of Occurrences	Occurrences as Percent of Total	Number of Occurrences	Occurrences as Percent of Total
14	1	3%	3	10%
15	3	10%	5	17%
16	1	3%	6	20%
17	2	7%	3	10%
18	4	13%	2	7%
19	0	0%	0	0%
Total	11	36%	19	64%

Note: Time based on a 24 hour clock. 16 and 17 represent the two hour PM peak period.

Conclusions:

1. Review of the top 30 highest hourly volumes at ATR 21-009 in 2008 indicates that there are many instances when high volumes occur both on weekdays and on weekends. Table 1 under Annual 30 HV identifies Saturday at 3 PM as the 30th HV; however the volumes during this time period are very close to the 30th HV volumes for the Seasonal period which occur on a weekday in the pm peak. Thus, consistent with this data, and with the prior TSP traffic analysis that focused on a weekday PM peak, it was determined that the 30th highest hourly volume (30 HV) will represent a summertime weekday PM peak hour (typically occurring between 5 and 6 PM).
2. Based on the ATR summary data the Seasonal period volumes are 17 percent higher than the Annual volumes. We propose that the Annual Average Peak Hour volume be determined by reducing the Seasonal volumes by 13 percent.

APPENDIX B

Yaquina Bay Bridge Capacity Calculation

2000 HCM Chapter 20 Rolling Terrain Methodology

Variables		
PHF=	0.95	
fg=	0.99	Exhibit 20-7
Equation 20-4		
Pt	0.04	
Et	1.5	
Pr	0	
Er	0	
fhv=1/(1+Pt(Et-1) +Pr(Er-1)		
fhv=	0.98	
Capacity=1700*PHF*fg*fhv		
Capacity =	1568	v/h

1994 HCM Chapter 8 Rolling Terrain Methodology

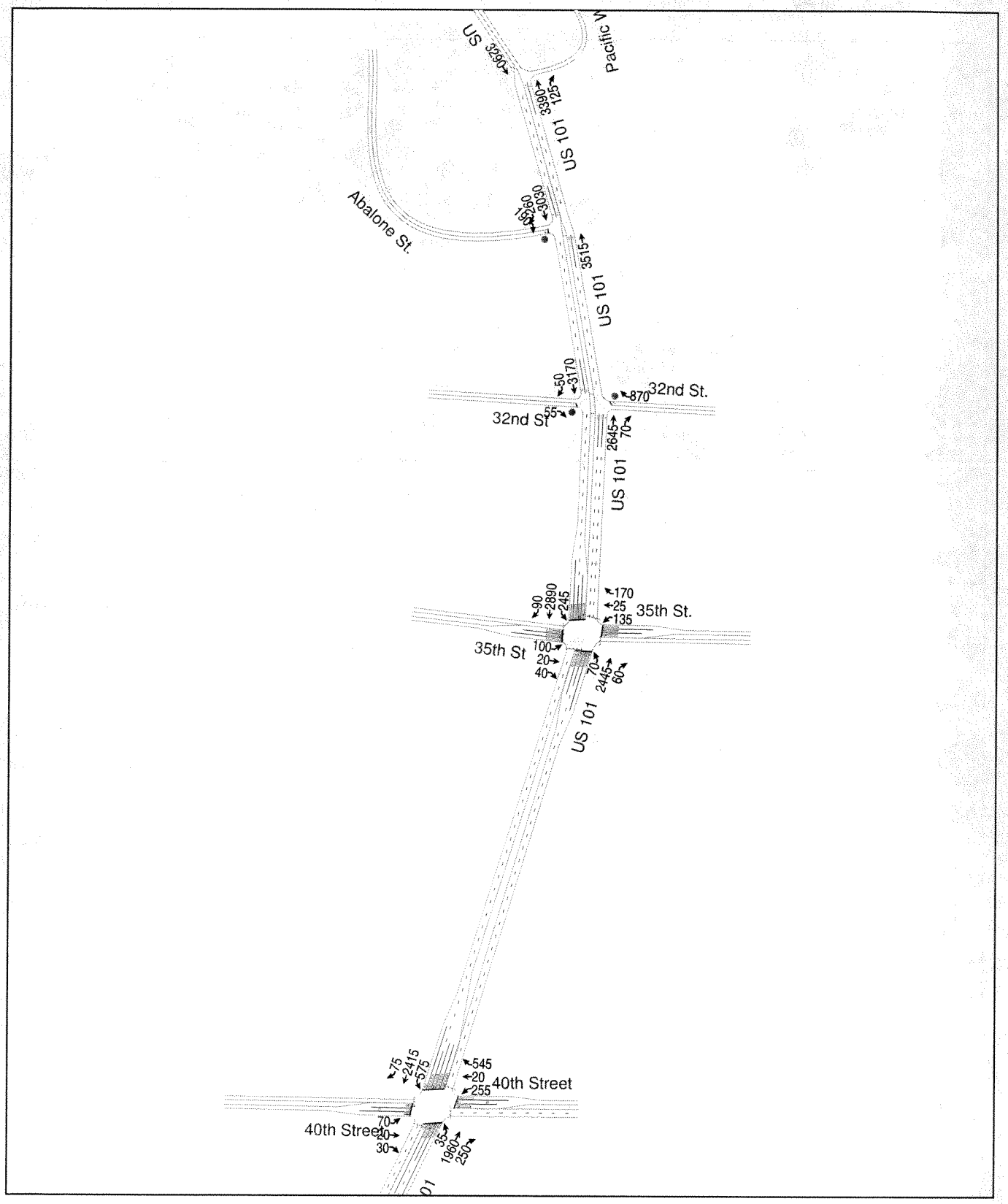
Variables		
PHF=	0.95	
fg=	0.99	Equation 8-4
fw=	0.88	Table 8-5
Equation 8-1 Modified		
Pt	0.04	
Et (1)	3.25	
Pr	0	
Er	0	
fhv=1/(1+Pt(Et-1) +Pr(Er-1)		
fhv=	0.92	
fg=1/(1+(Pplp))		
lp=0.02(E-Eo)		
E	1.3	Table 8-9
Eo	2	
lp	0.014	
fg	0.99	
Capacity=1700*PHF*fg*fhv*Fw		
Capacity =	1287	v/h

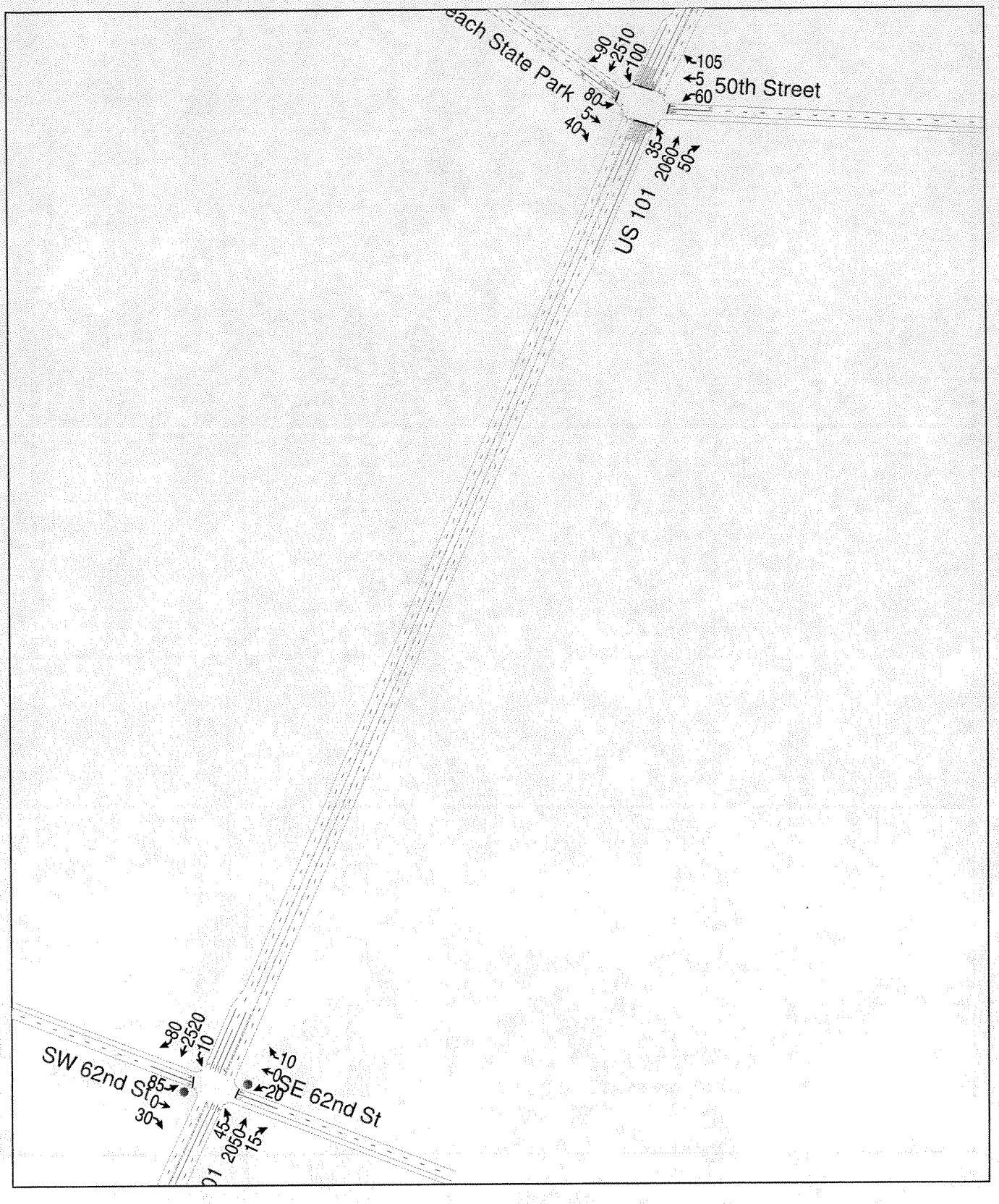
(1) Average of 1994 and 2000 HCM methods

APPENDIX C

2030 Traffic Volumes and Traffic Operations Analysis for 30 HV Conditions and Land Use Scenario #1

2030 Scenario 1-30 HV




each State Park
90
2510
100
105
5
60
50th Street
80
5
40
35
2060
50
US 101
80
2520
10
SW 62nd St
85
0
30
10
0
20
SE 62nd St
45
2050
15

Preliminary Signal Warrant Calculation						
Project:	Newport Alternate Mobility Standard					
Year:	2030					
Alternative	Scenario 1 & Scenario 2					
Percentage of Standard:	70%					
Intersection:	62nd / US 101 - Scen 1 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	47500	Yes	
	Minor	1	1850	850	NO	
Case B	Major	2	11100	47500	YES	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 - Scen 1 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	39400	Yes	
	Minor	1	1850	700	NO	
Case B	Major	2	11,100	39400	Yes	
	Minor	1	950	700	NO	
Intersection:	62nd / US 101 - Scen 1 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	35200	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	35,200	Yes	
	Minor	1	950	650	NO	
Intersection:	62nd / US 101 - Scen 2 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	45750	Yes	
	Minor	1	1850	1850	NO	
Case B	Major	2	11100	45750	Yes	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 - Scen 2 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	38000	Yes	
	Minor	1	1850	700	NO	
Case B	Major	2	11100	38000	Yes	
	Minor	1	950	700	NO	
Intersection:	62nd / US 101 - Scen 2 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	33900	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	33900	Yes	
	Minor	1	950	650	NO	

HCM Signalized Intersection Capacity Analysis
5: 35th St & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	20	40	135	25	170	70	2445	60	245	2890	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1748	1733	1449	1714	1699	1421	1722	3228	1405	1722	3228	1405
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1359	1733	1449	1338	1699	1421	1722	3228	1405	1722	3228	1405
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	118	24	47	159	29	200	74	2574	63	258	3042	95
RTOR Reduction (vph)	0	0	35	0	0	142	0	0	10	0	0	12
Lane Group Flow (vph)	118	24	12	159	29	58	74	2574	53	258	3042	83
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	18.7	18.7	18.7	18.7	18.7	18.7	4.0	93.0	93.0	15.3	104.3	104.3
Effective Green, g (s)	18.2	18.2	18.2	18.2	18.2	18.2	4.5	93.5	93.5	15.8	104.8	105.3
Actuated g/C Ratio	0.13	0.13	0.13	0.13	0.13	0.13	0.03	0.67	0.67	0.11	0.75	0.75
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	177	225	188	174	221	185	55	2156	938	194	2416	1057
v/s Ratio Prot		0.01			0.02		0.04	c0.80		0.15	c0.94	
v/s Ratio Perm	0.09		0.01	c0.12		0.04			0.04			0.06
v/c Ratio	0.67	0.11	0.06	0.91	0.13	0.31	1.35	1.19	0.06	1.33	1.26	0.08
Uniform Delay, d1	58.0	53.7	53.4	60.1	53.9	55.2	67.8	23.3	8.0	62.1	17.6	4.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.71	0.19	0.14	1.00	1.00	1.00
Incremental Delay, d2	10.0	0.3	0.2	44.6	0.4	1.3	166.2	87.7	0.0	179.4	120.1	0.1
Delay (s)	68.0	54.0	53.6	104.7	54.3	56.6	214.3	92.1	1.1	241.5	137.7	4.7
Level of Service	E	D	D	F	D	E	F	F	A	F	F	A
Approach Delay (s)		62.7			76.1			93.4			141.9	
Approach LOS		E			E			F			F	

Intersection Summary			
HCM Average Control Delay	116.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	116.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: 40th Street & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	20	30	255	20	545	35	1960	250	575	2415	75
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1739	1716	1458	1713	1716	1421	1739	3228	1421	3340	3228	1458
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1357	1716	1458	1337	1716	1421	1739	3228	1421	3340	3228	1458
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	82	24	35	300	24	641	37	2063	263	605	2542	79
RTOR Reduction (vph)	0	0	26	0	0	176	0	0	61	0	0	12
Lane Group Flow (vph)	82	24	9	300	24	465	37	2063	202	605	2542	67
Confl. Peds. (#/hr)				2		2			2	2		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	3%	3%	3%	3%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	35.0	35.0	35.0	34.5	34.5	34.5	3.2	72.7	72.7	19.8	89.3	89.3
Effective Green, g (s)	35.0	35.0	35.0	34.0	34.0	34.0	3.7	73.2	73.2	20.3	89.8	89.8
Actuated g/C Ratio	0.25	0.25	0.25	0.24	0.24	0.24	0.03	0.52	0.52	0.15	0.64	0.64
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	339	429	365	325	417	345	46	1688	743	484	2071	935
v/s Ratio Prot		0.01			0.01		0.02	c0.64		0.18	c0.79	
v/s Ratio Perm	0.06		0.01	0.22		c0.33			0.14			0.05
v/c Ratio	0.24	0.06	0.02	0.92	0.06	1.35	0.80	1.22	0.27	1.25	1.23	0.07
Uniform Delay, d1	41.9	39.9	39.6	51.7	40.7	53.0	67.8	33.4	18.6	59.8	25.1	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.14	0.65	0.31	0.88	0.72	0.97
Incremental Delay, d2	0.4	0.1	0.0	31.1	0.1	174.1	32.1	102.3	0.4	114.1	102.8	0.0
Delay (s)	42.3	40.0	39.6	82.8	40.8	227.1	109.0	124.1	6.1	167.0	120.7	9.1
Level of Service	D	D	D	F	D	F	F	F	A	F	F	A
Approach Delay (s)		41.2			177.6			110.7			126.7	
Approach LOS		D			F			F			F	

Intersection Summary			
HCM Average Control Delay	126.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: South Beach State Park & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	5	40	60	5	105	35	2060	50	100	2510	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	3.5	4.0		4.0	4.0		3.5	3.5	4.0	4.0	3.5	3.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1608	1452		1630	1470		1614	3228	1458	1630	3228	1403
Flt Permitted	0.44	1.00		0.72	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	750	1452		1239	1470		1614	3228	1458	1630	3228	1403
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.85	0.85	0.95	0.95
Adj. Flow (vph)	94	6	47	71	6	124	37	2168	59	118	2642	95
RTOR Reduction (vph)	0	42	0	0	110	0	0	0	16	0	0	12
Lane Group Flow (vph)	94	11	0	71	20	0	37	2168	43	118	2642	83
Confl. Peds. (#/hr)	2		2				2					2
Heavy Vehicles (%)	3%	2%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	16.0	16.0		16.0	16.0		3.2	101.0	101.0	11.0	108.8	108.8
Effective Green, g (s)	16.5	16.0		16.0	16.0		3.7	101.5	101.0	11.0	109.3	109.3
Actuated g/C Ratio	0.12	0.11		0.11	0.11		0.03	0.72	0.72	0.08	0.78	0.78
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	88	166		142	168		43	2340	1052	128	2520	1095
v/s Ratio Prot		0.01			0.01		0.02	c0.67		0.07	c0.82	
v/s Ratio Perm	c0.13			0.06					0.03			0.06
v/c Ratio	1.07	0.07		0.50	0.12		0.86	0.93	0.04	0.92	1.05	0.08
Uniform Delay, d1	61.8	55.3		58.2	55.7		67.9	16.1	5.6	64.1	15.4	3.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.27	0.33	0.06
Incremental Delay, d2	115.7	0.2		2.8	0.3		85.1	7.8	0.1	10.1	23.1	0.0
Delay (s)	177.4	55.5		61.0	56.0		153.0	24.0	5.7	91.5	28.2	0.2
Level of Service	F	E		E	E		F	C	A	F	C	A
Approach Delay (s)		133.5			57.8			25.6			29.9	
Approach LOS		F			E			C			C	

Intersection Summary			
HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	100.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Pacific Way & US 101

2030 Scenario 1-30 HV

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	3390	125	0	3290
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	3568	132	0	3463
Pedestrians	2		2			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	7036	3572			3702	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	7036	3572			3702	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	0	7			59	

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	3568	132	3463
Volume Left	0	0	0
Volume Right	0	132	0
cSH	1700	1700	1700
Volume to Capacity	2.10	0.08	2.04
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	204.4%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Abalone St. & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	190	0	3515	3030	260
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	224	0	3700	3189	274
Pedestrians	2			2	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1246		
pX, platoon unblocked	0.36					
vC, conflicting volume	5043	3193	3465			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8646	3193	3465			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	0	7	71			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	224	1850	1850	3189	274
Volume Left	0	0	0	0	0
Volume Right	224	0	0	0	274
cSH	7	1700	1700	1700	1700
Volume to Capacity	31.96	1.09	1.09	1.88	0.16
Queue Length 95th (ft)	Err	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0
Lane LOS	F				
Approach Delay (s)	Err	0.0		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	302.6		
Intersection Capacity Utilization	192.8%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: 32nd St & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	55	0	0	870	0	2645	70	0	3170	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	65	0	0	1024	0	2784	74	0	3337	53
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								700				
pX, platoon unblocked	0.35	0.35		0.35	0.35	0.35				0.35		
vC, conflicting volume	5783	6225	1699	4521	6178	1396	3391			2860		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10959	12224	1699	7351	12089	0	3391			2599		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	21	100	100	0	100			100		
cM capacity (veh/h)	0	0	82	0	0	378	77			56		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	65	1024	1392	1392	74	2225	1165
Volume Left	0	0	0	0	0	0	0
Volume Right	65	1024	0	0	74	0	53
cSH	82	378	1700	1700	1700	1700	1700
Volume to Capacity	0.79	2.71	0.82	0.82	0.04	1.31	0.69
Queue Length 95th (ft)	99	2130	0	0	0	0	0
Control Delay (s)	135.7	798.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	F					
Approach Delay (s)	135.7	798.3	0.0			0.0	
Approach LOS	F	F					

Intersection Summary			
Average Delay	112.6		
Intersection Capacity Utilization	144.8%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: SW 62nd St & US 101

2030 Scenario 1-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	85	0	30	20	0	10	45	2050	15	10	2520	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	100	0	35	24	0	12	47	2158	16	11	2653	84
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3863	4946	1330	3647	5022	1091	2739			2176		
vC1, stage 1 conf vol	2676	2676		2263	2263							
vC2, stage 2 conf vol	1187	2270		1385	2760							
vCu, unblocked vol	3863	4946	1330	3647	5022	1091	2739			2176		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	76	3	100	94	66			96		
cM capacity (veh/h)	21	27	146	24	0	211	141			238		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	100	35	24	12	47	1439	735	11	1326	1326	84
Volume Left	100	0	24	0	47	0	0	11	0	0	0
Volume Right	0	35	0	12	0	0	16	0	0	0	84
cSH	21	146	24	211	141	1700	1700	238	1700	1700	1700
Volume to Capacity	4.86	0.24	0.97	0.06	0.34	0.85	0.43	0.04	0.78	0.78	0.05
Queue Length 95th (ft)	Err	23	73	4	34	0	0	3	0	0	0
Control Delay (s)	Err	37.4	401.2	23.1	42.8	0.0	0.0	20.9	0.0	0.0	0.0
Lane LOS	F	E	F	C	E			C			
Approach Delay (s)	7400.3		275.2		0.9			0.1			
Approach LOS	F		F								

Intersection Summary			
Average Delay	197.2		
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		

2030 US 101 Segment V/C Analysis

Volumes

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3515	3225	2960	2700	2640	2400
35th to 50th	2245	3065	1870	2565	1665	2285
50th to 62nd	2145	2610	1790	2185	1590	1950

V/C

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.70	2.48	2.28	2.08	2.03	1.85
35th to 50th	0.64	0.88	0.53	0.73	0.48	0.65
50th to 62nd	0.61	0.75	0.51	0.62	0.45	0.56

Volumes

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3355	3125	2830	2615	2525	2330
35th to 50th	2125	2965	1770	2480	1585	2215
50th to 62nd	2035	2540	1700	2135	1515	1900

V/C

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.58	2.40	2.18	2.01	1.94	1.79
35th to 50th	0.61	0.85	0.51	0.71	0.45	0.63
50th to 62nd	0.58	0.73	0.49	0.61	0.43	0.54

Queues
5: 35th St & US 101

2030 Scenario 1-30 HV

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	118	24	47	159	29	200	74	2574	63	258	3042	95
v/c Ratio	0.61	0.10	0.19	0.83	0.12	0.59	1.14	1.25	0.07	1.30	1.32	0.09
Control Delay	61.6	44.8	14.4	82.2	45.2	19.4	119.1	125.3	0.8	180.7	162.4	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.6	44.8	14.4	82.2	45.2	19.4	119.1	125.3	0.8	180.7	162.4	4.3
Queue Length 50th (ft)	86	16	0	120	20	27	~68	~1307	2	~278	~1615	14
Queue Length 95th (ft)	141	40	32	#208	46	89	m48	m#191	m1	m123	m273	m6
Internal Link Dist (ft)		441			300			1419			620	
Turn Bay Length (ft)	120		155	120		155	130		175	130		175
Base Capacity (vph)	210	267	263	207	262	354	65	2058	908	198	2309	1025
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.09	0.18	0.77	0.11	0.56	1.14	1.25	0.07	1.30	1.32	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
4: 40th Street & US 101

2030 Scenario 1-30 HV

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	82	24	35	300	24	641	37	2063	263	605	2542	79
v/c Ratio	0.23	0.05	0.08	0.87	0.05	1.17	0.57	1.28	0.34	1.32	1.28	0.09
Control Delay	36.4	33.2	11.1	67.7	34.0	122.1	77.9	149.2	3.1	183.1	150.2	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	33.2	11.1	67.7	34.0	122.1	77.9	149.2	3.1	183.1	150.2	7.7
Queue Length 50th (ft)	50	14	0	223	14	~447	28	~1060	11	~311	~1331	13
Queue Length 95th (ft)	88	34	23	#347	35	#608	m32	m#1153	m13	m#203	m#731	m9
Internal Link Dist (ft)		558			358			3870			1419	
Turn Bay Length (ft)	120		155	120		155	215		215	130		175
Base Capacity (vph)	362	458	414	346	443	546	65	1614	780	459	1980	908
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.05	0.08	0.87	0.05	1.17	0.57	1.28	0.34	1.32	1.28	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	94	53	71	130	37	2168	59	118	2642	95
v/c Ratio	0.87	0.22	0.42	0.49	0.61	0.95	0.05	0.89	1.08	0.09
Control Delay	108.2	17.9	56.2	27.8	95.1	27.9	1.6	57.8	45.7	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.2	17.9	56.2	27.8	95.1	27.9	1.6	57.8	45.7	0.1
Queue Length 50th (ft)	72	4	51	37	29	737	0	95	~1254	0
Queue Length 95th (ft)	#156	38	94	91	#85	#1023	11	m79	m88	m0
Internal Link Dist (ft)		573		801		2367			3870	
Turn Bay Length (ft)					150		320	215		150
Base Capacity (vph)	115	251	179	280	61	2272	1125	133	2450	1080
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.21	0.40	0.46	0.61	0.95	0.05	0.89	1.08	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Arterial Level of Service: NE US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
50th Street	II	55	44.9	27.9	72.8	0.69	33.9	B
40th Street	II	45	59.8	149.2	209.0	0.75	12.9	F
35th St.	II	35	31.2	125.3	156.5	0.28	6.5	F
Hurbert St	II	31	200.2	794.3	994.5	1.73	6.2	F
Total	II		336.1	1096.7	1432.8	3.44	8.7	F

Arterial Level of Service: SB US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Hurbert St	III	30	21.9	769.8	791.7	0.16	0.7	F
35th St	III	31	200.2	162.4	362.6	1.73	17.1	D
40th Street	III	35	34.1	150.2	184.3	0.28	5.5	F
South Beach State Pa	III	55	49.0	45.7	94.7	0.75	28.4	B
Total	III		305.2	1128.1	1433.3	2.92	7.3	F

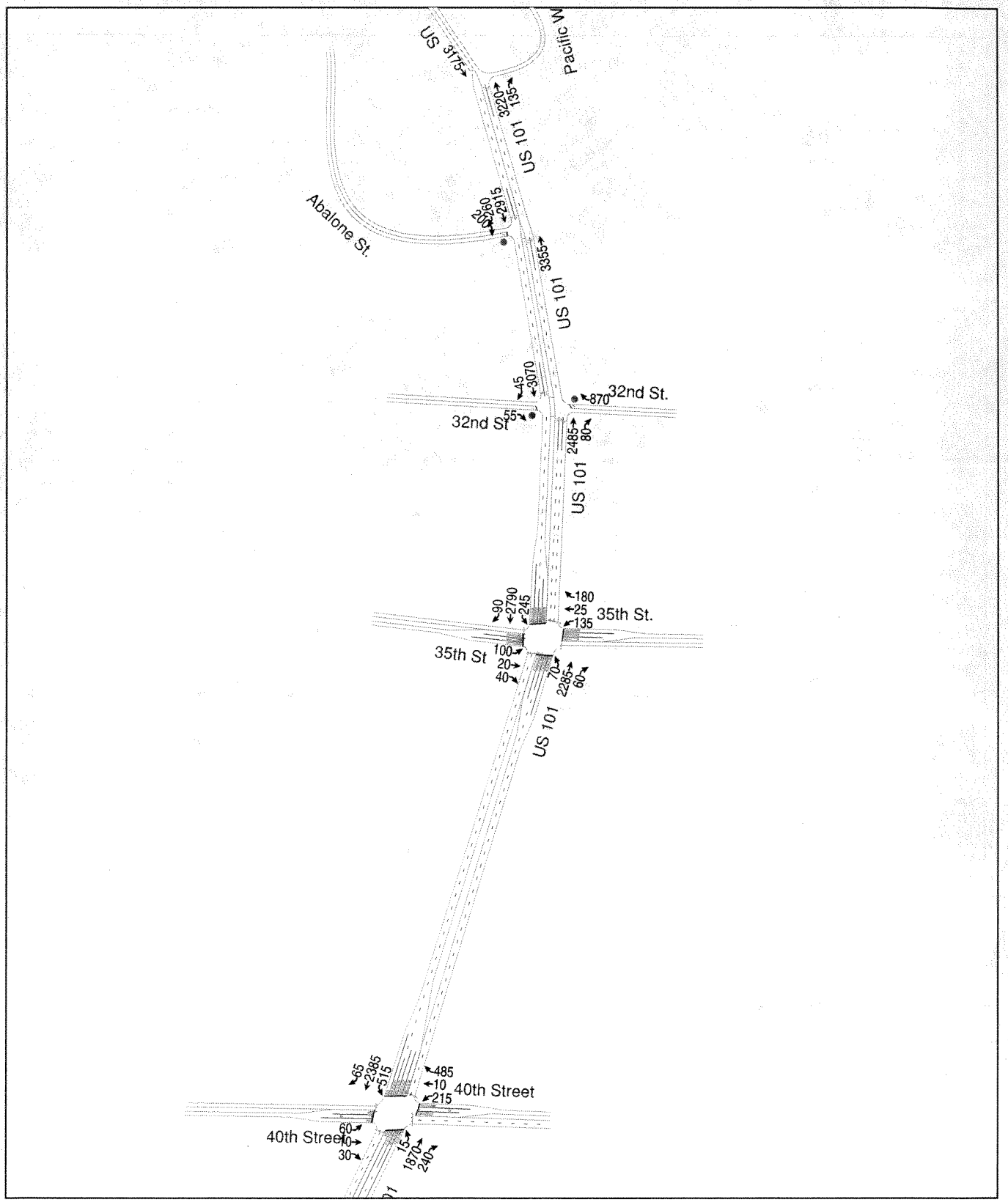
US 101

Direction	NB	SB	All
Average Speed (mph)	8	8	8
Total Travel Time (hr)	1228	1311	2540
Distance Traveled (mi)	9663	10318	19981
Unserved Vehicles (#)	3069	3682	6751
Performance Index	1018.4	1068.0	2086.5

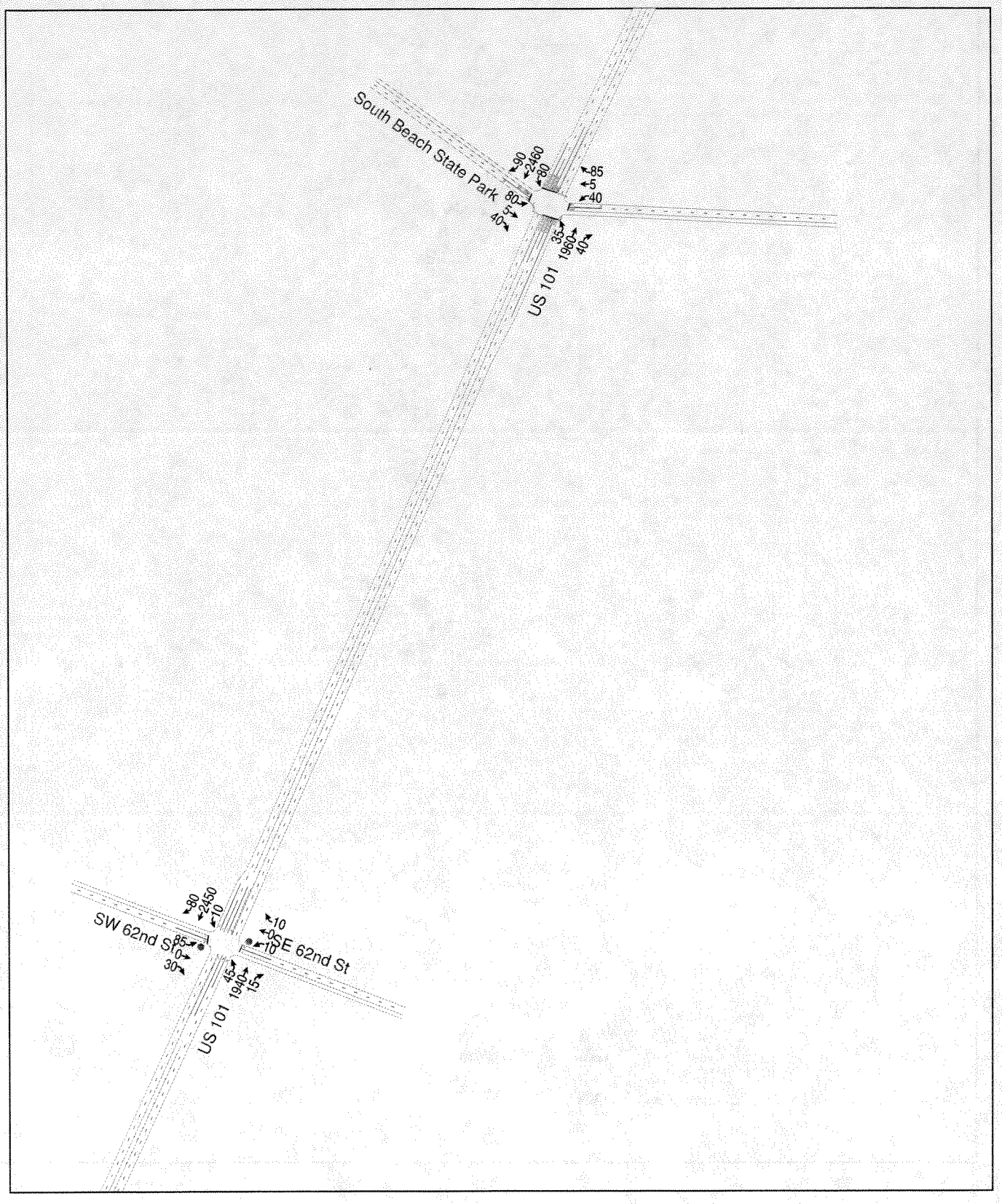
APPENDIX D

2030 Volumes and Traffic Operations Analysis for 30 HV Conditions and Land Use Scenario #2

2030 Scenario2-30 HV



2030 Scenario2-30 HV



Preliminary Signal Warrant Calculation						
Project:	Newport Alternate Mobility Standard					
Year:	2030					
Alternative	Scenario 1 & Scenario 2					
Percentage of Standard:	70%					
Intersection:	62nd / US 101 - Scen 1 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	47500	Yes	
	Minor	1	1850	850	NO	
Case B	Major	2	11100	47500	Yes	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 - Scen 1 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	39400	Yes	
	Minor	1	1850	700	NO	
Case B	Major	2	11,100	39400	Yes	
	Minor	1	950	700	No	
Intersection:	62nd / US 101 - Scen 1 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	35200	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	35,200	Yes	
	Minor	1	950	650	NO	
Intersection:	62nd / US 101 - Scen 2 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	45750	Yes	
	Minor	1	1850	1850	NO	
Case B	Major	2	11100	45750	Yes	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 - Scen 2 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	38000	Yes	
	Minor	1	1850	700	No	
Case B	Major	2	11100	38000	Yes	
	Minor	1	950	700	NO	
Intersection:	62nd / US 101 - Scen 2 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	33900	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	33900	Yes	
	Minor	1	950	650	NO	

HCM Signalized Intersection Capacity Analysis
5: 35th St & US 101

2030 Scenario2-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	20	40	135	25	180	70	2285	60	245	2790	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1748	1733	1448	1714	1699	1420	1722	3228	1404	1722	3228	1404
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1358	1733	1448	1338	1699	1420	1722	3228	1404	1722	3228	1404
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	118	24	47	159	29	212	74	2405	63	258	2937	95
RTOR Reduction (vph)	0	0	34	0	0	157	0	0	10	0	0	12
Lane Group Flow (vph)	118	24	13	159	29	55	74	2405	53	258	2937	83
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	19.0	19.0	19.0	19.0	19.0	19.0	4.0	100.0	100.0	18.0	114.0	114.0
Effective Green, g (s)	18.5	18.5	18.5	18.5	18.5	18.5	4.5	100.5	100.5	18.5	114.5	115.0
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.03	0.67	0.67	0.12	0.76	0.77
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	167	214	179	165	210	175	52	2163	941	212	2464	1076
v/s Ratio Prot		0.01			0.02		0.04	c0.75		0.15	c0.91	
v/s Ratio Perm	0.09		0.01	c0.12		0.04			0.04			0.06
v/c Ratio	0.71	0.11	0.07	0.96	0.14	0.31	1.42	1.11	0.06	1.22	1.19	0.08
Uniform Delay, d1	63.1	58.4	58.2	65.4	58.6	60.0	72.8	24.8	8.5	65.8	17.8	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.73	0.23	0.15	1.00	1.00	1.00
Incremental Delay, d2	13.6	0.3	0.2	59.1	0.4	1.4	200.3	51.1	0.0	132.7	90.7	0.1
Delay (s)	76.8	58.8	58.4	124.6	59.1	61.4	253.5	56.7	1.3	198.4	108.5	4.5
Level of Service	E	E	E	F	E	E	F	E	A	F	F	A
Approach Delay (s)		69.9			86.3			61.1			112.5	
Approach LOS		E			F			E			F	

Intersection Summary			
HCM Average Control Delay	89.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: 40th Street & US 101

2030 Scenario2-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	10	30	215	10	485	15	1870	240	515	2385	65
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1739	1716	1458	1712	1716	1420	1739	3228	1420	3340	3228	1458
Flt Permitted	0.75	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1372	1716	1458	1351	1716	1420	1739	3228	1420	3340	3228	1458
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	71	12	35	253	12	571	16	1968	253	542	2511	68
RTOR Reduction (vph)	0	0	27	0	0	173	0	0	58	0	0	9
Lane Group Flow (vph)	71	12	8	253	12	398	16	1968	195	542	2511	59
Confl. Peds. (#/hr)				2		2			2	2		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	3%	3%	3%	3%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	33.0	33.0	33.0	32.5	32.5	32.5	1.6	82.1	82.1	22.4	102.9	102.9
Effective Green, g (s)	33.0	33.0	33.0	32.0	32.0	32.0	2.1	82.6	82.6	22.9	103.4	103.4
Actuated g/C Ratio	0.22	0.22	0.22	0.21	0.21	0.21	0.01	0.55	0.55	0.15	0.69	0.69
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	302	378	321	288	366	303	24	1778	782	510	2225	1005
v/s Ratio Prot		0.01			0.01		0.01	c0.61		0.16	c0.78	
v/s Ratio Perm	0.05		0.01	0.19		c0.28			0.14			0.04
v/c Ratio	0.24	0.03	0.02	0.88	0.03	1.31	0.67	1.11	0.25	1.06	1.13	0.06
Uniform Delay, d1	48.1	46.0	45.9	57.1	46.7	59.0	73.6	33.7	17.5	63.6	23.3	7.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.10	0.68	0.36	0.88	0.65	0.97
Incremental Delay, d2	0.4	0.0	0.0	25.3	0.1	162.6	29.8	52.9	0.4	32.9	58.5	0.0
Delay (s)	48.5	46.0	45.9	82.4	46.8	221.6	110.9	75.8	6.6	88.8	73.6	7.3
Level of Service	D	D	D	F	D	F	F	E	A	F	E	A
Approach Delay (s)		47.5			177.0			68.3			74.8	
Approach LOS		D			F			E			E	

Intersection Summary			
HCM Average Control Delay	85.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: South Beach State Park & US 101

2030 Scenario2-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	5	40	40	5	85	35	1960	40	80	2460	90
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	3.5	4.0		4.0	4.0		3.5	3.5	4.0	4.0	3.5	3.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1607	1452		1630	1473		1614	3228	1458	1630	3228	1402
Flt Permitted	0.52	1.00		0.72	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	881	1452		1237	1473		1614	3228	1458	1630	3228	1402
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.85	0.85	0.95	0.95
Adj. Flow (vph)	94	6	47	47	6	100	37	2063	47	94	2589	95
RTOR Reduction (vph)	0	42	0	0	89	0	0	0	13	0	0	12
Lane Group Flow (vph)	94	11	0	47	17	0	37	2063	34	94	2589	83
Confl. Peds. (#/hr)	2		2				2					2
Heavy Vehicles (%)	3%	2%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	17.2	17.2		17.2	17.2		3.2	109.4	109.4	11.4	117.6	117.6
Effective Green, g (s)	17.7	17.2		17.2	17.2		3.7	109.9	109.4	11.4	118.1	118.1
Actuated g/C Ratio	0.12	0.11		0.11	0.11		0.02	0.73	0.73	0.08	0.79	0.79
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	104	166		142	169		40	2365	1063	124	2542	1104
v/s Ratio Prot		0.01			0.01		0.02	c0.64		0.06	c0.80	
v/s Ratio Perm	c0.11			0.04					0.02			0.06
v/c Ratio	0.90	0.07		0.33	0.10		0.92	0.87	0.03	0.76	1.02	0.08
Uniform Delay, d1	65.3	59.3		61.1	59.5		73.0	14.9	5.6	67.9	16.0	3.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.21	0.41	0.05
Incremental Delay, d2	58.2	0.2		1.4	0.3		112.0	4.8	0.1	2.4	11.0	0.0
Delay (s)	123.6	59.4		62.5	59.8		185.0	19.7	5.7	84.7	17.5	0.2
Level of Service	F	E		E	E		F	B	A	F	B	A
Approach Delay (s)		100.4			60.6			22.2			19.2	
Approach LOS		F			E			C			B	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Pacific Way & US 101

2030 Scenario2-30 HV

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	3220	135	0	3175
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	3389	142	0	3342
Pedestrians	2		2			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	6736	3393			3534	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6736	3393			3534	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	0	10			69	

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	3389	142	3342
Volume Left	0	0	0
Volume Right	0	142	0
cSH	1700	1700	1700
Volume to Capacity	1.99	0.08	1.97
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	194.6%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Abalone St. & US 101

2030 Scenario2-30 HV

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	200	0	3355	2915	260
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	235	0	3532	3068	274
Pedestrians	2			2	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1246		
pX, platoon unblocked	0.36					
vC, conflicting volume	4838	3072	3344			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8137	3072	3344			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	0	9	80			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	235	1766	1766	3068	274
Volume Left	0	0	0	0	0
Volume Right	235	0	0	0	274
cSH	9	1700	1700	1700	1700
Volume to Capacity	27.49	1.04	1.04	1.80	0.16
Queue Length 95th (ft)	Err	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0
Lane LOS	F				
Approach Delay (s)	Err	0.0		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	330.9		
Intersection Capacity Utilization	186.9%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: 32nd St & US 101

2030 Scenario2-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	55	0	0	870	0	2485	80	0	3070	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	65	0	0	1024	0	2616	84	0	3232	47
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								700				
pX, platoon unblocked	0.35	0.35		0.35	0.35	0.35				0.35		
vC, conflicting volume	5591	5959	1643	4300	5899	1312	3281			2702		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10481	11545	1643	6755	11370	0	3281			2140		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	27	100	100	0	100			100		
cM capacity (veh/h)	0	0	89	0	0	374	85			85		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	65	1024	1308	1308	84	2154	1125
Volume Left	0	0	0	0	0	0	0
Volume Right	65	1024	0	0	84	0	47
cSH	89	374	1700	1700	1700	1700	1700
Volume to Capacity	0.73	2.73	0.77	0.77	0.05	1.27	0.66
Queue Length 95th (ft)	91	2141	0	0	0	0	0
Control Delay (s)	113.8	810.1	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	F					
Approach Delay (s)	113.8	810.1	0.0			0.0	
Approach LOS	F	F					

Intersection Summary				
Average Delay	118.4			
Intersection Capacity Utilization	140.0%	ICU Level of Service	H	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
1: SW 62nd St & US 101

2030 Scenario2-30 HV

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	85	0	30	10	0	10	45	1940	15	10	2450	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	100	0	35	12	0	12	47	2042	16	11	2579	84
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3732	4757	1293	3495	4833	1033	2665			2060		
vC1, stage 1 conf vol	2602	2602		2147	2147							
vC2, stage 2 conf vol	1130	2155		1348	2686							
vCu, unblocked vol	3732	4757	1293	3495	4833	1033	2665			2060		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	77	60	100	95	69			96		
cM capacity (veh/h)	23	32	154	29	1	231	151			264		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	100	35	12	12	47	1361	696	11	1289	1289	84
Volume Left	100	0	12	0	47	0	0	11	0	0	0
Volume Right	0	35	0	12	0	0	16	0	0	0	84
cSH	23	154	29	231	151	1700	1700	264	1700	1700	1700
Volume to Capacity	4.32	0.23	0.40	0.05	0.31	0.80	0.41	0.04	0.76	0.76	0.05
Queue Length 95th (ft)	Err	21	32	4	31	0	0	3	0	0	0
Control Delay (s)	Err	35.1	193.7	21.5	39.3	0.0	0.0	19.2	0.0	0.0	0.0
Lane LOS	F	E	F	C	E			C			
Approach Delay (s)	7399.7		107.6		0.9			0.1			
Approach LOS	F		F								

Intersection Summary			
Average Delay	203.7		
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

2030 US 101 Segment V/C Analysis

Volumes

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3515	3225	2960	2700	2640	2400
35th to 50th	2245	3065	1870	2565	1665	2285
50th to 62nd	2145	2610	1790	2185	1590	1950

V/C

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.70	2.48	2.28	2.08	2.03	1.85
35th to 50th	0.64	0.88	0.53	0.73	0.48	0.65
50th to 62nd	0.61	0.75	0.51	0.62	0.45	0.56

Volumes

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3355	3125	2830	2615	2525	2330
35th to 50th	2125	2965	1770	2480	1585	2215
50th to 62nd	2035	2540	1700	2135	1515	1900

V/C

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.58	2.40	2.18	2.01	1.94	1.79
35th to 50th	0.61	0.85	0.51	0.71	0.45	0.63
50th to 62nd	0.58	0.73	0.49	0.61	0.43	0.54

Queues

2: South Beach State Park & US 101

2030 Scenario2-30 HV

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	94	53	47	106	37	2063	47	94	2589	95
v/c Ratio	0.80	0.23	0.29	0.41	0.61	0.91	0.04	0.63	1.05	0.09
Control Delay	92.3	18.1	52.4	20.8	95.1	22.8	1.8	49.1	30.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	92.3	18.1	52.4	20.8	95.1	22.8	1.8	49.1	30.9	0.2
Queue Length 50th (ft)	71	4	33	18	29	638	0	76	~1178	0
Queue Length 95th (ft)	#142	38	68	64	#85	800	10	m69	m106	m0
Internal Link Dist (ft)		573		801		2367			3870	
Turn Bay Length (ft)					150		320	215		150
Base Capacity (vph)	132	251	179	282	61	2262	1117	149	2470	1088
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.21	0.26	0.38	0.61	0.91	0.04	0.63	1.05	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
4: 40th Street & US 101

2030 Scenario2-30 HV

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	71	12	35	253	12	571	16	1968	253	542	2511	68
v/c Ratio	0.24	0.03	0.10	0.90	0.03	1.20	0.25	1.11	0.30	1.18	1.13	0.07
Control Delay	41.4	37.6	12.8	79.8	38.4	135.4	68.5	72.6	1.6	125.3	75.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.4	37.6	12.8	79.8	38.4	135.4	68.5	72.6	1.6	125.3	75.4	5.4
Queue Length 50th (ft)	46	7	0	192	7	~391	12	~920	13	~257	~1139	9
Queue Length 95th (ft)	84	23	25	#316	23	#550	m14	#1050	m14	m172	m357	m7
Internal Link Dist (ft)		558			386			3870			1419	
Turn Bay Length (ft)	120		155	120		155	215		215	130		175
Base Capacity (vph)	297	372	343	282	358	475	65	1775	852	459	2227	1017
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.03	0.10	0.90	0.03	1.20	0.25	1.11	0.30	1.18	1.13	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
5: 35th St & US 101

2030 Scenario2-30 HV

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	118	24	47	159	29	212	74	2405	63	258	2937	95
v/c Ratio	0.61	0.10	0.19	0.83	0.12	0.62	1.14	1.17	0.07	1.30	1.27	0.09
Control Delay	61.6	44.8	14.4	82.2	45.2	21.6	119.7	87.8	0.7	180.0	142.1	4.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.6	44.8	14.4	82.2	45.2	21.6	119.7	87.8	0.7	180.0	142.1	4.3
Queue Length 50th (ft)	86	16	0	120	20	34	~66	~1155	2	~278	~1525	15
Queue Length 95th (ft)	141	40	32	#208	46	100	m#55	m#932	m2	m125	m279	m6
Internal Link Dist (ft)		441			300			1419			620	
Turn Bay Length (ft)	120		155	120		155	130		175	130		175
Base Capacity (vph)	210	267	263	207	262	356	65	2058	908	198	2309	1026
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.09	0.18	0.77	0.11	0.60	1.14	1.17	0.07	1.30	1.27	0.09

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Arterial Level of Service: NE US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	II	55	44.9	22.8	67.7	0.69	36.5	A
40th Street	II	45	59.8	72.6	132.4	0.75	20.3	D
35th St.	II	35	31.2	87.8	119.0	0.28	8.6	F
Hurbert St	II	31	200.2	794.6	994.8	1.73	6.2	F
Total	II		336.1	977.8	1313.9	3.44	9.4	F

Arterial Level of Service: SB US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Hurbert St	III	30	21.9	769.8	791.7	0.16	0.7	F
35th St	III	31	200.2	142.1	342.3	1.73	18.1	C
40th Street	III	35	34.1	75.4	109.5	0.28	9.3	F
South Beach State Pa	III	55	49.0	30.9	79.9	0.75	33.7	A
Total	III		305.2	1018.2	1323.4	2.92	7.9	F

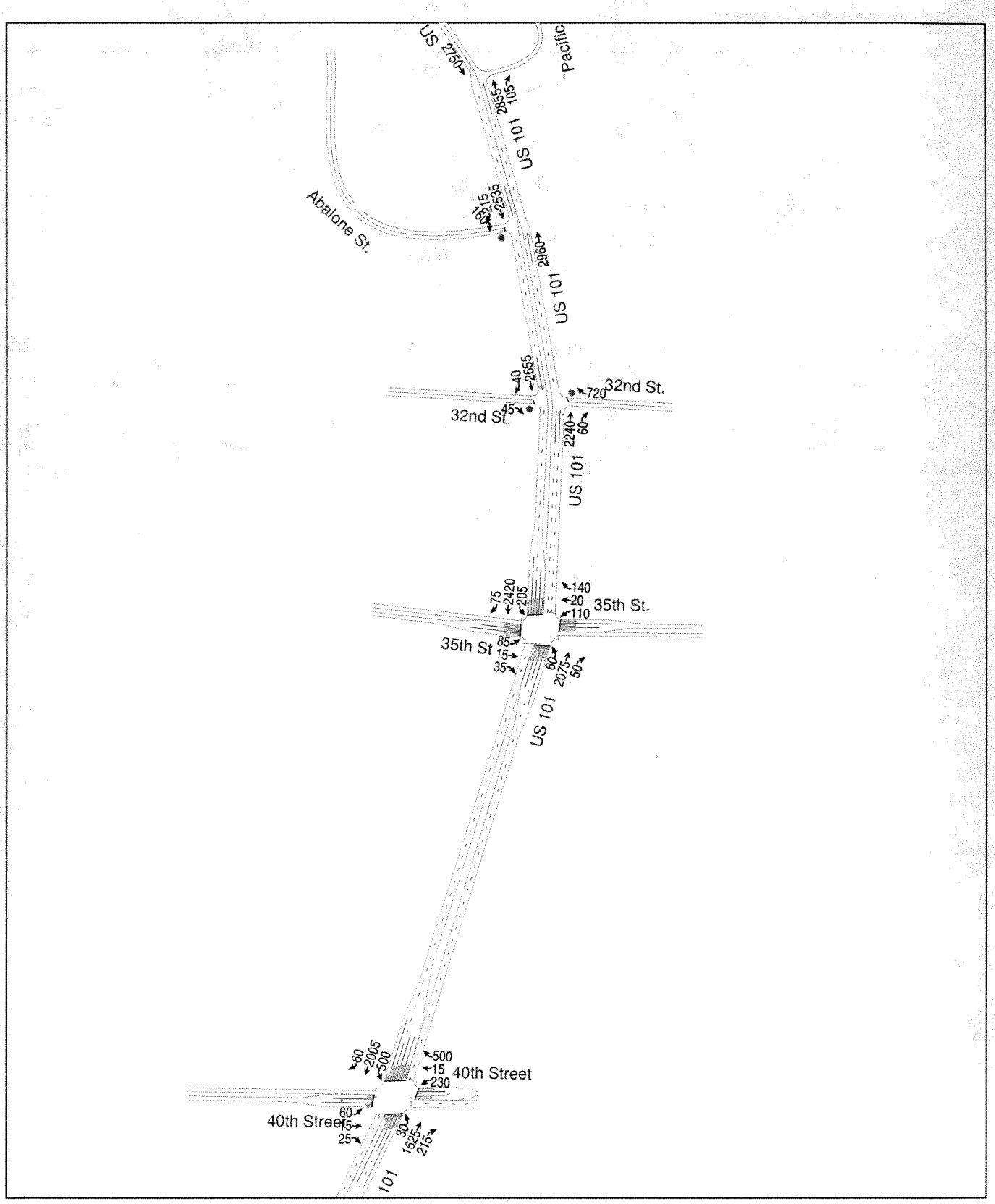
US 101

Direction	NB	SB	All
Average Speed (mph)	8	8	8
Total Travel Time (hr)	1141	1210	2351
Distance Traveled (mi)	9276	10034	19310
Unserved Vehicles (#)	2666	3188	5854
Performance Index	942.8	973.8	1916.7

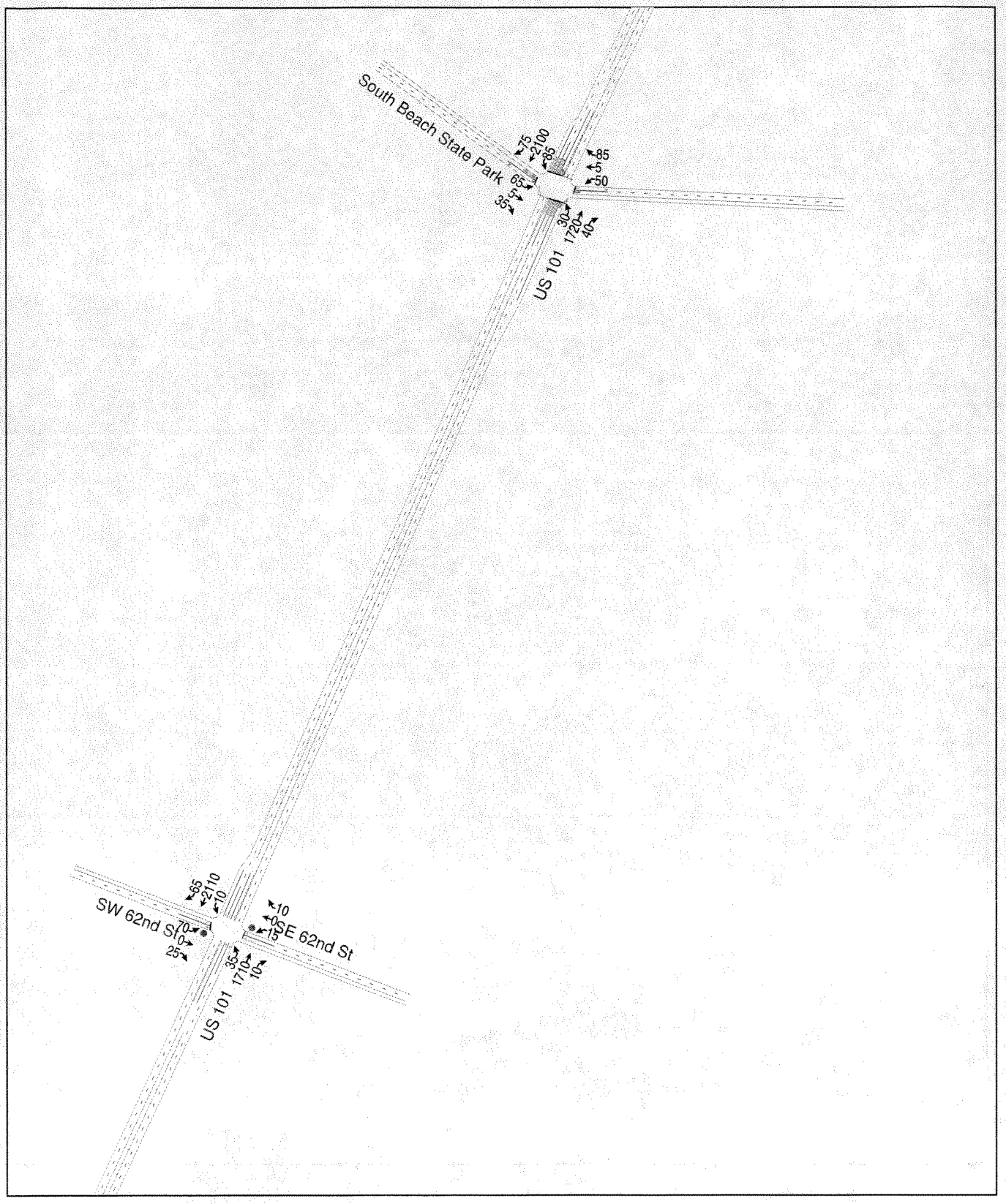
APPENDIX E

2030 Volumes and Traffic Operations Analysis for Average Annual Conditions and Land Use Scenario #1

2030 Scenario 1-Annual Average



2030 Scenario 1-Annual Average



Preliminary Signal Warrant Calculation						
Project:	Newport Alternate Mobility Standard					
Year:	2030					
Alternative	Scenario 1 & Scenario 2					
Percentage of Standard:	70%					
Intersection:	62nd / US 101 – Scen 1 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	47500	Yes	
	Minor	1	1850	850	NO	
Case B	Major	2	11100	47500	Yes	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 – Scen 1 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	39400	Yes	
	Minor	1	1850	700	NO	
Case B	Major	2	11100	39400	Yes	
	Minor	1	950	700	No	
Intersection:	62nd / US 101 – Scen 1 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	35200	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	35,200	Yes	
	Minor	1	950	650	NO	
Intersection:	62nd / US 101 – Scen 2 30 HV					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	45750	Yes	
	Minor	1	1850	1850	NO	
Case B	Major	2	11100	45750	Yes	
	Minor	1	950	850	NO	
Intersection:	62nd / US 101 – Scen 2 AAvg					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	38000	Yes	
	Minor	1	1850	700	NO	
Case B	Major	2	11100	38000	Yes	
	Minor	1	950	700	NO	
Intersection:	62nd / US 101 – Scen 2 Off-Season					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met	
Case A	Major	2	7400	33900	Yes	
	Minor	1	1850	650	NO	
Case B	Major	2	11100	33900	Yes	
	Minor	1	950	650	NO	

HCM Signalized Intersection Capacity Analysis
5: 35th St & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	15	35	110	20	140	60	2075	50	205	2420	75
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	3.5
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1748	1733	1448	1714	1699	1420	1722	3228	1404	1722	3228	1404
Flt Permitted	0.74	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1364	1733	1448	1345	1699	1420	1722	3228	1404	1722	3228	1404
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	100	18	41	129	24	165	63	2184	53	216	2547	79
RTOR Reduction (vph)	0	0	36	0	0	146	0	0	9	0	0	11
Lane Group Flow (vph)	100	18	5	129	24	19	63	2184	44	216	2547	68
Confl. Peds. (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	1%	1%	1%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	17.8	17.8	17.8	17.8	17.8	17.8	5.0	100.0	100.0	19.2	114.2	114.2
Effective Green, g (s)	17.3	17.3	17.3	17.3	17.3	17.3	5.5	100.5	100.5	19.7	114.7	115.2
Actuated g/C Ratio	0.12	0.12	0.12	0.12	0.12	0.12	0.04	0.67	0.67	0.13	0.76	0.77
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	157	200	167	155	196	164	63	2163	941	226	2468	1078
v/s Ratio Prot		0.01			0.01		0.04	c0.68		0.13	c0.79	
v/s Ratio Perm	0.07		0.00	c0.10		0.01			0.03			0.05
v/c Ratio	0.64	0.09	0.03	0.83	0.12	0.12	1.00	1.01	0.05	0.96	1.03	0.06
Uniform Delay, d1	63.4	59.3	58.9	64.9	59.5	59.5	72.2	24.8	8.4	64.7	17.6	4.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.72	0.17	0.15	1.00	1.00	1.00
Incremental Delay, d2	9.2	0.3	0.1	31.1	0.4	0.4	34.0	8.4	0.0	47.1	27.0	0.1
Delay (s)	72.5	59.6	59.0	96.0	59.9	59.9	86.0	12.7	1.3	111.8	44.6	4.4
Level of Service	E	E	E	F	E	E	F	B	A	F	D	A
Approach Delay (s)		67.6			74.6			14.5			48.6	
Approach LOS		E			E			B			D	

Intersection Summary			
HCM Average Control Delay	36.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	100.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: 40th Street & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	15	25	230	15	500	30	1625	215	500	2005	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	14	12	12	14	12	12	14	12	12	14	12	12
Total Lost time (s)	4.0	4.0	4.0	5.0	5.0	5.0	3.5	4.0	4.0	3.5	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1739	1716	1458	1712	1716	1420	1739	3228	1420	3340	3228	1458
Flt Permitted	0.75	1.00	1.00	0.75	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1365	1716	1458	1344	1716	1420	1739	3228	1420	3340	3228	1458
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	71	18	29	271	18	588	32	1711	226	526	2111	63
RTOR Reduction (vph)	0	0	22	0	0	185	0	0	58	0	0	11
Lane Group Flow (vph)	71	18	7	271	18	403	32	1711	168	526	2111	52
Confl. Peds. (#/hr)				2		2			2	2		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	3%	2%	3%	3%	3%	3%	2%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	38.0	38.0	38.0	37.5	37.5	37.5	3.2	77.7	77.7	21.8	96.3	96.3
Effective Green, g (s)	38.0	38.0	38.0	37.0	37.0	37.0	3.7	78.2	78.2	22.3	96.8	96.8
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.02	0.52	0.52	0.15	0.65	0.65
Clearance Time (s)	4.0	4.0	4.0	4.5	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	346	435	369	332	423	350	43	1683	740	497	2083	941
v/s Ratio Prot		0.01			0.01		0.02	c0.53		0.16	c0.65	
v/s Ratio Perm	0.05		0.01	0.20		c0.28			0.12			0.04
v/c Ratio	0.21	0.04	0.02	0.82	0.04	1.15	0.74	1.02	0.23	1.06	1.01	0.06
Uniform Delay, d1	44.1	42.3	42.0	53.3	43.0	56.5	72.7	35.9	19.5	63.8	26.6	9.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.66	0.84
Incremental Delay, d2	0.3	0.0	0.0	15.0	0.1	96.4	50.5	26.2	0.7	31.2	9.7	0.0
Delay (s)	44.4	42.3	42.0	68.3	43.1	152.9	123.1	62.1	20.2	86.6	27.3	8.2
Level of Service	D	D	D	E	D	F	F	E	C	F	C	A
Approach Delay (s)		43.5			124.5			58.3			38.4	
Approach LOS		D			F			E			D	

Intersection Summary			
HCM Average Control Delay	58.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: South Beach State Park & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	5	35	50	5	85	30	1720	40	85	2100	75
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	3.5	4.0		4.0	4.0		3.5	3.5	4.0	4.0	3.5	3.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.87		1.00	0.86		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1610	1459		1630	1473		1614	3228	1458	1630	3228	1408
Flt Permitted	0.64	1.00		0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1081	1459		1246	1473		1614	3228	1458	1630	3228	1408
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.85	0.85	0.95	0.95
Adj. Flow (vph)	76	6	41	59	6	100	32	1811	47	100	2211	79
RTOR Reduction (vph)	0	36	0	0	89	0	0	0	16	0	0	15
Lane Group Flow (vph)	76	11	0	59	17	0	32	1811	31	100	2211	64
Confl. Peds. (#/hr)	2		2				2					2
Heavy Vehicles (%)	3%	2%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	9.6	9.6		9.6	9.6		2.3	56.8	56.8	7.0	61.5	61.5
Effective Green, g (s)	10.1	9.6		9.6	9.6		2.8	57.3	56.8	7.0	62.0	62.0
Actuated g/C Ratio	0.12	0.11		0.11	0.11		0.03	0.67	0.67	0.08	0.73	0.73
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	128	164		140	166		53	2166	970	134	2344	1022
v/s Ratio Prot		0.01			0.01		0.02	c0.56		0.06	c0.68	
v/s Ratio Perm	c0.07			0.05					0.02			0.05
v/c Ratio	0.59	0.06		0.42	0.10		0.60	0.84	0.03	0.75	0.94	0.06
Uniform Delay, d1	35.7	33.9		35.3	34.0		40.8	10.5	4.9	38.3	10.2	3.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.2	0.2		2.0	0.3		17.9	3.0	0.0	20.0	8.6	0.0
Delay (s)	42.9	34.1		37.4	34.3		58.6	13.5	4.9	58.4	18.8	3.4
Level of Service	D	C		D	C		E	B	A	E	B	A
Approach Delay (s)		39.5			35.4			14.0			19.9	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	7.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
8: Pacific Way & US 101

2030 Scenario 1-Annual Average

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	2855	105	0	2750
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	3005	111	0	2895
Pedestrians	2		2			2
Lane Width (ft)	0.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	5904	3009			3118	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	5904	3009			3118	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	0	17			102	

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	3005	111	2895
Volume Left	0	0	0
Volume Right	0	111	0
cSH	1700	1700	1700
Volume to Capacity	1.77	0.07	1.70
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			
Approach Delay (s)	0.0		0.0
Approach LOS			

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	173.8%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Abalone St. & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	160	0	2960	2535	215
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	188	0	3116	2668	226
Pedestrians	2			2	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	0			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1246		
pX, platoon unblocked	0.37					
vC, conflicting volume	4230	2672	2897			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6355	2672	2897			
tC, single (s)	6.9	7.0	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	0	17	122			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	188	1558	1558	2668	226
Volume Left	0	0	0	0	0
Volume Right	188	0	0	0	226
cSH	17	1700	1700	1700	1700
Volume to Capacity	11.34	0.92	0.92	1.57	0.13
Queue Length 95th (ft)	Err	0	0	0	0
Control Delay (s)	Err	0.0	0.0	0.0	0.0
Lane LOS	F				
Approach Delay (s)	Err	0.0		0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	303.6		
Intersection Capacity Utilization	162.7%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
6: 32nd St & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	45	0	0	720	0	2240	60	0	2655	40
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	0	53	0	0	847	0	2358	63	0	2795	42
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								700				
pX, platoon unblocked	0.35	0.35		0.35	0.35	0.35				0.35		
vC, conflicting volume	4846	5241	1422	3812	5199	1183	2839			2423		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	8291	9424	1422	5328	9303	0	2839			1346		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	58	100	100	0	100			100		
cM capacity (veh/h)	0	0	126	0	0	377	129			175		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	53	847	1179	1179	63	1863	974
Volume Left	0	0	0	0	0	0	0
Volume Right	53	847	0	0	63	0	42
cSH	126	377	1700	1700	1700	1700	1700
Volume to Capacity	0.42	2.25	0.69	0.69	0.04	1.10	0.57
Queue Length 95th (ft)	45	1594	0	0	0	0	0
Control Delay (s)	52.7	592.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	F	F					
Approach Delay (s)	52.7	592.3	0.0			0.0	
Approach LOS	F	F					

Intersection Summary			
Average Delay	81.9		
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
1: SW 62nd St & US 101

2030 Scenario 1-Annual Average

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	0	25	15	0	10	35	1710	10	10	2110	65
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	82	0	29	18	0	12	37	1800	11	11	2221	68
Pedestrians		2			2			2			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	3232	4130	1115	3044	4193	909	2291			1813		
vC1, stage 1 conf vol	2244	2244		1881	1881							
vC2, stage 2 conf vol	987	1886		1163	2313							
vCu, unblocked vol	3232	4130	1115	3044	4193	909	2291			1813		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.2			4.2		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	86	67	100	96	83			97		
cM capacity (veh/h)	40	53	203	53	30	279	214			330		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	82	29	18	12	37	1200	611	11	1111	1111	68
Volume Left	82	0	18	0	37	0	0	11	0	0	0
Volume Right	0	29	0	12	0	0	11	0	0	0	68
cSH	40	203	53	279	214	1700	1700	330	1700	1700	1700
Volume to Capacity	2.07	0.14	0.33	0.04	0.17	0.71	0.36	0.03	0.65	0.65	0.04
Queue Length 95th (ft)	221	12	29	3	15	0	0	2	0	0	0
Control Delay (s)	713.5	25.7	102.8	18.5	25.3	0.0	0.0	16.3	0.0	0.0	0.0
Lane LOS	F	D	F	C	D			C			
Approach Delay (s)	532.5		69.1		0.5			0.1			
Approach LOS	F		F								

Intersection Summary			
Average Delay	14.6		
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

2030 US 101 Segment V/C Analysis

Volumes

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3515	3225	2960	2700	2640	2400
35th to 50th	2245	3065	1870	2565	1665	2285
50th to 62nd	2145	2610	1790	2185	1590	1950

V/C

Scenario 1	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.70	2.48	2.28	2.08	2.03	1.85
35th to 50th	0.64	0.88	0.53	0.73	0.48	0.65
50th to 62nd	0.61	0.75	0.51	0.62	0.45	0.56

Volumes

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	SB
Pacific to 35th	3355	3125	2830	2615	2525	2330
35th to 50th	2125	2965	1770	2480	1585	2215
50th to 62nd	2035	2540	1700	2135	1515	1900

V/C

Scenario 2	30 HV		AA		Offseason	
	NB	SB	NB	SB	NB	
Pacific to 35th	2.58	2.40	2.18	2.01	1.94	1.79
35th to 50th	0.61	0.85	0.51	0.71	0.45	0.63
50th to 62nd	0.58	0.73	0.49	0.61	0.43	0.54

Queues
2: South Beach State Park & US 101

2030 Scenario 1-Annual Average

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	76	47	59	106	32	1811	47	100	2211	79
v/c Ratio	0.72	0.22	0.40	0.40	0.44	0.78	0.04	0.71	0.87	0.07
Control Delay	85.1	19.4	56.9	15.2	75.2	14.8	1.8	63.5	6.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	85.1	19.4	56.9	15.2	75.2	14.8	1.8	63.5	6.0	0.2
Queue Length 50th (ft)	57	4	43	4	25	460	0	83	117	0
Queue Length 95th (ft)	#109	37	81	49	#72	567	10	m83	m113	m0
Internal Link Dist (ft)		573		801		2367			3870	
Turn Bay Length (ft)					150		320	215		150
Base Capacity (vph)	129	246	180	300	73	2311	1140	143	2546	1119
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.19	0.33	0.35	0.44	0.78	0.04	0.70	0.87	0.07

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
4: 40th Street & US 101

2030 Scenario 1-Annual Average

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	71	18	29	271	18	588	32	1711	226	526	2111	63
v/c Ratio	0.20	0.04	0.07	0.78	0.04	1.09	0.49	1.04	0.28	1.22	1.04	0.07
Control Delay	35.8	33.1	11.7	58.1	33.9	92.7	83.3	56.4	3.6	142.5	41.6	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	33.1	11.7	58.1	33.9	92.7	83.3	56.4	3.6	142.5	41.6	6.8
Queue Length 50th (ft)	43	10	0	196	11	~372	24	~757	5	~256	~962	9
Queue Length 95th (ft)	78	28	22	#294	28	#531	m32	#886	m11	m#231	m#684	m8
Internal Link Dist (ft)		558			172			3870			1419	
Turn Bay Length (ft)	120		155	120		155	215		215	130		175
Base Capacity (vph)	364	458	410	348	443	538	65	1641	795	431	2023	926
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.04	0.07	0.78	0.04	1.09	0.49	1.04	0.28	1.22	1.04	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
5: 35th St & US 101

2030 Scenario 1-Annual Average

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	100	18	41	129	24	165	63	2184	53	216	2547	79
v/c Ratio	0.56	0.08	0.18	0.73	0.11	0.50	0.97	1.08	0.06	0.92	1.08	0.08
Control Delay	60.4	44.9	15.1	73.1	45.5	12.4	72.0	44.3	0.8	57.7	56.2	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.4	44.9	15.1	73.1	45.5	12.4	72.0	44.3	0.8	57.7	56.2	3.9
Queue Length 50th (ft)	73	12	0	96	16	0	48	~976	2	~179	~1174	11
Queue Length 95th (ft)	122	33	29	152	40	52	m48	m#237	m2	m117	m274	m5
Internal Link Dist (ft)		441			300			1419			620	
Turn Bay Length (ft)	120		155	120		155	130		175	130		175
Base Capacity (vph)	211	267	258	208	262	359	65	2031	896	234	2348	1041
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.07	0.16	0.62	0.09	0.46	0.97	1.08	0.06	0.92	1.08	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Arterial Level of Service: NE US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
	II	55	44.9	14.8	59.7	0.69	41.4	A
40th Street	II	45	59.8	56.4	116.2	0.75	23.2	C
35th St.	II	35	31.2	44.3	75.5	0.28	13.5	E
Hurbert St	II	31	200.2	561.1	761.3	1.73	8.2	F
Total	II		336.1	676.6	1012.7	3.44	12.2	F

Arterial Level of Service: SB US 101

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Hurbert St	III	30	21.9	542.6	564.5	0.16	1.0	F
35th St	III	31	200.2	56.2	256.4	1.73	24.2	B
40th Street	III	35	34.1	41.6	75.7	0.28	13.5	E
South Beach State Pa	III	55	49.0	6.0	55.0	0.75	49.0	A
Total	III		305.2	646.4	951.6	2.92	11.1	E

US 101

Direction	NB	SB	All
Average Speed (mph)	11	12	11
Total Travel Time (hr)	728	745	1472
Distance Traveled (mi)	8089	8623	16713
Unserved Vehicles (#)	1748	1842	3590
Performance Index	516.0	527.0	1043.0