

Potentially Significant Impact	Less-Than- Significant With Mitigation Incorporation	Less-Than- Significant Impact	No Impact
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**XVI. TRANSPORTATION/TRAFFIC**

Would the project:

- |   |                          |                          |                                     |                                     |
|---|--------------------------|--------------------------|-------------------------------------|-------------------------------------|
| a. Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?  | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?  | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| e. Result in inadequate emergency access?   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

## Affected Environment

The proposed project includes a 9,121 square foot retail building and automated car wash stall. Vehicular travel to the site would be facilitated by a right-in/right-out driveway located on Willow Street. Parking consists of 19 spaces for the car wash and 58 spaces for the retail building.

## Discussion

XVI(a) **Less Than Significant Impact.** In accordance with City guidelines, level of service (LOS) definitions for signalized intersections were based on the Intersection Capacity Utilization (ICU) method, which relates traffic demand to available capacity (volume-to-capacity [v/c] ratios). The ICU analysis methodology describes the operation of an intersection using a range from LOS A (free-flow conditions) to LOS F (severely congested conditions), based on the corresponding v/c ratios. The ICU analysis assumes a capacity of 1,600 vehicles per hour per lane per lane and a dual lane capacity of 2,880 vehicles per hour per lane. A clearance adjustment factor of 0.18 was added to the intersections of Grand Avenue/Willow Street and Lakewood Boulevard/Willow Street. The City of Long Beach considers intersections with an Intersection Capacity Utilization (ICU) of 0.90 (LOS D) as the upper limit of satisfactory operations. A project impact at an intersection is considered significant if the intersection operates at an unsatisfactory LOS (LOS E or F) and the project increases the ICU by 2 percent or higher ( $ICU \geq 0.02$ ), or the project traffic causes the intersection to deteriorate from LOS D to LOS E or F.

An analysis of the Existing and Existing Plus Project conditions at three intersections in the vicinity of the proposed project was completed to determine potential project impacts on the circulation system. The project study area included the intersections of Grand Avenue/Willow Street, Project Driveway/Willow Street, and Lakewood Boulevard/Willow Street.

To determine the number of trips that could be generated by the project, trip generation rates from the Institute of Transportation Engineers, *Trip Generation*, 8th Edition were used for Shopping Center (820) and Automated Car Wash (948). Since there are no ITE trip generation rates available for Automated Car Wash in the a.m. peak hour, San Diego Association of Governments (SANDAG) trip generation rates were compared to the ITE rates and it was determined that 50% of the p.m. peak hour trip generation rate would be assumed for the a.m. peak hour. Pass-by trips for the shopping center were calculated based on data published in ITE's *Trip Generation Handbook*, 2<sup>nd</sup> Edition. The trip generation for the proposed project is included in Appendix \_\_. As shown in Appendix \_\_, the proposed project is projected to generate approximately 69 a.m. peak-hour trips, 158 p.m. peak-hour trips, and 1,388 daily trips. The project-generated peak hour trips were assigned to the surrounding arterial network based on the site's proximity to major developments and surrounding land use patterns. Trip distribution patterns assume 25 percent of project traffic will be distributed west of the project, 50 percent to the east, 20 percent to the south, and 5 percent to the north.

Existing traffic volumes at study area intersections are based on peak hour intersection turn movement counts collected by National Data and Surveying Services (NDS) in September

2010. Existing plus project traffic volumes were developed by adding the project traffic to the existing traffic volumes.

An intersection level of service analysis was conducted for existing and existing plus project conditions to determine intersection performance using Traffix 8.0 software. Level of service calculation worksheets are contained in Appendix \_\_. Based on the LOS analysis, the project area intersections would operate at an acceptable level of service (LOS D or better) during the a.m. and p.m. peak hours under existing and existing plus project conditions with the exception of the intersection of Lakewood Boulevard/Willow Street, which operates at an unacceptable level of service in the a.m. and p.m. peak hour under both scenarios. This is not considered a significant project impact because the proposed project would not increase the ICU at the intersection of Lakewood Boulevard/Willow Street by 0.02. Therefore, the proposed project will not conflict with the City of Long Beach level of service policy for the performance of the circulation system.

**XVI(b) Less than Significant Impact.** The intersection of Lakewood Boulevard/Willow Street is considered a CMP arterial monitoring location but would not exceed the significant impact criteria established by the 2004 Los Angeles County Congestion Management Plan (CMP). The CMP considers a significant impact to occur when the proposed project increases traffic demand on a CMP arterial monitoring location operating at LOS F by 2% of capacity ( $V/C \geq 0.02$ ). The project increases capacity at Lakewood Boulevard/Willow Street by 0.012 in the a.m. and p.m. peak hours, therefore, the proposed project will not conflict with level of service standards and travel demand measures established in the Los Angeles County CMP.

**XVI(c) No Impact.** The project site is located less than one mile south of Long Beach Airport, but the proposed project would not result in a change in air traffic patterns. In addition, the proposed project is expected to serve the surrounding community and would not draw substantial numbers of people to the City of Long Beach such that an increase in air travel would result. Therefore, the proposed project would not result in a significant impact related to air traffic patterns, and no mitigation is required.

**XVI(d) Less than Significant Impact.** The vehicle turning radius was evaluated for the entrance and exit into the car wash tunnel. The site plan shows a 180 degree turn at these two locations. Vehicle turn templates were overlaid onto the site plan to ensure adequate turning width for a large passenger car. As a result, the proposed design of these turn movements will function properly for a large passenger vehicle without encroaching onto the adjacent curbs/landscaping. It should be noted that a larger type vehicle (e.g., SU-30) would not be able to make these turn movements.

**XVI(e) No Impact.** The project will not change project site access or modify the surrounding street system. Direct access for emergency vehicles is via the project driveway on Willow Street. This street will remain open during construction, and project site access will be maintained. Therefore, implementation of the proposed project will not result in inadequate emergency access, and no mitigation is required.

**XVI(f) No Impact.** The project would not affect adopted policies supporting alternative transportation and would be subject to compliance with policies, plans, and programs of the

City of Long Beach and other applicable agencies regarding alternative modes of transportation. Pedestrians accessing the project may utilize pedestrian facilities (e.g., sidewalks and crosswalks) that are part of the surrounding street system. In addition, a bus stop is located on the northwest corner of Lakewood Boulevard and Willow Street, just south of the proposed project. The project will not remove or relocate any alternative transportation access points. Therefore, the project does not conflict with adopted plans, policies, or programs supporting alternative transportation.

**APPENDIX**  
**TRAFFIC ANALYSIS**

**Table A - Project Trip Generation**

Land Use	Size	Units	A.M. Peak Hour			P.M. Peak Hour			Daily
			In	Out	Total	In	Out	Total	
<b>EXISTING SITE</b>									
New Car Sales Trip Generation <sup>1</sup>	17.231	TSF	4	3	7	1	3	4	n/a
<b>PROPOSED USES</b>									
Retail	9.121	TSF							
Trip Rate <sup>2</sup>			2.51	1.60	4.11	6.87	7.15	14.02	157.00
Trip Generation			23	14	37	63	65	128	1,432
Pass-By Trips <sup>3</sup>		34%				(22)	(22)	(44)	(44)
Total Net Trips			23	14	37	41	43	84	1,388
Car Wash	1	Stall							
Trip Rate <sup>4</sup>			19.38	19.38	38.75	38.75	38.75	77.50	n/a
Trip Generation			19	20	39	39	39	78	n/a
Total Project Trip Generation =			<b>42</b>	<b>34</b>	<b>76</b>	<b>80</b>	<b>82</b>	<b>162</b>	<b>1,388</b>
<b>NET NEW PROJECT TRIPS</b>			<b>38</b>	<b>31</b>	<b>69</b>	<b>79</b>	<b>79</b>	<b>158</b>	<b>1,388</b>

## Notes:

- <sup>1</sup> New Car Sales a.m. and p.m. peak hour trip generation based on existing counts at the project driveway collected on 9/2/10.
- <sup>2</sup> ITE Shopping Center (820) Regression Equation
- <sup>3</sup> Pass-by rates of 34% based on rates for Land Use 820 - "Shopping Center" from ITE *Trip Generation Handbook, 2nd Edition*.
- <sup>4</sup> ITE Automated Car Wash (948) 50% of p.m. peak hour rates was assumed for the a.m. peak hour (consistent with other trip generation sources).

**Table B - Existing Level of Service Summary**

Intersection	Control	Existing						Existing Plus Project						Δ		Significant Impact
		A.M. Peak Hour			P.M. Peak Hour			A.M. Peak Hour			P.M. Peak Hour			A.M.	P.M.	
		V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS			
1 . Grand Avenue/Willow Street	Signal	0.607	-	B	0.822	-	D	0.609	-	B	0.850	-	D	0.002	0.028	No
2 . Project Driveway/Willow Street	TWSC	-	13.3	B	-	10.9	B	-	14.2	B	-	12.8	B	-	-	No
3 . Lakewood Boulevard/Willow Street	Signal	0.976	-	E *	1.014	-	F *	0.988	-	E *	1.026	-	F *	0.012	0.012	No

Notes:

Δ=Increase in V/C

Significant Impact = The City of Long Beach considers a project impact at an intersection to be significant if the intersection operates at an unsatisfactory LOS (LOS E of F) and the project increases the ICU by 2 percent or higher ( $ICU \geq 0.02$ ), or the project causes the intersection to deteriorate from LOS D to LOS E or F.

LOS = Level of Service

TWSC = Two-Way Stop Control

For TWSC intersections, reported delay is for worst-case approach.

# Intersection Turning Movement

Prepared by:



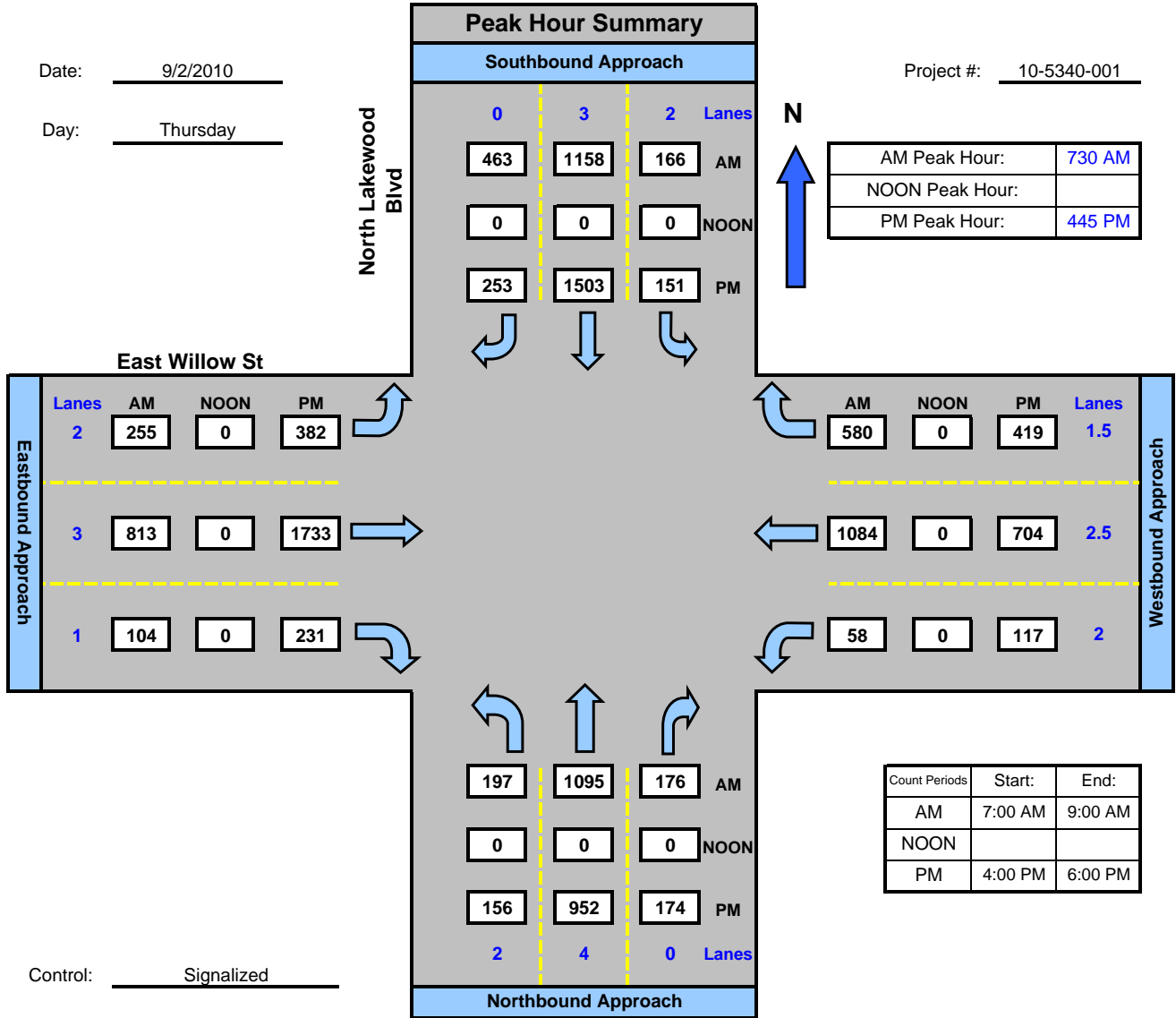
National Data & Surveying Services

## North Lakewood Blvd and East Willow St, City of Long Beach

Date: 9/2/2010

Day: Thursday

Project #: 10-5340-001





# Intersection Turning Movement

Prepared by:



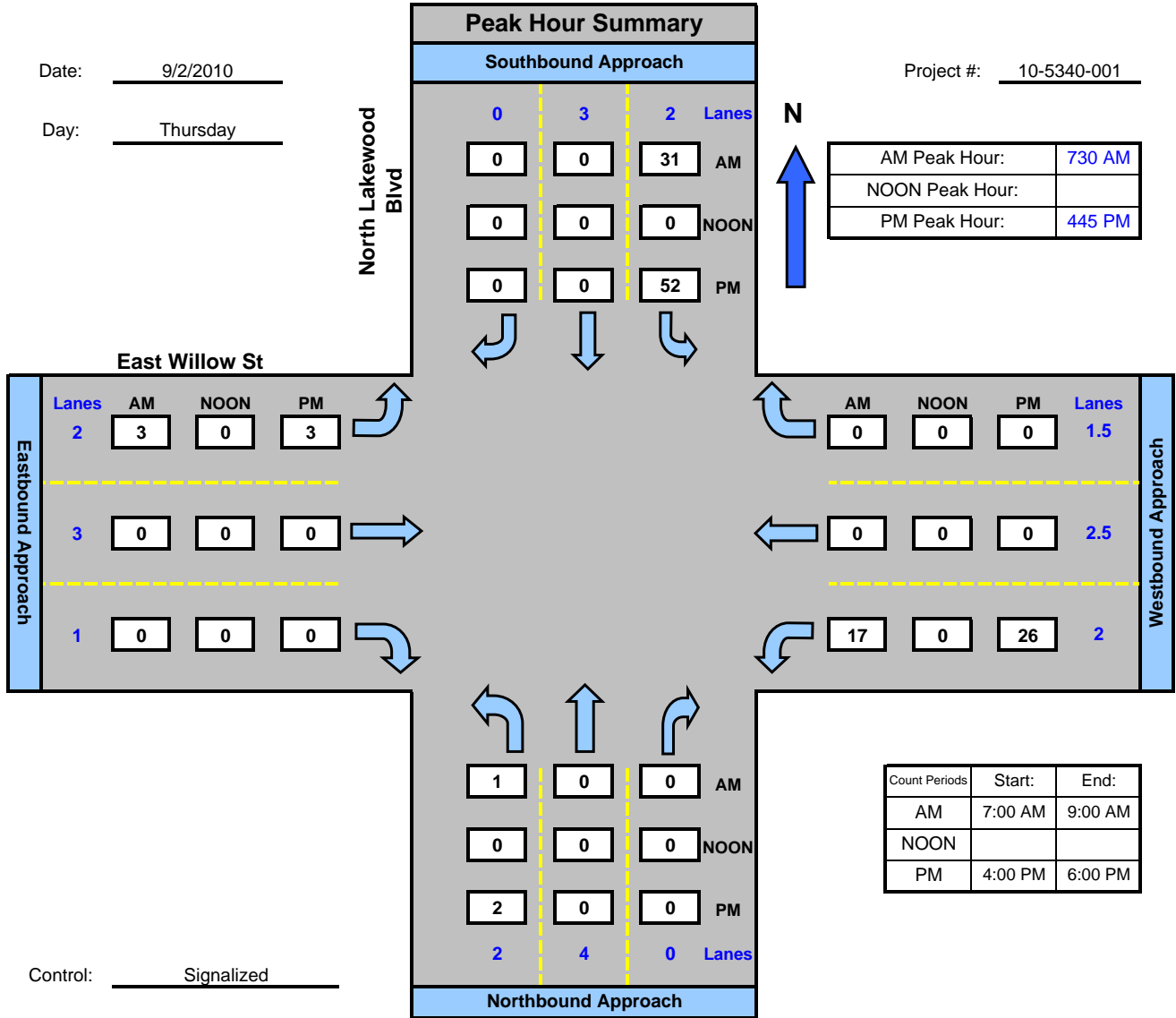
National Data & Surveying Services

## North Lakewood Blvd and East Willow St, City of Long Beach

Date: 9/2/2010

Day: Thursday

Project #: 10-5340-001



# Intersection Turning Movement

Prepared by:



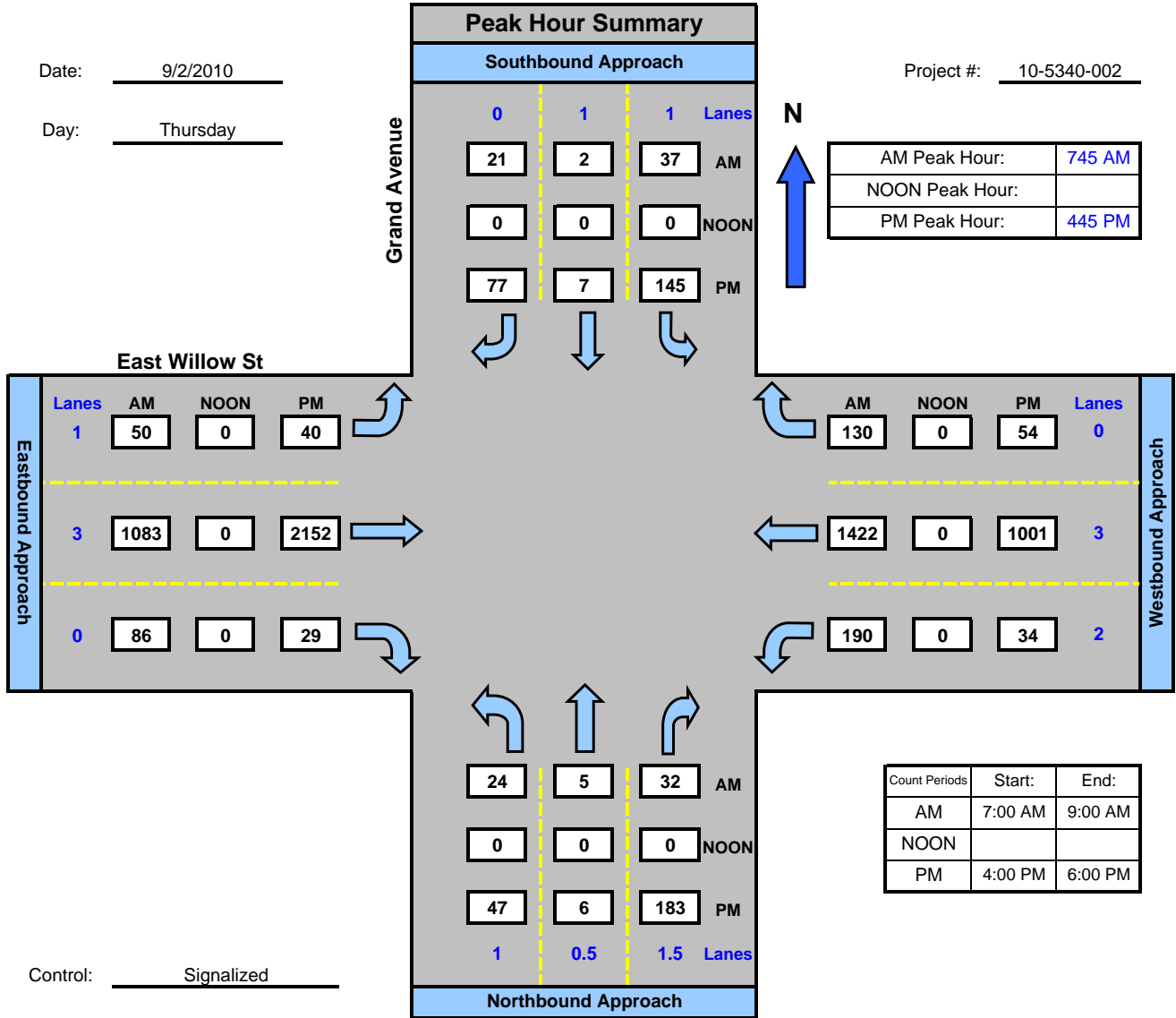
National Data & Surveying Services

## Grand Avenue and East Willow St , City of Long Beach

Date: 9/2/2010

Day: Thursday

Project #: 10-5340-002



# Intersection Turning Movement

Prepared by:



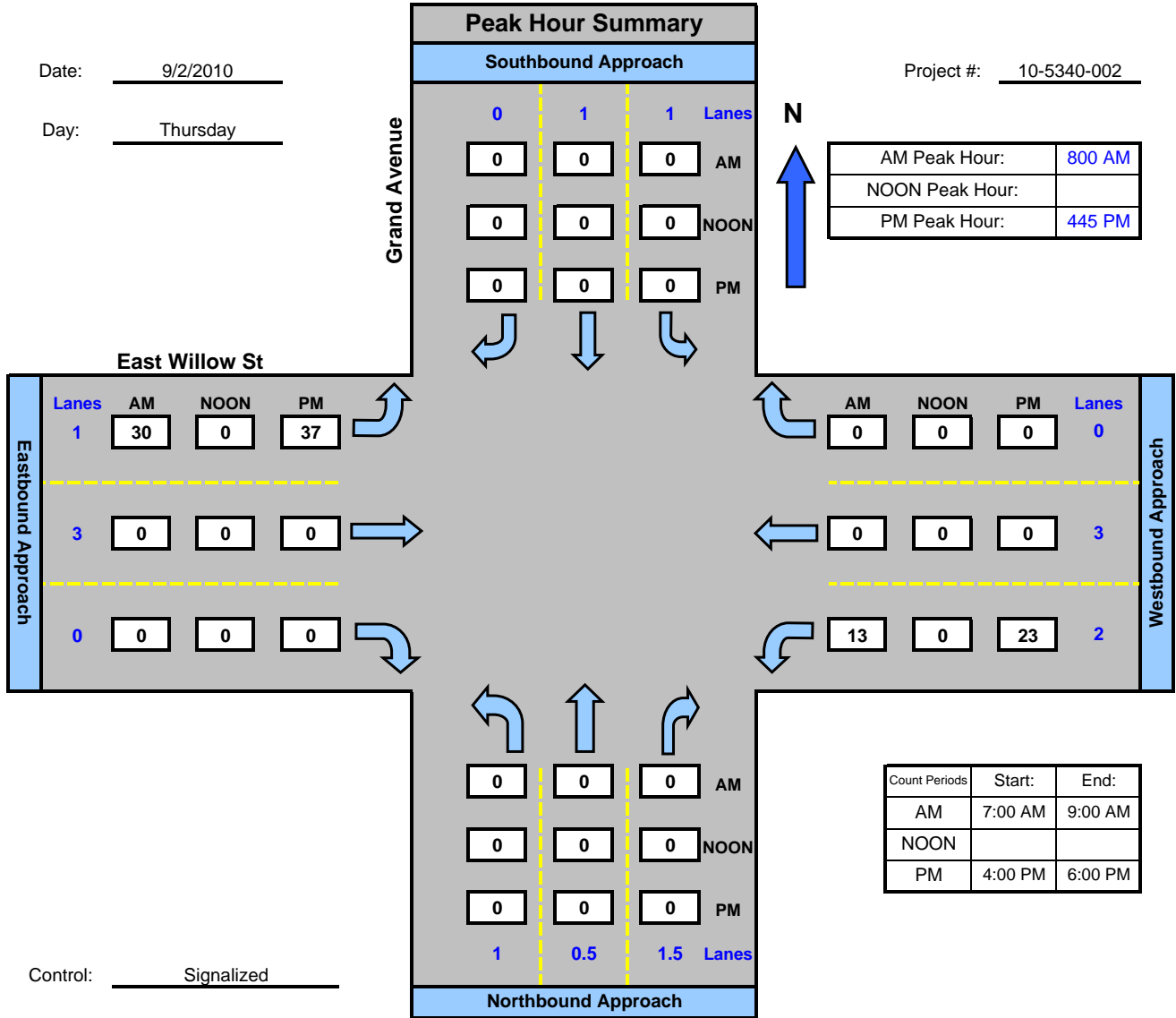
National Data & Surveying Services

## Grand Avenue and East Willow St , City of Long Beach

Date: 9/2/2010

Day: Thursday

Project #: 10-5340-002



# Intersection Turning Movement

Prepared by:



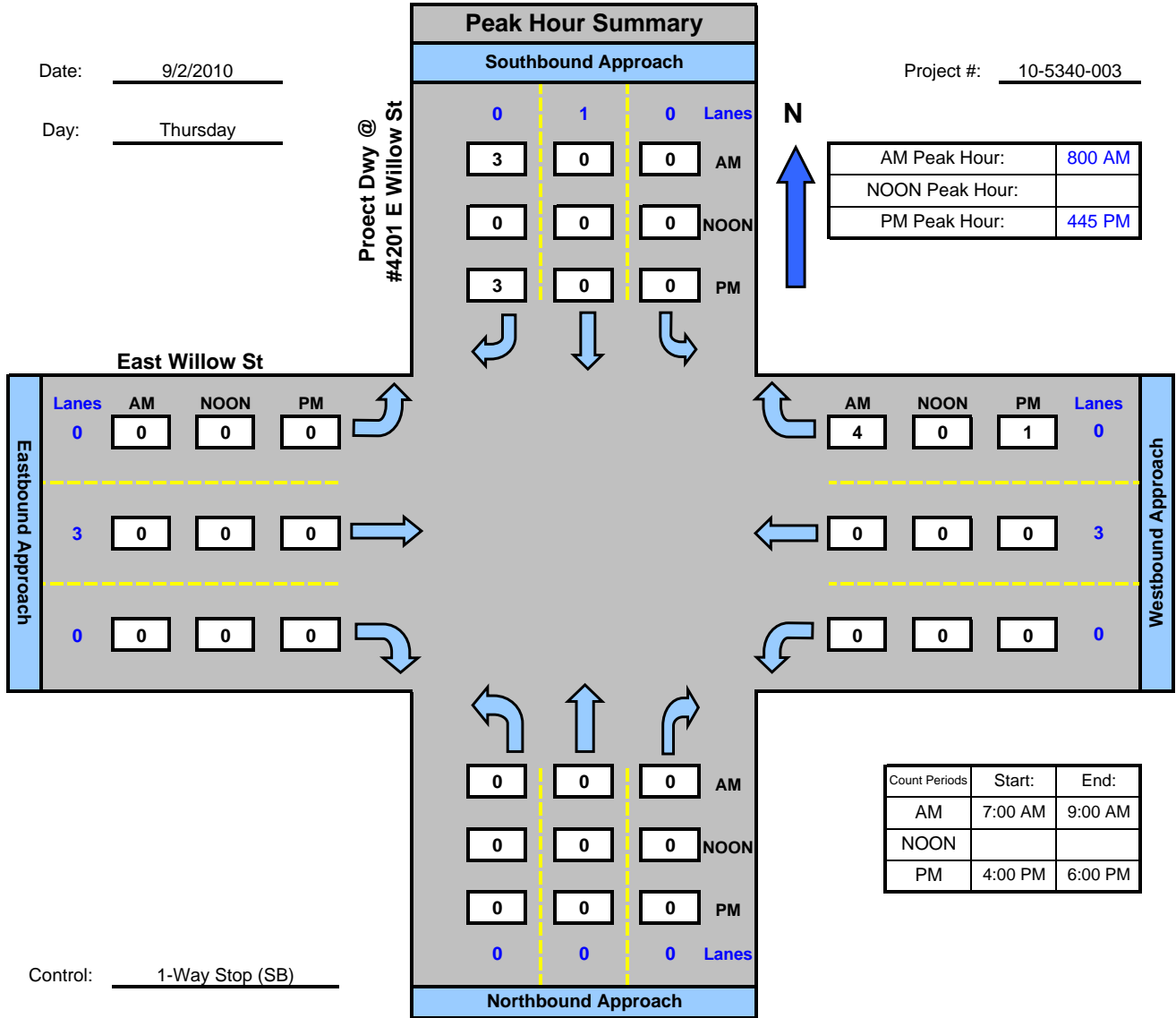
National Data & Surveying Services

## Proect Dwy @ #4201 E Willow St and East Willow St, City of Long Beach

Date: 9/2/2010

Day: Thursday

Project #: 10-5340-003



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Scenario Report

Scenario: Exist AM  
Command: Exist AM  
Volume: Exist Am  
Geometry: Default Geometry  
Impact Fee: Default Impact Fee  
Trip Generation: Default Trip Generation  
Trip Distribution: Default Trip Distribution  
Paths: Default Path  
Routes: Default Route  
Configuration: Default Configuration

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #1 Grand Avenue/Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 0.607
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 54 Level Of Service: B

\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement (L-T-R), Control (Protected), Rights (Include), Min. Green, Y+R, and Lanes.

Volume Module: Table with 12 columns for different traffic movements. Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, Reduced Vol, PCE Adj, MLF Adj, and Final Volume.

Saturation Flow Module: Table with 12 columns for different traffic movements. Rows include Sat/Lane, Adjustment, Lanes, and Final Sat.

Capacity Analysis Module: Table with 12 columns for different traffic movements. Rows include Vol/Sat and Crit Moves.

\*\*\*\*\*

Level Of Service Computation Report

2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Project Driveway/Willow Street
\*\*\*\*\*

Average Delay (sec/veh): 0.0 Worst Case Level Of Service: B[ 13.3]
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Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, and Lanes.

Volume Module: Table with 12 columns for volume adjustments. Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, and Final Volume.

Critical Gap Module: Table with 12 columns for gap and follow-up times. Rows include Critical Gap and FollowUp Time.

Capacity Module: Table with 12 columns for capacity metrics. Rows include Conflict Vol, Potent Cap, Move Cap, and Volume/Cap.

Level Of Service Module: Table with 12 columns for LOS metrics. Rows include 2Way95thQ, Control Del, LOS by Move, Movement, Shared Cap, Shared Queue, Shrd ConDel, Shared LOS, ApproachDel, and ApproachLOS.

Note: Queue reported is the number of cars per lane.
\*\*\*\*\*

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

\*\*\*\*\*

Intersection #3 Lakewood Blvd./Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 0.976
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 153 Level Of Service: E

\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

-----|-----|-----|-----|

Volume Module: Table with 12 columns representing different traffic movements and 10 rows of volume-related metrics.

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Saturation Flow Module: Table with 12 columns and 5 rows showing saturation flow and adjustment factors.

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Capacity Analysis Module: Table with 12 columns and 3 rows showing capacity analysis metrics.

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Scenario Report

Scenario: Exist PM  
Command: Exist PM  
Volume: Exist PM  
Geometry: Default Geometry  
Impact Fee: Default Impact Fee  
Trip Generation: Default Trip Generation  
Trip Distribution: Default Trip Distribution  
Paths: Default Path  
Routes: Default Route  
Configuration: Default Configuration

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #1 Grand Avenue/Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 0.822
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 87 Level Of Service: D

\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

Table with 12 columns representing different traffic phases. Rows include Volume Module metrics like Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, Reduced Vol, PCE Adj, MLF Adj, and Final Volume.

Table with 12 columns representing different traffic phases. Rows include Saturation Flow Module metrics like Sat/Lane, Adjustment, Lanes, and Final Sat.

Table with 12 columns representing different traffic phases. Rows include Capacity Analysis Module metrics like Vol/Sat and Crit Moves.

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Level Of Service Computation Report

2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Project Driveway/Willow Street
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Average Delay (sec/veh): 0.0 Worst Case Level Of Service: B[ 10.9]

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, and Lanes.

Volume Module: Table with 12 columns representing different volume categories and 4 rows for Base Vol, Growth Adj, Initial Bse, and Final Volume.

Critical Gap Module: Table with 12 columns for gap metrics and 2 rows for Critical Gp and FollowUpTim.

Capacity Module: Table with 12 columns for capacity metrics and 4 rows for Cnflct Vol, Potent Cap, Move Cap, and Volume/Cap.

Level Of Service Module: Table with 12 columns for LOS metrics and 8 rows including 2Way95thQ, Control Del, LOS by Move, Movement, Shared Cap, Shrd ConDel, Shared LOS, and ApproachDel.

Note: Queue reported is the number of cars per lane.

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #3 Lakewood Blvd./Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 1.014
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 180 Level Of Service: F

\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement (L-T-R), Control, Rights, Min. Green, Y+R, and Lanes.

-----|-----|-----|-----|

Volume Module: Table with 12 columns for volume and adjustment factors across four approaches.

-----|-----|-----|-----|

Saturation Flow Module: Table with 12 columns for saturation flow and adjustment factors.

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Capacity Analysis Module: Table with 12 columns for capacity and critical moves.

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Scenario Report

Scenario: Exist P AM  
Command: Exist P AM  
Volume: Exist P AM  
Geometry: Default Geometry  
Impact Fee: Default Impact Fee  
Trip Generation: Default Trip Generation  
Trip Distribution: Default Trip Distribution  
Paths: Default Path  
Routes: Default Route  
Configuration: Default Configuration

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #1 Grand Avenue/Willow Street

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Cycle (sec): 100 Critical Vol./Cap.(X): 0.609
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 55 Level Of Service: B

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Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

Volume Module table with 12 columns and 11 rows including Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, Reduced Vol, PCE Adj, MLF Adj, and Final Volume.

Saturation Flow Module table with 12 columns and 4 rows including Sat/Lane, Adjustment, Lanes, and Final Sat.

Capacity Analysis Module table with 12 columns and 2 rows including Vol/Sat and Crit Moves.

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Level Of Service Computation Report

2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Project Driveway/Willow Street
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Average Delay (sec/veh): 0.2 Worst Case Level Of Service: B[ 14.2]
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Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, and Lanes.

Volume Module: Table with 12 columns for volume and adjustment factors. Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, and Final Volume.

Critical Gap Module: Table with 12 columns for gap and timing. Rows include Critical Gap and FollowUp Time.

Capacity Module: Table with 12 columns for capacity and volume. Rows include Conflict Vol, Potent Cap, Move Cap, and Volume/Cap.

Level Of Service Module: Table with 12 columns for LOS and delay. Rows include 2Way95thQ, Control Del, LOS by Move, Movement, Shared Cap, Shared Queue, Shrd ConDel, Shared LOS, ApproachDel, and ApproachLOS.

Note: Queue reported is the number of cars per lane.
\*\*\*\*\*

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #3 Lakewood Blvd./Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 0.988
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 163 Level Of Service: E

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Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

Volume Module: Table with 12 columns representing different traffic movements and 10 rows of volume-related metrics.

Saturation Flow Module: Table with 12 columns representing different traffic movements and 5 rows of saturation flow metrics.

Capacity Analysis Module: Table with 12 columns representing different traffic movements and 3 rows of capacity analysis metrics.

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Scenario Report

Scenario: Exist P PM  
Command: Exist P PM  
Volume: Exist P PM  
Geometry: Default Geometry  
Impact Fee: Default Impact Fee  
Trip Generation: Default Trip Generation  
Trip Distribution: Default Trip Distribution  
Paths: Default Path  
Routes: Default Route  
Configuration: Default Configuration

Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #1 Grand Avenue/Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 0.850
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 95 Level Of Service: D

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Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

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Volume Module: Table with 12 columns for various volume and adjustment factors like Base Vol, Growth Adj, Initial Bse, etc.

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Saturation Flow Module: Table with 12 columns for saturation flow factors like Sat/Lane, Adjustment, Lanes, Final Sat.

-----|-----|-----|-----|

Capacity Analysis Module: Table with 12 columns for capacity analysis factors like Vol/Sat, Crit Moves.

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Level Of Service Computation Report

2000 HCM Unsignalized Method (Base Volume Alternative)

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Intersection #2 Project Driveway/Willow Street
\*\*\*\*\*

Average Delay (sec/veh): 0.4 Worst Case Level Of Service: B[ 12.8]
\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, and Lanes.

Volume Module: Table with 12 columns for volume adjustments. Rows include Base Vol, Growth Adj, Initial Bse, User Adj, PHF Adj, PHF Volume, Reduct Vol, and Final Volume.

Critical Gap Module: Table with 12 columns for gap analysis. Rows include Critical Gp and FollowUpTim.

Capacity Module: Table with 12 columns for capacity analysis. Rows include Cnflct Vol, Potent Cap., Move Cap., and Volume/Cap.

Level Of Service Module: Table with 12 columns for LOS analysis. Rows include 2Way95thQ, Control Del, LOS by Move, Movement, Shared Cap., Shared Queue, Shrd ConDel, Shared LOS, ApproachDel, and ApproachLOS.

Note: Queue reported is the number of cars per lane.
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Level Of Service Computation Report

ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

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Intersection #3 Lakewood Blvd./Willow Street

\*\*\*\*\*

Cycle (sec): 100 Critical Vol./Cap.(X): 1.026
Loss Time (sec): 18 Average Delay (sec/veh): xxxxxx
Optimal Cycle: 180 Level Of Service: F

\*\*\*\*\*

Table with 4 columns: North Bound, South Bound, East Bound, West Bound. Rows include Movement, Control, Rights, Min. Green, Y+R, and Lanes.

-----|-----|-----|-----|

Volume Module: Table with 12 columns for volume and adjustment factors across four approaches.

-----|-----|-----|-----|

Saturation Flow Module: Table with 12 columns for saturation flow and adjustment factors.

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Capacity Analysis Module: Table with 12 columns for capacity and critical moves.

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**Table 5.6**  
**Pass-By Trips and Diverted Linked Trips**  
**Weekday, p.m. Peak Period**

**Land Use 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS- BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
53	Port Orange, FL	1993	162	2:00–6:00 p.m.	—	41	—	59	n/a	n/a	TPD Inc.
9	Kissimmee, FL	1994	107	2:00–6:00 p.m.	20	—	14	66	n/a	n/a	TPD Inc.
77	Edgewater, FL	1992	365	2:00–6:00 p.m.	—	54	—	46	n/a	n/a	TPD Inc.
82	Deltona, FL	1992	336	2:00–6:00 p.m.	—	66	—	34	n/a	n/a	TPD Inc.
78	Orlando, FL	1991	702	2:00–6:00 p.m.	23	—	22	55	n/a	n/a	TPD Inc.
45	Orlando, FL	1992	844	2:00–6:00 p.m.	24	—	20	56	n/a	n/a	TPD Inc.
50	Orlando, FL	1992	555	2:00–6:00 p.m.	41	—	18	41	n/a	n/a	TPD Inc.
52	Orlando, FL	1995	665	2:00–6:00 p.m.	33	—	25	42	n/a	n/a	TPD Inc.
17	Orlando, FL	1994	196	2:00–6:00 p.m.	—	34	—	66	n/a	n/a	TPD Inc.
60	Orlando, FL	1995	1,583	3:00–7:00 p.m.	38	—	22	40	n/a	n/a	TPD Inc.
158	Crestwood, KY	Jun. 1993	129	4:00–6:00 p.m.	39	—	25	36	759	n/a	Barton-Aschman Assoc.
118	Louisville area, KY	Jun. 1993	133	4:00–6:00 p.m.	51	—	27	22	3,555	n/a	Barton-Aschman Assoc.
74	Louisville, KY	Jun. 1993	187	4:00–6:00 p.m.	43	—	27	30	922	n/a	Barton-Aschman Assoc.
59	Louisville area, KY	Jun. 1993	247	4:00–6:00 p.m.	52	—	17	31	2,659	n/a	Barton-Aschman Assoc.
145	Louisville area, KY	Jun. 1993	210	4:00–6:00 p.m.	30	—	17	53	2,636	n/a	Barton-Aschman Assoc.
104	Louisville area, KY	Jun. 1993	281	4:00–6:00 p.m.	50	—	22	28	2,111	n/a	Barton-Aschman Assoc.
235	Louisville, KY	Jun. 1993	211	4:00–6:00 p.m.	29	—	36	35	2,593	n/a	Barton-Aschman Assoc.
71	Louisville, KY	Jun. 1993	109	4:00–6:00 p.m.	42	—	33	25	1,559	n/a	Barton-Aschman Assoc.
350	Worcester, MA	Apr. 1994	224	4:00–6:00 p.m.	45	—	37	18	2,112	n/a	ICSC
738	East Brunswick, NJ	Apr. 1994	283	4:00–6:00 p.m.	79	—	7	14	8,059	n/a	ICSC
294	Philadelphia, PA	Apr. 1994	213	4:00–6:00 p.m.	51	—	24	25	4,055	n/a	ICSC
256	Hamden, CT	Apr. 1994	208	4:00–6:00 p.m.	51	—	22	27	3,422	n/a	ICSC
418	Glen Burnie, MD	Apr. 1994	281	4:00–6:00 p.m.	51	—	29	20	5,610	n/a	ICSC
560	Harrisonburg, VA	Apr. 1994	437	4:00–6:00 p.m.	49	—	32	19	3,051	n/a	ICSC

**Table 5.6 (Cont'd)**  
**Pass-By Trips and Diverted Linked Trips**  
**Weekday, p.m. Peak Period**

**Land Use 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS- BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
361	Glen Allen, VA	Apr. 1994	315	4:00–6:00 p.m.	54	—	29	17	2,034	n/a	ICSC
375	Shelby, NC	May 1994	214	4:00–6:00 p.m.	48	—	22	30	3,053	n/a	ICSC
413	Texas City, TX	May 1994	228	4:00–6:00 p.m.	52	—	20	28	589	n/a	ICSC
488	Texas City, TX	May 1994	257	4:00–6:00 p.m.	75	—	13	12	1,094	n/a	ICSC
293	Berwyn, IL	May 1994	282	4:00–6:00 p.m.	70	—	6	24	4,606	n/a	ICSC
667	Bourbonais, IL	May 1994	200	4:00–6:00 p.m.	53	—	31	16	2,770	n/a	ICSC
225	Belleville, IL	May 1994	264	4:00–6:00 p.m.	32	—	33	35	1,970	n/a	ICSC
255	Bettendorf, IA	May 1994	222	4:00–6:00 p.m.	37	—	39	24	3,706	n/a	ICSC
808	Laguna Hills, CA	Jun. 1994	240	4:00–6:00 p.m.	73	—	14	13	4,035	n/a	ICSC
450	Hanford, CA	May 1994	321	4:00–6:00 p.m.	49	—	28	23	2,787	n/a	ICSC
800	San Jose, CA	May 1994	205	4:00–6:00 p.m.	51	—	28	21	7,474	n/a	ICSC
598	Greeley, CO	May 1994	205	4:00–6:00 p.m.	55	—	28	17	3,840	n/a	ICSC
581	Pueblo, CO	May 1994	296	4:00–6:00 p.m.	53	—	29	18	2,939	n/a	ICSC
476	Bellevue, WA	May 1994	234	4:00–6:00 p.m.	54	—	20	26	3,427	n/a	ICSC
720	Framingham, MA	Dec. 1982	92	3:30–7:00 p.m.	39	—	38	23	n/a	73,628	Raymond Keyes Assoc.
890	Newark, DE	Jul. 1984	179	3:00–8:00 p.m.	49	—	39	12	n/a	n/a	Raymond Keyes Assoc.
402	Manassas, VA	Jun. 1984	87	4:00–6:00 p.m.	25	—	27	48	n/a	n/a	Raymond Keyes Assoc.
462	Ross, PA	Jun. 1980	175	5:30–7:00 p.m.	—	64	—	36	n/a	27,200	Raymond Keyes Assoc.
234	Huntington LI, NY	Nov. 1985	181	4:00–7:00 p.m.	21	—	33	46	n/a	34,630	Raymond Keyes Assoc.
658	Wayne, NJ	Sept. 1984	243	3:00–6:00 p.m.	61	—	12	27	n/a	85,600	Raymond Keyes Assoc.
1,200	Washington, DC	1980	364	4:00–6:00 p.m.	35	—	40	25	n/a	n/a	Gorove-Slade
800	Southern CA	n/a	1,000	4:00–6:00 p.m.	45	—	43	12	n/a	n/a	Frischer
451	Portland, OR	n/a	n/a	5:00–6:00 p.m.	—	75	—	25	n/a	n/a	Buttke
113	Portland, OR	n/a	n/a	5:00–6:00 p.m.	—	83	—	17	n/a	n/a	Buttke

**Table 5.6 (Cont'd)**  
**Pass-By Trips and Diverted Linked Trips**  
**Weekday, p.m. Peak Period**

**Land Use 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS- BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
622	Ramsey, MN	Nov. 1985	46	4:00–9:00 p.m.	26	—	30	44	n/a	36,370	Raymond Keyes Assoc.
736	Pensacola, FL	Oct. 1985	383	3:00–7:00 p.m.	35	—	39	26	n/a	n/a	Raymond Keyes Assoc.
84	Dover, DE	Jul. 1985	218	3:30–7:00 p.m.	6	—	44	50	n/a	n/a	Raymond Keyes Assoc.
500	Meriden, CT	Apr. 1985	n/a	4:00–6:00 p.m.	—	92	—	8	n/a	n/a	Connecticut DOT
660	Enfield, CT	Apr. 1985	n/a	4:00–6:00 p.m.	—	78	—	22	n/a	n/a	Connecticut DOT
845	Waterford, CT	Apr. 1985	n/a	4:00–6:00 p.m.	—	86	—	14	n/a	n/a	Connecticut DOT
1,060	West Hartford, CT	Apr. 1985	n/a	4:00–6:00 p.m.	—	83	—	17	n/a	n/a	Connecticut DOT
131	Pr. Georges Co., MD	1982/83	88	4:00–6:00 p.m.	—	11	—	89	n/a	n/a	JHK
181	Pr. Georges Co., MD	1982/83	105	4:00–6:00 p.m.	—	64	—	36	n/a	n/a	JHK
100	Pr. Georges Co., MD	1982/83	93	4:00–6:00 p.m.	—	64	—	36	n/a	n/a	JHK
475	Pr. Georges Co., MD	1982/83	130	4:00–6:00 p.m.	—	80	—	20	n/a	n/a	JHK
60	Pr. Georges Co., MD	1982/83	72	4:00–6:00 p.m.	—	18	—	82	n/a	n/a	JHK
90	Pr. Georges Co., MD	1982/83	91	4:00–6:00 p.m.	—	42	—	58	n/a	n/a	JHK
78	Pr. Georges Co., MD	1982/83	113	4:00–6:00 p.m.	—	41	—	59	n/a	n/a	JHK
44	Pr. Georges Co., MD	1982/83	97	4:00–6:00 p.m.	—	49	—	51	n/a	n/a	JHK
467	Pr. Georges Co., MD	1982/83	99	4:00–6:00 p.m.	—	44	—	56	n/a	n/a	JHK
352	W. Orange, NJ	Mar. 1986	149	4:00–6:00 p.m.	19	—	43	38	n/a	21,520	Raymond Keyes Assoc.
176	Tarpon Springs, FL	May 1986	124	3:00–7:00 p.m.	28	—	35	37	n/a	34,080	Raymond Keyes Assoc.
762	Orlando, FL	Fall 1985	182	4:00–6:00 p.m.	52	—	23	25	n/a	n/a	Kimley-Horn and Assoc. Inc.
166	Orlando, FL	Fall 1985	124	4:00–6:00 p.m.	48	—	25	27	n/a	n/a	Kimley-Horn and Assoc. Inc.
129	Orlando, FL	Fall 1985	116	4:00–6:00 p.m.	50	—	22	28	n/a	n/a	Kimley-Horn and Assoc. Inc.
71	Orlando, FL	Fall 1985	81	4:00–6:00 p.m.	44	—	6	50	n/a	n/a	Kimley-Horn and Assoc. Inc.

**Table 5.6 (Cont'd)**  
**Pass-By Trips and Diverted Linked Trips**  
**Weekday, p.m. Peak Period**

**Land Use 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS- BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
921	Albany, NY	Jul. & Aug. 1985	196	4:00–6:00 p.m.	42	—	35	23	n/a	60,950	Raymond Keyes Assoc.
108	Overland Park, KS	Jul. 1988	111	4:30–5:30 p.m.	61	—	13	26	n/a	34,000	n/a
118	Overland Park, KS	Aug. 1988	123	4:30–5:30 p.m.	55	—	20	25	n/a	—	n/a
256	Greece, NY	Jun. 1988	120	4:00–6:00 p.m.	62	—	—	38	n/a	23,410	Sear Brown
160	Greece, NY	Jun. 1988	78	4:00–6:00 p.m.	71	—	—	29	n/a	57,306	Sear Brown
550	Greece, NY	Jun. 1988	117	4:00–6:00 p.m.	52	—	—	48	n/a	40,763	Sear Brown
51	Boca Raton, FL	Dec. 1987	110	4:00–6:00 p.m.	34	—	33	33	n/a	42,225	Kimley-Horn and Assoc. Inc.
1,090	Ross Twp, PA	Jul. 1988	411	2:00–8:00 p.m.	56	—	10	34	n/a	51,500	Wilbur Smith and Assoc.
97	Upper Dublin Twp, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	59	—	41	n/a	34,000	McMahon Associates
118	Tredyffrin Twp, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	76	—	24	n/a	10,000	Booz Allen & Hamilton
122	Lawnside, NJ	Winter 1988/89	n/a	4:00–6:00 p.m.	—	63	—	37	n/a	20,000	Pennoni Associates
126	Boca Raton, FL	Winter 1988/89	n/a	4:00–6:00 p.m.	—	57	—	43	n/a	40,000	McMahon Associates
150	Willow Grove, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	61	—	39	n/a	26,000	Booz Allen & Hamilton
153	Broward Cnty, FL	Winter 1988/89	n/a	4:00–6:00 p.m.	—	50	—	50	n/a	85,000	McMahon Associates
153	Arden, DE	Winter 1988/89	n/a	4:00–6:00 p.m.	—	70	—	30	n/a	26,000	Orth-Rodgers & Assoc. Inc.
154	Doylestown, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	68	—	32	n/a	29,000	Orth-Rodgers & Assoc. Inc.
164	Middletown Twp, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	67	—	33	n/a	25,000	Booz Allen & Hamilton
166	Haddon Twp, NJ	Winter 1988/89	n/a	4:00–6:00 p.m.	—	80	—	20	n/a	6,000	Pennoni Associates
205	Broward Cnty., FL	Winter 1988/89	n/a	4:00–6:00 p.m.	—	45	—	55	n/a	62,000	McMahon Associates



**Table 5.6 (Cont'd)**  
**Pass-By Trips and Diverted Linked Trips**  
**Weekday, p.m. Peak Period**

**Land Use 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS- BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
237	W. Windsor Twp, NJ	Winter 1988/89	n/a	4:00–6:00 p.m.	—	52	—	48	n/a	46,000	Booz Allen & Hamilton
242	Willow Grove, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	63	—	37	n/a	26,000	McMahon Associates
297	Whitehall, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	67	—	33	n/a	26,000	Orth-Rodgers & Assoc. Inc.
360	Broward Cnty., FL	Winter 1988/89	n/a	4:00–6:00 p.m.	—	56	—	44	n/a	73,000	McMahon Associates
370	Pittsburgh, PA	Winter 1988/89	n/a	4:00–6:00 p.m.	—	81	—	19	n/a	33,000	Wilbur Smith
150	Portland, OR	n/a	519	4:00–6:00 p.m.	6	—	26	68	n/a	25,000	Kittleson and Associates
150	Portland, OR	n/a	655	4:00–6:00 p.m.	7	—	28	65	n/a	30,000	Kittleson and Associates
760	Calgary, Alberta	Oct-Dec 1987	15,436	4:00–6:00 p.m.	39	—	41	20	n/a	n/a	City of Calgary DOT
178	Bordentown, NJ	Apr. 1989	154	2:00–6:00 p.m.	—	65	—	35	n/a	37,980	Raymond Keyes Assoc.
144	Manalapan, NJ	Jul. 1990	176	3:30–6:15 p.m.	44	—	24	32	n/a	69,347	Raymond Keyes Assoc.
549	Natick, MA	Feb. 1989	n/a	4:45–5:45 p.m.	26	—	41	33	n/a	48,782	Raymond Keyes Assoc.

Average Pass-By Trip Percentage: 34