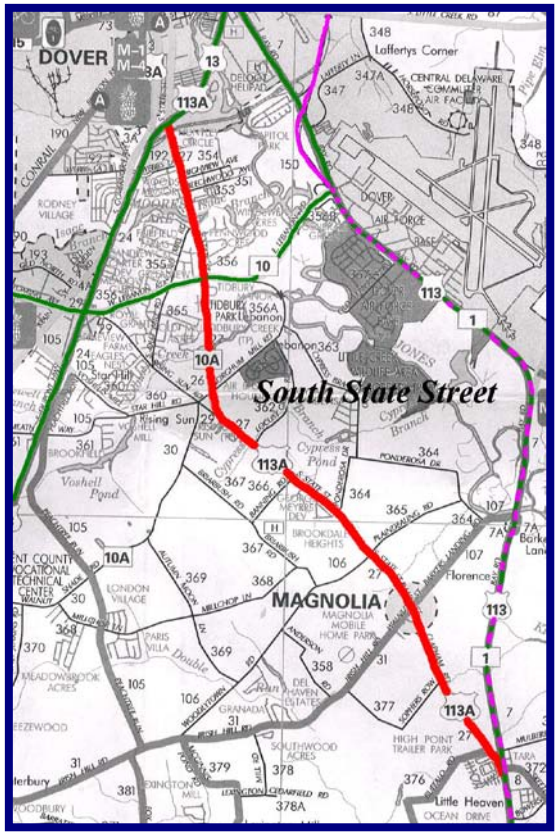
SOUTH STATE STREET AREA AND ACCESS STUDY
APPENDICES



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FINAL DRAFT

Prepared For:

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APPENDIX A

ORIGINAL SCOPE OF WORK

A. UNDERSTANDING OF THE PROJECT AND WORK PLAN

Understanding of the Project

The purpose of the study is to examine traffic using Alternate US Route 113 (US 113A), also known as South State Street, to:

- Determine its origin and destination,
- Determine causes for the existing travel patterns,
- Develop strategies for encouraging use of alternate parallel facilities.

The study will also assess current and future access to downtown Dover and determine its impact on US 113A. Strategies will be developed for managing the area's future transportation needs, including safety, the provision of alternate modes of travel and the diversion of through traffic.

Study Area

The study area is bounded by Little Creek Road to the north, US Route 113 (US 113) and DE Routes 1 to the east, US 113A to Little Heaven to the south and US Route 13 (US 13) and US 113A to the west. Figure 1 shows a Location Map with the study area limits plotted. The study area includes the east-central portion of Kent County, encompassing southeast Dover, east Camden, and Magnolia. Within the study area, US 13, SR 1, US 113 and US 113A, similar to spokes in a wheel, serve as the primary access to the City of Dover. Route 10 traverses through the center of the study area in an east to west direction. Each roadway funnels all regional and local traffic from the south towards this center of employment, commerce, governmental and institutional services. The study area includes roughly a 7-mile stretch of US 113A from Division Street in Central Dover to Little Heaven. This corridor is comprised of vastly differing land uses ranging from small town urban characteristics in the City of Dover to suburban and rural landscapes south of the city limits.

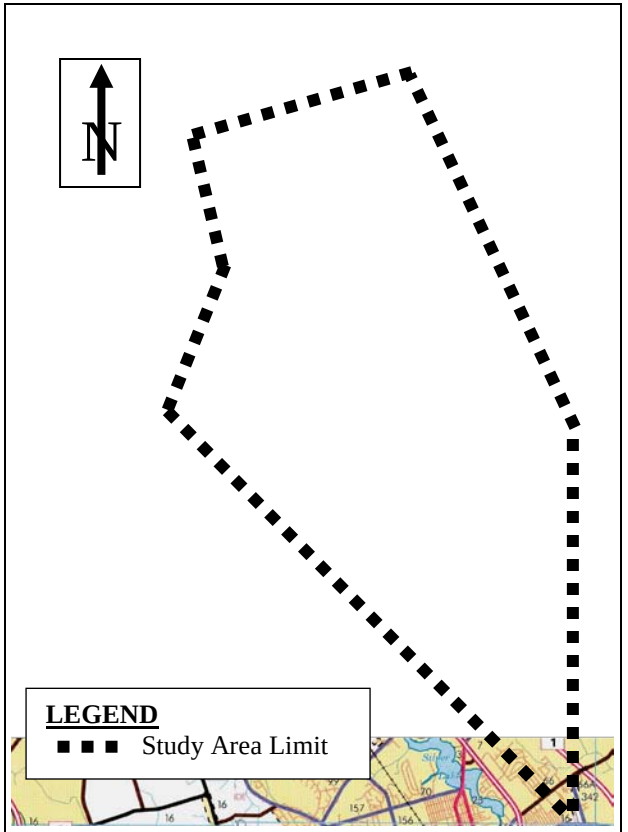


Figure 1. Study Area

Scope of Work

Because it is anticipated that the study will be used as a basis for determining future land use strategies and transportation improvements, we plan to approach the project in a manner similar to that of a Needs Study.

We believe the critical challenge associated with this project is the acceptance by the local community of the study methods and results. Transportation studies are best conducted in a step by step manner with active community and agency involvement. In this manner, the public and reviewing agencies become owners of the project. Active involvement of these stakeholders ensures the diverse concerns of the community and reviewing agencies are addressed at an early stage. Effective involvement of the stakeholders will enable the project to move forward and eliminate "show stoppers" that, if identified too late in the process, might affect the project schedule.

As such, we propose to complete the study using a step by step approach that divides each project phase into tasks. Each task contains a number of 'subtasks' which defines the technical work, the work products and

involvement of the reviewing agencies and public. We believe this approach will best fulfill the needs of the MPO.

Work Plan

We propose to conduct the study following the task list developed by the MPO to include:

- Task 1. Establish Steering Committees and Project Kick-off (N/A)
- Task 2. Define Study Area and Data Collection
- Task 3. Analysis of Existing and Future No Build Conditions
- Task 4. Develop and Analyze Improvement Alternatives
- Task 5. Develop Project Report

Because of the importance of the public involvement process to the overall success of the project, we have identified key meetings within each specific task. A detailed discussion of the public involvement process, entitled Agency and Public Coordination, is located Section B of this document.

Task 1. Establish Steering Committee and Project Kickoff

Discussion for the task is also included in Section B. Public and Agency Coordination. Based on our input presented in this writeup, we have not included any manhours in this proposal to set up Committee, but, have assumed that the MPO will coordinate the members of this group.

Task 2. Define Study Area and Data Collection

Upon completion of Task 1 we will begin data collection efforts for the study.

Task 2A. Define Project Study Area

The Study Area has been defined within the RFP and described in Century's Statement of Qualifications dated December 10, 1999. No manhours are included in this proposal to complete this task.

Task 2B. Traffic Data

The collection of existing Traffic Data is described in our subconsultant, Landmark Engineering proposal attached herein.

Task 2C. Land Use Data

The collection of Land Use Data is described in our subconsultant, Landmark Engineering proposal attached herein.

Task 2D: Origin and Destination Survey

An origin and destination survey (O-D survey) will provide valuable information in establishing both the travel patterns in the study area and also the need for improvements.

We propose to conduct a license plate survey within the study area. This type of survey can be used to determine the travel patterns within the study area as vehicles traveling along a route are tracked. Personnel located at strategic locations within the study area record the State and last digits of vehicles license plate as travel through the study area. This same information is collected at points where the vehicles leave the corridor; the data is correlated and travel patterns determined. License plates will be matched by Century's traffic engineer/technician while collating the data after the field work has been completed. We have assumed that there would be approximately ten (10) entry/exit locations at the borders of the study area, with each location staffed by two individuals for a period from 6 a.m. to 6 p.m. for one day. These locations will be presented and approved by DelDOT prior to beginning the study.

Task 3. Analysis of Existing and Future No-Build Conditions

This task consists of four parts:

- Analysis of Existing Traffic Conditions
- Projection of Future Traffic Volumes (No-Build)
- Analysis of Future Traffic Conditions (No-Build)
- Develop the Preliminary Project Report

Task 3A. Analysis of Existing Traffic Conditions

In this task, we will determine the existing levels of service and travel patterns at the key intersections and roadway segments within the study area. In addition, we will identify deficiencies in the existing transportation system such as geometry, transit, bicycle and pedestrian facilities. This analysis provides the basis by which the impacts of future land use and network improvements are determined.

Analysis of the roadway links and signalized and unsignalized intersections will be performed using the *1997 Highway Capacity Manual* published by the Transportation Research Board. We will develop tables showing the levels of service during each analysis period. Concurrently, we will create trip tables using the results of the O&D study and, possibly, the DelDOT TAZones tables to quantify the origin, destination, and direction of motorists along the US 113A corridor. This data is critical in determining the extent of local and regional traffic in the corridor. Finally, we will develop a land use map showing the extent of approved and committed developments within the study area and develop projections of other developments likely to occur within the study area consistent with the current zoning and comprehensive plans.

We will meet with the MPO and stakeholders to review the results of our work. The purpose of the meeting will be to achieve consensus with respect to identified travel patterns, levels of service, roadway deficiencies and the level and location of development to be used in future tasks. As these elements provide the basis for the projection of future traffic volumes, we believe it is important that consensus be achieved among the parties.

Task 3B. Projection of Future Traffic Volumes (No-Build)

All traffic projections will be completed by DelDOT and not included in the scope of work herein. Projections will need to be completed by DelDOT in a timely fashion to maintain the schedule that has been set. Century will review the traffic projections for appropriateness and coordinate with DelDOT as required.

Task 3C. Analysis of Future Traffic Conditions (No-Build)

Once projection of the volumes is complete we will conduct detailed analyses on not more than twenty (20) intersections using the projected "No-Build" volumes to identify deficiencies within the system. The volumes generated and the resultant levels-of-service will provide the baseline values by which the improvement alternatives can be evaluated and compared against one another. Appropriate graphics demonstrating traffic volumes, levels of service and system deficiencies will be developed. Once this is complete, we will meet with the MPO and interested stakeholders in order to review our projections, including generation and assignments, to develop a consensus. The volumes generated in this task form the basis for the future traffic analyses and the development of improvement alternatives. Therefore, it is important that the parties agree with the data and assumptions used to develop the future volumes.

Task 3D. Develop the Preliminary Project Report

The Preliminary Project Report will document the work completed and results of the study through Task 3. The report will describe the process used to determine existing and future base traffic volumes, travel patterns, land use projections, and existing and future conditions (levels of service). Graphics including level of service diagrams, maps showing the locations of future developments and distribution and assignment figures for the developments will be included in the report. Generally the outline of the report will include:

I. Introduction
   - A. Project Purpose
   - B. Scope of Work
   - C. Project Goals and Objectives

II. Existing Traffic Conditions
   - A. Existing Transportation Facilities
   - B. Existing Traffic Conditions
     1. Traffic Volumes
     2. Traffic Patterns
     3. Levels of Service

III. Land Use Analysis
   - A. Land Use, Zoning and Comprehensive Plans
   - B. Projections of Future Land Use and Development

IV. Future Traffic Analysis (No-Build)
   - A. Projection of Future Traffic Volumes

B. Analysis of Future Traffic Conditions
   1. Levels of Service
   2. Identified Deficiencies

The Preliminary Project Report will be presented to the MPO, DelDOT and Kent County Planning for review and comment. Once comments are received from each party, the report will be revised and submitted to the Stakeholders and presented at the Public Meeting. One unbound original and one electronic copy will be submitted to the MPO for their distribution to all parties (i.e. DelDOT, Planning, the Stakeholders and x number of copies for public review).

Task 4. Develop and Analyze Improvement Alternatives

Following the second public workshop we will hold a meeting with the MPO and stakeholders to discuss the comments and improvement options expressed by the community. The purpose of this meeting will also be to receive final comments on the Preliminary Project Report and to reach consensus on the options that should be advanced for consideration under this task. Once consensus is reached with respect to the results of the Phase 1 work, we will undertake alternative analysis.

Task 4A. Define Improvement Alternatives

This task involves defining the improvement options provided through the public workshop and stakeholders meetings. The improvements will be generally evaluated for their ability to provide relief of existing deficiencies, access to the central business district of Dover, ability to divert traffic from this corridor to other parallel facilities and increased safety and mobility. We believe the alternatives will fall into three categories: Congestion Management Strategies (CMS), Transportation Network Improvements and Legislative.

Congestion management is a series of strategies or improvements that better utilize the capacity of the existing transportation system through the implementation of reasonable cost-effective improvements or by reducing the number of vehicles on the roadway. Generally the strategies consist of:

- New or Improved Public Transportation Service
- Employer Trip Reduction Programs
- Staggering of Work Hours
- Carpooling/ Vanpooling Programs
- Parking Management
- Operational Improvements/ Bottleneck Elimination.

While not all of these strategies may be applicable to the project we believe new and improved public transportation service and operational improvements (bottleneck elimination) could provide solutions to deficiencies identified by the study. Regarding new and improved public transportation service, we will work with DTC staff to identify the need for new or improved services along the corridor. This evaluation will include new stops along the roadway, construction of facilities such as bus stop pads, shelters and pullover lanes to construction of new or improved existing park and ride facilities.

Operational improvements consist of low cost intersection, signal and signing improvements. The types of improvements that are typical include spot intersection improvements, sidewalk and bicycle lane construction, signal coordination and timing and signing improvements. With the results of the traffic analysis, we will identify low cost improvements that will provide for increased mobility and safety along the corridor. To the end that the community desires US 113A to carry local trips, this could also include evaluation of directional signing changes to keep the more regionally oriented traffic on existing parallel routes.

Transportation Network Improvements consist of larger scale corridor improvements including roadway widening and construction of new alignments.

Legislative elements could consist of updated and revised land use controls and implementation of access management policies along the corridor. This category could even consist of requiring employer trip reduction programs, staggering of work hours and carpooling and vanpooling programs be implemented as part of new and proposed land development.

Task 4B. Analyze Improvement Alternatives

Based on the scope limitations of the project, we have assumed that we will retain two (2) improvement options for analysis. DelDOT will complete the required traffic projections and adjustements to the future traffic required for

these alternatives. Once the traffic projections are complete, we will conduct detailed analysis of the intersections and roadway segments. Preliminary environmental impacts will also be determined. Volume figures, level-of-service tables, environmental impacts and other related data such as order of magnitude cost estimates will be summarized in order that comparisons can be made between the improvement alternatives as well as the baseline conditions. A list of advantages and disadvantages of each alternative will also be prepared.

Upon completion of this task, we will hold a meeting with the MPO and stakeholders to review the results of the alternative studies. Input will be received from the group on the improvement options to be recommended as well as the format of the Final Project Report. Following this meeting we will hold the final public workshop. The purpose of the this meeting is to present the work completed under Task 4 and to receive input regarding the recommended alternatives.

Task 4C. Develop Project Recommendations

Following the stakeholder meeting and public workshop, we will develop detailed cost estimates for the recommended improvement alternatives. In addition, we will refine other strategies to be instituted along with the proposed improvements.

Task 4D. Prepare Final Project Report

The last task to be undertaken will be the preparation of the Final Project Report. This report will document the information presented in the preliminary report (Task 3D) as well as the results of the public meetings, stakeholder meetings and the alternatives analysis. The report will describe the process used to develop the future traffic projections, improvement alternates and recommendations. Graphics including level of service diagrams, maps showing the locations of future developments, distribution and assignment figures for the developments, and improvement alternatives will be included in the report. Generally the outline of the report will include:

I. Introduction
   - A. Project Purpose
   - B. Scope of Work
   - C. Project Goals and Objectives

II. Existing Conditions
   - A. Traffic Conditions
   - B. Land Use/ Socioeconomic Conditions

III. Projections of Future Traffic (No-Build)
   - A. Future Traffic Projections
   - B. Future Traffic Situation
   - C. Definition of Improvement Alternatives

III. Improvement Alternative Evaluation and Selection
   - A. Description of Improvement Alternative
   - B. Analyses of Improvement Alternatives
   - C. Comparison of Improvement Alternatives
   - D. Recommended Improvement Alternative(s)

IV. Implementation Plan
   - A. Define Timing for Improvements and Strategies
   - B. Define Funding Sources for Improvements
     1. Public Funded
     2. Private/ Developer Funded
     3. Policy/ Controls

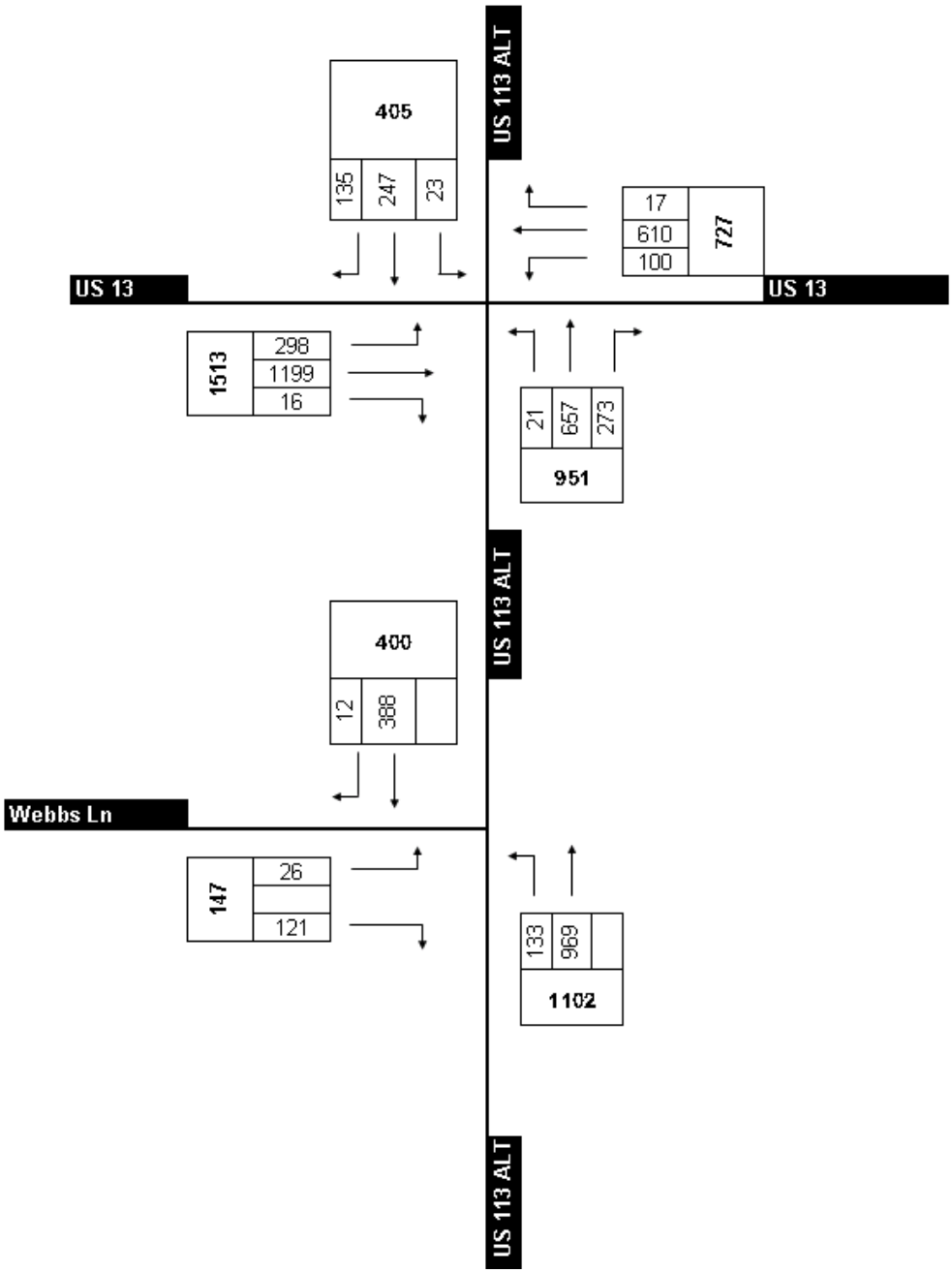
V. Conclusions and Recommendations

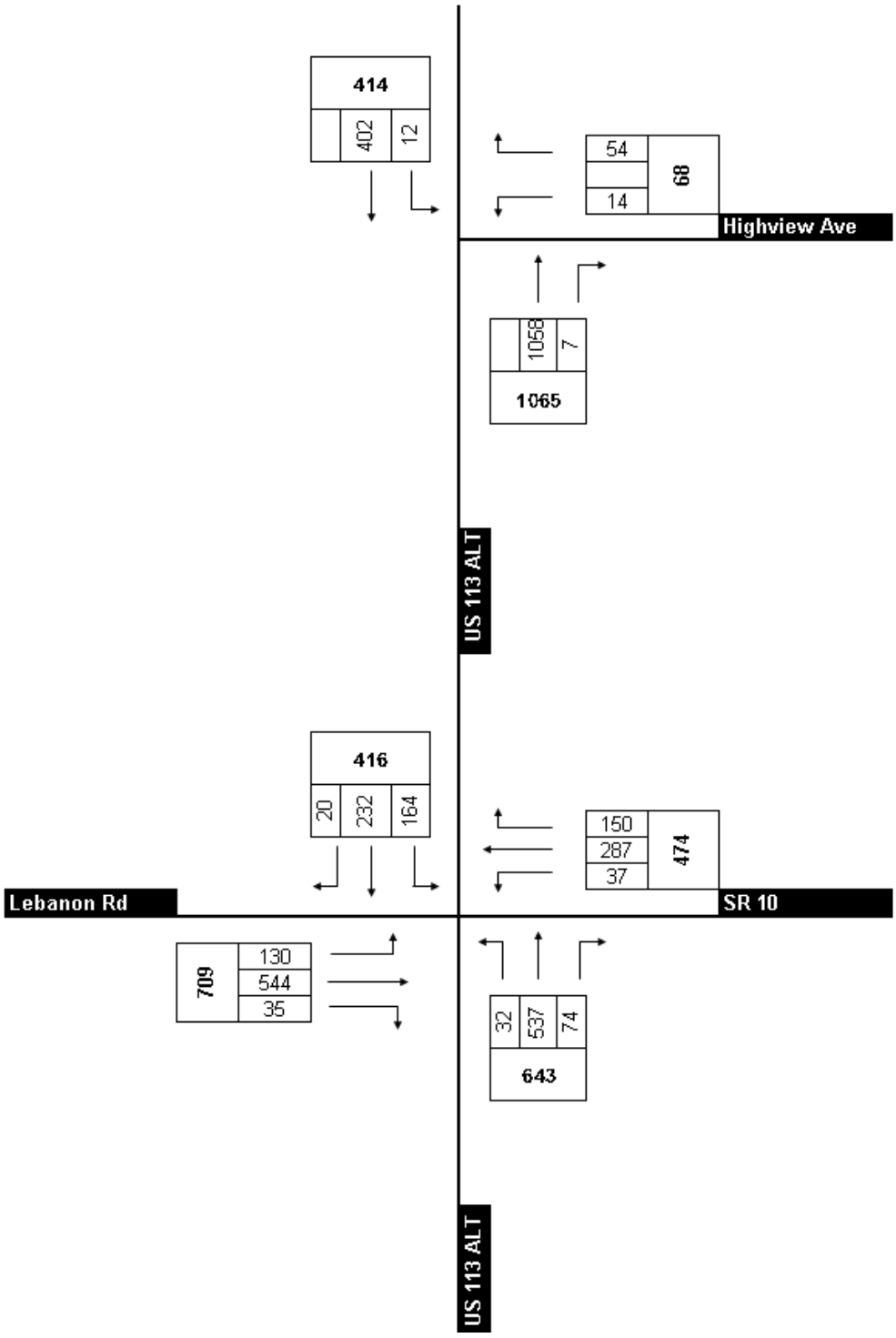
The Final Project Report will be presented to the MPO, DelDOT and Planning for review and comment. Once comments are received from each party, the report will be revised and submitted to the Stakeholders. Once review and comment by the Stakeholders has been received, the report will be revised prior to the Public Meeting. Comments from the Public Hearing will incorporated into the Final Report. One unbound original and one electronic copy will be submitted to the MPO for their distribution to all parties (i.e. DelDOT, Planning, the Stakeholders and x number of copies for public review).

APPENDIX B

EXISTING AM PEAK HOUR TRAFFIC VOLUMES

Existing AM Peak Hour Traffic Volumes

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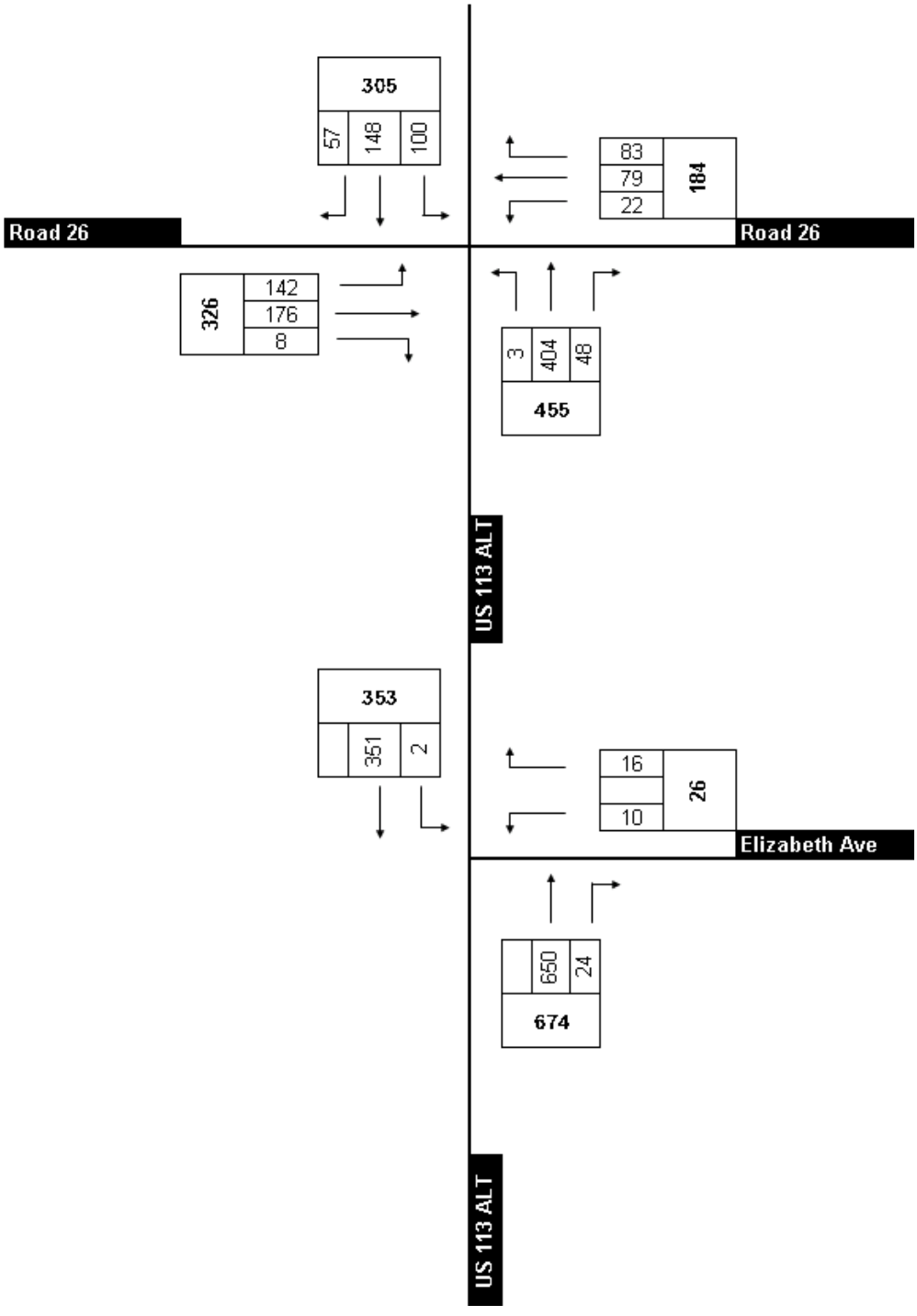
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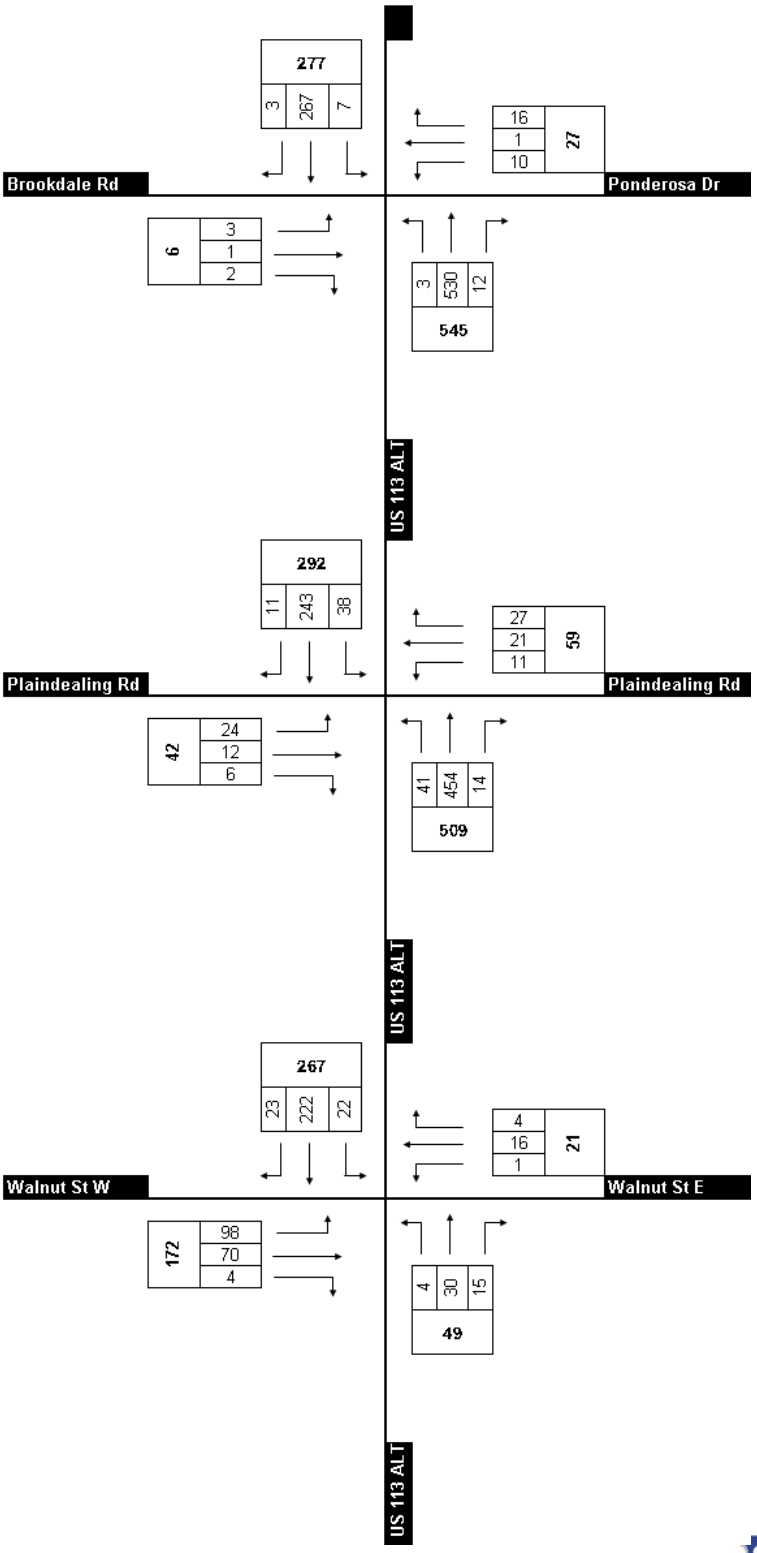
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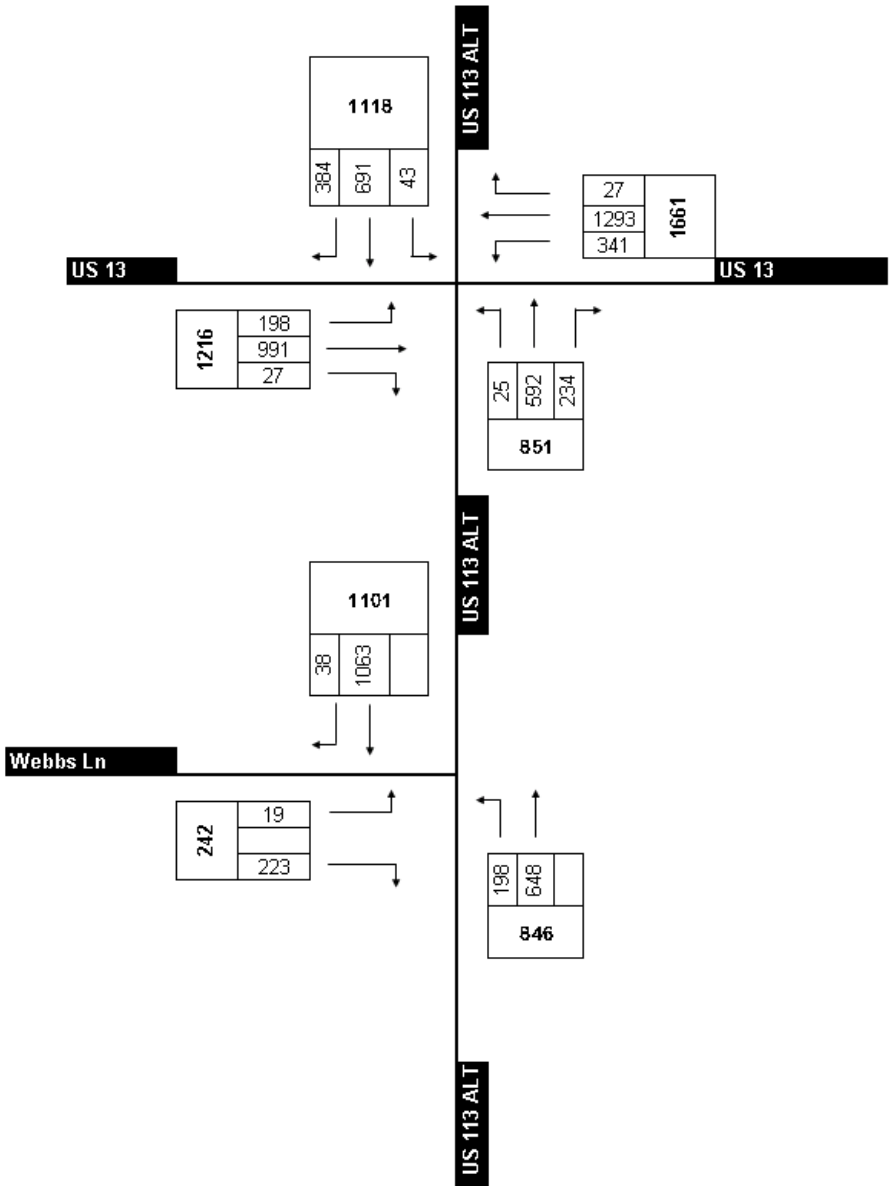
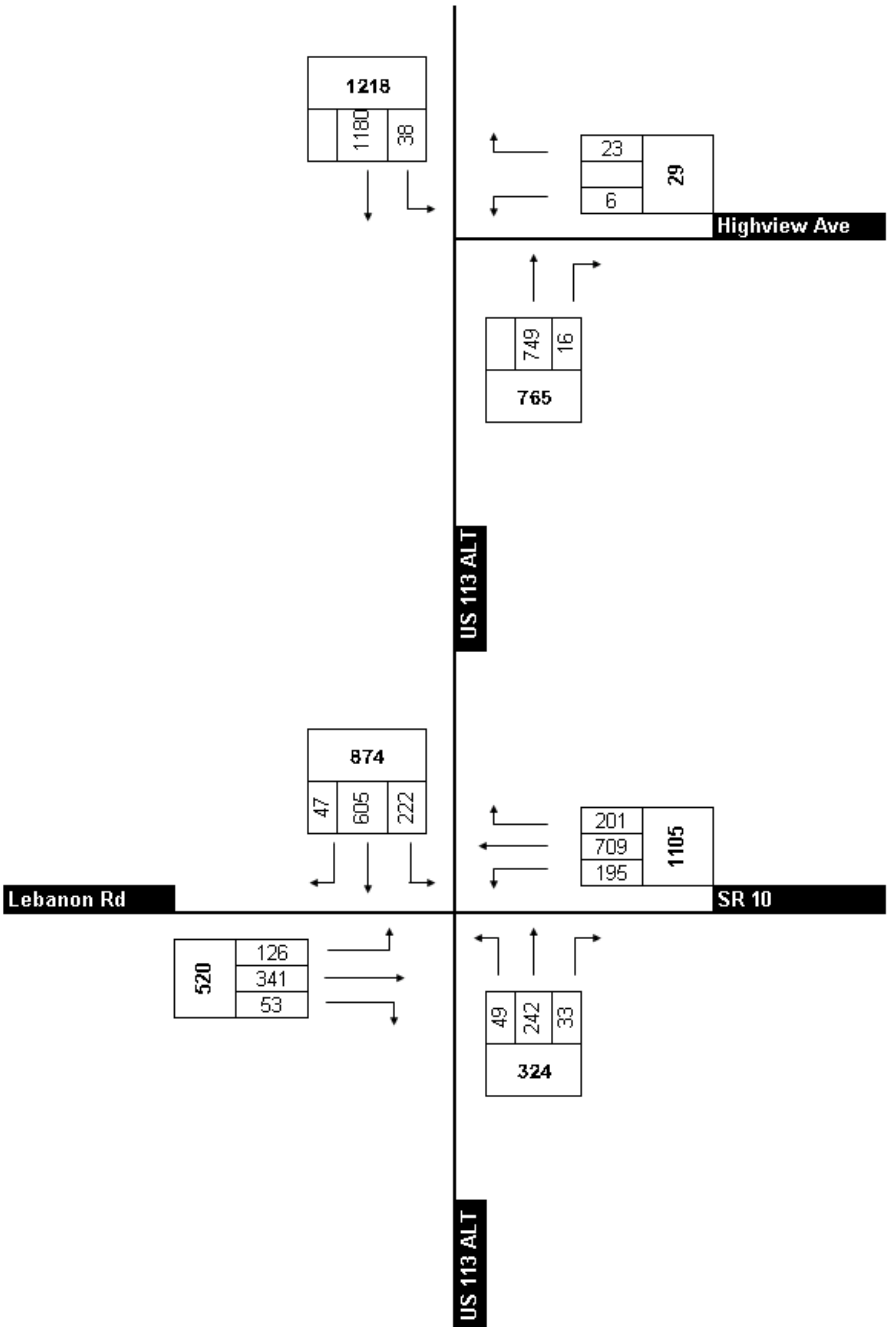
Existing PM Peak Hour Traffic Volumes

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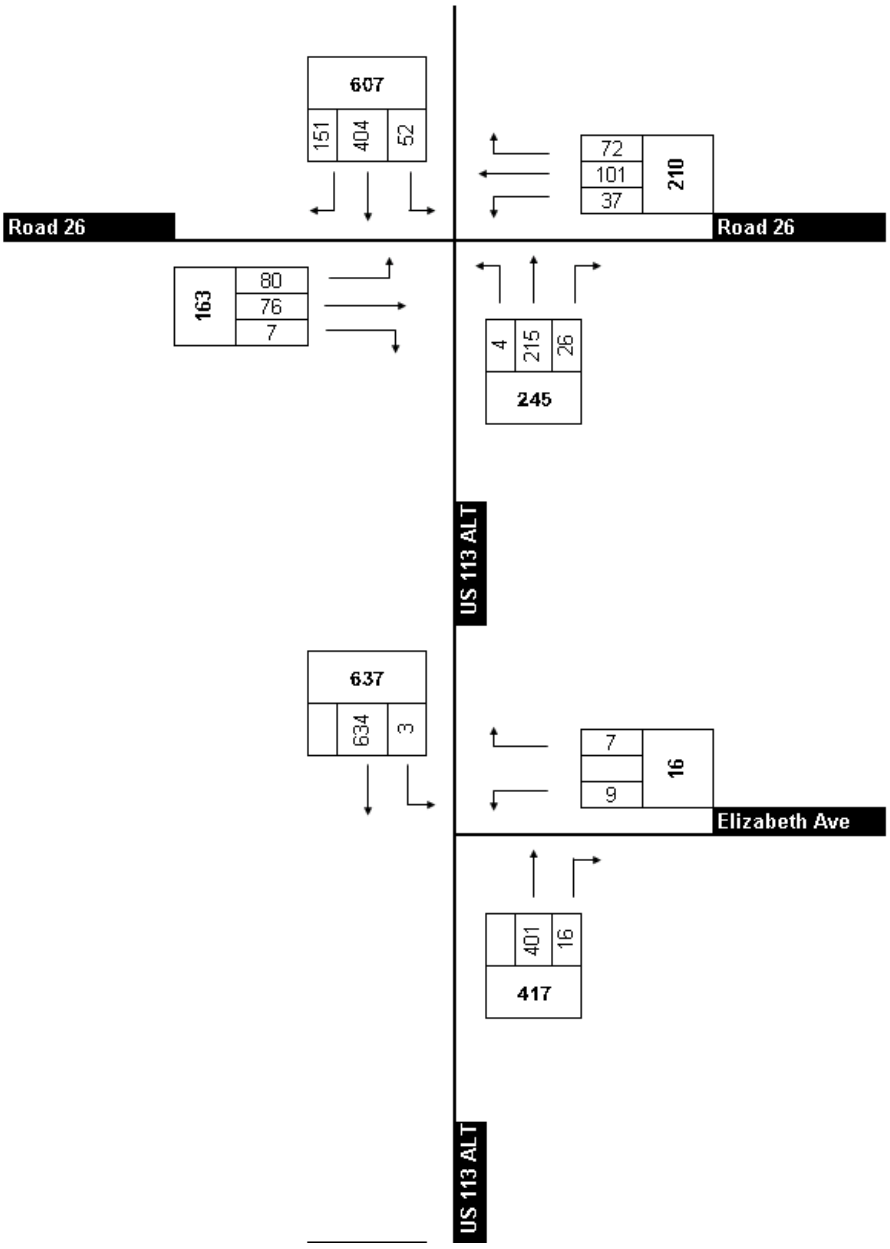
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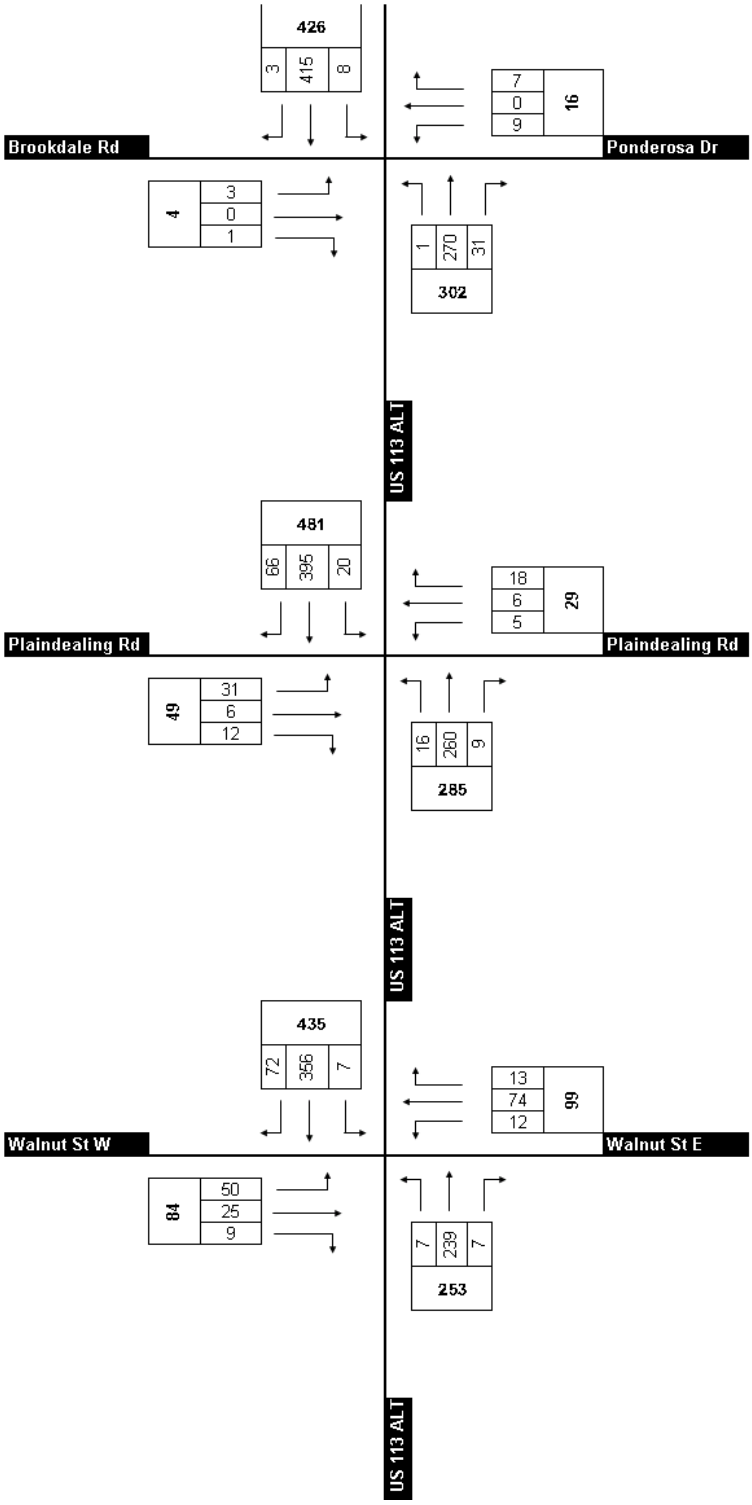
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APPENDIX C

ORIGIN DESTINATION STUDY

ORIGIN DESTINATION STUDY

INTRODUCTION

On Wednesday, May 9, 2001, Century Engineering, Inc. (CEI) conducted an origin-destination study to determine the patterns of vehicular trips internal and external to the Dover metropolitan area. This study was performed through a license plate survey, where license plate numbers of vehicles passing a certain point were recorded according to arrival time, compiled, reduced, and then analyzed. This was undertaken as part of South State Street Access Study and covered the same study area. The results of this study are provided through trip origin-destination matrices for the morning, afternoon, and evening peak hour periods and can be found in this report. This also report describes the methodologies used in the data collection, analysis, and development of the vehicular trip matrices.

STUDY OBJECTIVES

The License Plate study objectives are as follows:

- Collect meaningful and unbiased data at each station in a way so as to minimize systematic and random error;
- Compile the data using a computer spreadsheet program and implement quality assurance techniques;
- Reduce the data using a FORTRAN-based processing program through the identification of origin-destination matches; and
- Analyze the origin-destination matches and develop percentage splits according to average daily traffic at each location.

SCOPE OF STUDY

The license plate recording was conducted for 12 consecutive hours between 6:00 am and 7:00pm at 14 direction-specific locations. These locations are shown in Exhibit 1. Each survey location was manned by one or two field technicians, depending on traffic volumes, who manually recorded partial or complete license plate numbers of passing vehicles. A summary of these locations is included in Table 1.

These 14 locations were strategically located in order to identify and monitor trips entering and exiting the study area throughout the day. Of specific interest, were the trip patterns experienced during peak hour conditions. These time periods help to illustrate the typical home-to-work, lunchtime, and work-to-home trips which tend to occur within the area.

FIELD DATA COLLECTION

Prior to data collection on May 9, 2001, each field personnel participated in a training session, where detailed procedures and safety issues were highlights of the project. During this training session, participants were instructed to record a minimum of the first three digits on each license plate they record. Due to the expected congestion and high speeds at several of the locations, this seemed to be an appropriate method. In addition, buses, state vehicles, police cars, emergency vehicles, and any other vehicles that may not be following typical routes were not to be tracked.

Each of the 14 locations was manned by at least one or two field personnel at all times throughout the day. License plates were recorded according to five-minute intervals from 6:00 am through 7:00 pm at each location. Using clipboards, binoculars when necessary, and pre-pared spreadsheets the field personnel recorded each license plate according to arrival time. Many locations were along divided highways, with congested or high speed traffic making data collection difficult. As such, we set a goal of successfully recording at least 15 % of the daily traffic passing each location at such high speed / congested locations and at least 25 % of the daily traffic at all other locations. These were expected to generate a representative distribution of the peak hour and daily traffic patterns. Field personnel were also instructed to carefully record license plates of vehicles in all lanes at a relatively consistent rate to ensure an unbiased sampling.

Each location was adequately distanced from the adjacent roadway and the data collectors were equipped with orange vests and strobe lights according to DelDOT safety regulations. Throughout the day, management and support personnel relieved the data collectors for periodic breaks and during mealtime. At the end of the day, the spreadsheets were collected from each location and each participant was debriefed. Due to privacy issues, participants were asked not to disclose information regarding specific vehicles and the license plate data was kept in a secure location.

ANALYSIS

Data Compilation

Following field data collection, the license plate data was manually entered into Microsoft Excel spreadsheet files. Over a total of 58,000 license plates were recorded throughout the day and compiled by the team. This also afforded us to monitor the data and implement quality assurance. Thus, all human and systematic errors were minimized by eliminating extraneous and illegible plates during field data entry. A vast majority of the vehicles observed had Delaware tags, while approximately 10% were out-of-state, including Maryland, Virginia, and New Jersey. During data collection, distinctions were made between in-state and out-of-state vehicles by denoting a two-digit prefix prior to the license plate digits (i.e., DE-Delaware, MD-Maryland, etc.). These distinctions were maintained during data entry.

Data Reduction

For analysis of the data collected, a program coded in the FORTRAN computer language was developed in order to reduce the data and provide origin-destination matches. This program operated under several design assumptions. These design assumptions included minimum probable travel times between locations, a minimum of three-digit recognition, single-event matching, and origin-to-destination relationships. The program reduced the data per each location and developed unadjusted 14 by 14 matrices indicating origin-destination matches according to the data collected.

Methodology

Minimum travel times between locations were entered into the program as default criteria in identifying origin-destination matches. These minimum travel times assisted the program in identifying true matches based on the realistic time it takes to travel from one location to another.

At many locations where high speed and congestion predominated the day and/or peak hours, technicians were able to record only three digits of the license plates, whereas more than three digits or the entire license plate were usually recorded at the lower volume, lower speed locations. As such, the majority of the data consisted of three-digit values and the program was designed to make matches based on at least the first three-digits.

The program was also defaulted to recognize single-event matches, being those matches where a vehicle transverses the study area with one ultimate origin and one ultimate destination. Many vehicles traveled the study area and may possibly have been recorded at multiple stations

throughout the day and during peak hour periods. As such, the program tracked the true one-way route taken by the vehicle.

The location where a vehicle first appears and the location where the vehicle appears at a later time were recognized as the origin and destination locations, respectively. Negative travel times were disregarded by the program and were not included as an origin-to-destination match. Instead, should the trip match have been above the minimum travel time threshold, a negative travel time would have indicated the reversal of the origin and destination locations.

Calibration

In the data reduction of the data, the program was calibrated to determine the total number of origin-destination matches over the entire day and during each of the peak hour periods within the study area. During the development of the trip matrices, the program was also calibrated using finer and improved design assumptions. The program was calibrated to determine matches per the morning peak hour period, being 7:30am to 8:30am, the afternoon peak hour period, being 11:45am to 12:45pm, and the evening peak hour period, being 4:30pm to 5:30pm as well as for the entire day.

Sources of Error

Despite the design assumptions and calibration of the program, extraneous origin-destination matches may have been made. These sources of error may be the result of human error in data collection, irregularities in travel patterns, a biased sampling of data, and/or extraneous matches made by the program. Through the efforts of quality assurance, improved design assumptions during data reduction, and sound engineering judgement, we expect that these have minimized the amount of systematic error.

Results

Following the analysis of the data, the program generated a 14x14 trip matrix for each time period designated: Morning Peak Hour (7:30am – 8:30am), Afternoon Peak Hour (11:45am – 12:45pm), and Evening Peak Hour (4:30pm – 5:30pm). These results were expanded and weighted according to the average hourly traffic at each location. The weighted trip results can be found in Tables 2.1, 2.2, and 2.3 for the morning, afternoon, and evening peak hour periods, respectively. The weighted trip results were then divided by the hourly traffic volumes and percentage splits per each location were developed. These percentage splits are shown in Tables 3.1, 3.2, and 3.3 for the morning, afternoon, and evening peak hour periods, respectively.

Interpretation of Results

A successful license plate match is defined as a positively identified route from an origin location to a destination location taken by one recorded vehicle. For purposes of our study, we identified single-event trips, or in other words, those routes with one ultimate origin and one destination. The possibility of overlap, or the tendency of a vehicle having more than one destination relative to its origin location, is illustrated by the total matches per location in the expanded data set exceeding the actual number of valid license plates recorded in the field.

Retention Rates

A retention rate for purposes of our analysis is defined as a percent ratio of the total number of successful license plate matches of all origin or destination locations to the total number of license plates recorded in the field. Rates were determined for each location as an origin and a destination and essentially represent the capture made during data collection. Retention rates for the morning, afternoon and evening peak hour periods were also determined per location and according to the overall study area. Low retention rates relative to the mean may have a tendency to suggest that trips were not successfully tracked possibly due to the presence of an unmonitored alternate route, a conceptual boundary of the study area, and/or some degree of error within the matching or data collection processes. High retention rates may suggest that many trips were successfully tracked and those rates exceeding 100 percent may suggest that vehicles were successfully tracked through more than one survey (data collection) location.

Success Rates

A success rate for purposes of our analysis is defined as a percent ratio of the total number of license plates recorded to the directional hourly average daily traffic (DHADT) traveling by each survey location. Rates were determined for each location during the morning, afternoon, and evening peak hour periods as well as the entire study area. They essentially represent the degree of success in recording as much of the adjacent roadway traffic as possible. Low success rates relative to the mean may suggest that the adjacent roadway traffic was very high in volume, congested, or was traveling at high speeds, and thus it was more difficult to record license plates. High success rates relative to the mean may suggest that the adjacent traffic was lower in volume or more attainable during data collection.

STUDY FINDINGS

The following summarizes our basic study findings according to peak travel period:

Morning Peak Hour Period

The morning peak hour period occurred from 7:30 am to 8:30 am within the study area. During this time period, we recorded approximately 5,400 license plates, of which approximately 3,800 matches were successfully made giving an overall retention rate for all locations of approximately 71%. It should be noted that these matches may also include matches made by more than one vehicle, and as such, this 71% retention rate does not truly reflect the number of vehicles successfully tracked. Also during this peak hour period, approximately 12,000 vehicles traveled through the survey locations providing an overall success rate of approximately 45%.

Entering the study area along northbound SR 1-US Route 113 at Little Heaven, approximately 30% of traffic was found to travel into Dover via northbound US Route 113, about 6% of traffic was found to travel elsewhere within the study area.

Entering the study area along southbound US Route 13 at SR8 in Dover, approximately 17% of traffic was found to travel out of Dover via southbound US Route 113, approximately 5% was found to travel via US Route 113 Alternate towards Little Heaven, approximately 13% traveled elsewhere within the study area.

Afternoon Peak Hour Period

The afternoon peak hour period occurred from 11:45 am to 12:45 pm within the study area. During this time frame, we recorded approximately 4,500 license plates, of which approximately 2,600 license plates were successfully tracked giving an overall retention rate for all locations of approximately 58%. It should be noted that these matches may also include matches made by more than one vehicle, and as such, this 58% retention rate does not truly reflect the number of vehicles successfully tracked. Also during this peak hour period, approximately 12,400 vehicles traveled through the survey locations providing an overall success rate of approximately 36%.

Entering the study area along northbound SR 1-US Route 113 at Little Heaven, approximately 5% of traffic was found to travel into Dover via northbound US Route 113, about 2% of traffic was found to travel elsewhere within the study area, and a remaining 93% of traffic was not tracked.

Entering the study area along southbound US Route 13 at SR8 in Dover, approximately 4% of traffic was found to travel out of Dover via southbound US Route 113, approximately 1% was found to travel via US Route 113 Alternate towards Little Heaven, approximately 9% traveled elsewhere within the study area, and a remaining 86% of traffic was not tracked.

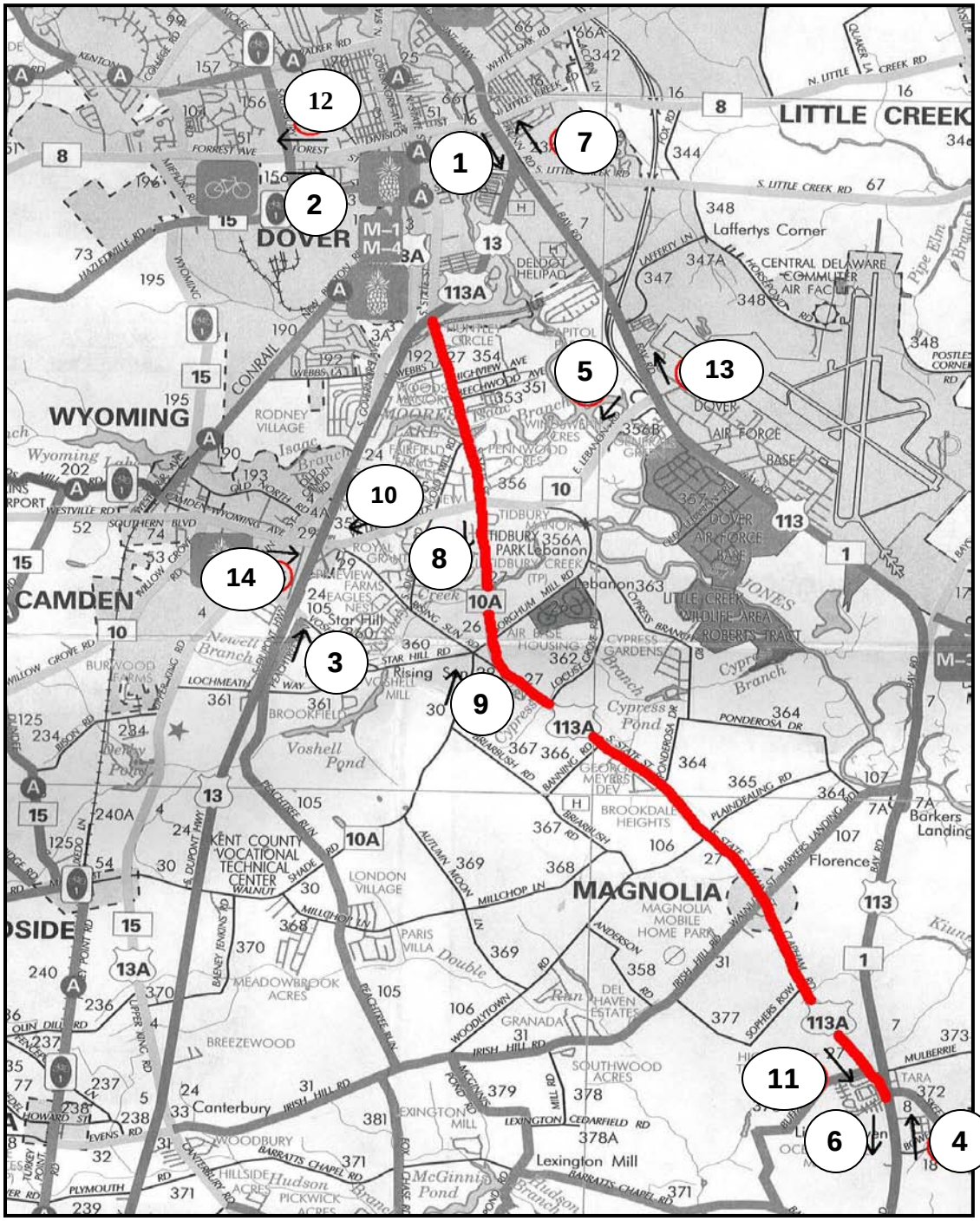
Evening Peak Hour Period

The evening peak hour period occurred from 4:30 pm to 5:30 pm within the study area. During this time period, we recorded approximately 4,800 license plates, of which approximately 3,000 license plates were successfully tracked giving an overall retention rate for all locations of approximately 63%. It should be noted that these matches may also include matches made by more than one vehicle, and as such, this 63% retention rate does not truly reflect the number of vehicles successfully tracked. Also during this peak hour period, approximately 15,000 vehicles traveled through the survey locations providing an overall success rate of approximately 32%.

Entering the study area along northbound SR 1-US Route 113 at Little Heaven, approximately 8% of traffic was found to travel into Dover via northbound US Route 113, about 1% of traffic was found to travel elsewhere within the study area.

Entering the study area along southbound US Route 13 at SR8 in Dover, approximately 33% of traffic was found to travel out of Dover via southbound US Route 113, approximately 10% was found to travel via US Route 113 Alternate towards Little Heaven, approximately 12% traveled elsewhere within the study area.

Appendix C Figure 1: Location of License Plate Survey Stations



Appendix C Table 1

Station Number	Location	Direction	Number of Travel Lanes (One-way)	Traffic Analysis Zone (TAZ)
1	Along US Route 13 at Loockerman Street	Southbound	3	K 085
2	Along State Route 8 at Gibbs Drive	Eastbound	1	K 107
3	Along US Route 13 at Star Hill Road (K105)	Northbound	2	K 103
4	Along SR 1 / US Route 113 at North Bowers Beach Road (K18)	Northbound	2	K 103
5	Along State Route 10 at Generals Green Way	Westbound	2	K 088
6	Along SR 1 / US Route 113 at US Route 113 Alternate	Southbound	2	K 088
7	Along US Route 13 at State Route 8 (Division Street)	Northbound	3	K 080
8	Along US Route 113 Alternate at State Route 10	Southbound	2	K 091
9	Along State Route 10 Alternate at Rising Sun Road (K29)	Northbound	1	K 123
10	Along State Route 10 at Rising Sun Road (K29)	Westbound	2	K 091
11	Along US Route 113 Alternate at K376	Southbound	1	K 124
12	Along State Route 8 at Gibbs Avenue	Westbound	1	K 107
13	Along US Route 113 at State Route 10 / SR 1 off ramp	Northbound	2	K 120
14	Along State Route 10 at East Street	Eastbound	1	K 092

Appendix C Table 2.1 (AM Matches)

Century Engineering, Inc.
Kent MPO / South State Street Study
Origin-Destination Survey
License Plate Study
TABLE 2.1

Weighted Expansion
3-Digit Matching
AM Peak Hour Period (Improved Minimum Travel Times) (7:30 am - 8:30 am)

DHADT = 2001 Directional hourly average daily traffic
Source DelDOT 2000 Traffic Summary
please note that this is NOT the design volume

TOTALO = Total number of matches (from/to)
TOTALD = Total number of matches (to/from)
T.c. = Total number of valid license plates recorded
R.R.O. = Retention rate (%) as ratio of TOTALO to T.c.
R.R.D. = Retention rate (%) as ratio of TOTALD to T.c.
S.R. = Success rate (%) as ratio of T.c. to DHADT

		DESTINATION																		
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	TOTALO	T.c.	R.R.O.	DHADT	S.R.
ORIGIN	Loc.1	N/A	17	11	10	95	223	48	83	1	45	13	28	41	34	649	363	178.87%	1849	19.64%
	Loc. 2	71	N/A	0	4	10	43	103	15	1	5	14	3	7	9	285	349	81.57%	481	72.63%
	Loc. 3	25	2	N/A	12	2	9	153	37	2	3	21	32	253	95	646	291	221.83%	1226	23.74%
	Loc. 4	7	6	3	N/A	27	10	115	3	5	31	3	31	238	22	500	509	98.24%	1383	36.80%
	Loc. 5	3	2	0	4	N/A	5	15	54	4	57	6	16	24	73	262	278	94.25%	577	48.19%
	Loc. 6	8	2	4	8	3	N/A	6	4	3	1	1	3	12	4	60	467	12.89%	1292	36.13%
	Loc. 7	19	5	5	9	9	12	N/A	3	1	1	3	76	12	4	160	636	25.14%	1546	41.13%
	Loc. 8	1	0	3	2	1	6	5	N/A	3	4	54	1	12	11	103	183	56.08%	314	58.22%
	Loc. 9	2	0	1	4	1	2	32	0	N/A	1	13	8	54	28	147	199	73.88%	214	93.19%
	Loc. 10	6	1	1	6	5	6	110	3	1	N/A	6	48	17	179	389	270	143.99%	744	36.27%
	Loc. 11	3	2	1	7	1	1	36	1	0	1	N/A	2	44	3	103	167	61.62%	211	78.96%
	Loc. 12	8	5	4	4	1	3	10	3	2	1	4	N/A	7	4	57	355	16.02%	481	73.87%
	Loc. 13	6	6	4	1	2	4	120	1	7	1	1	38	N/A	4	195	865	22.58%	1155	74.86%
	Loc. 14	7	3	33	5	6	4	63	22	6	3	14	17	100	N/A	283	482	58.78%	604	79.76%
	TOTALD	**168**	**53**	**72**	**75**	**164**	**327**	**817**	**229**	**35**	**154**	**153**	**303**	**819**	**469**	**3838**				
	T.c.	**363**	**349**	**291**	**509**	**278**	**467**	**636**	**183**	**199**	**270**	**167**	**355**	**865**	**482**		**5414**			
	R.R.D.	**46.29%**	**15.09%**	**24.70%**	**14.70%**	**59.16%**	**70.01%**	**128.42%**	**125.37%**	**17.65%**	**57.06%**	**91.54%**	**85.37%**	**94.73%**	**97.28%**			0.70898831		
	DHADT	**1849**	**481**	**1226**	**1383**	**577**	**1292**	**1546**	**314**	**214**	**744**	**211**	**481**	**1155**	**604**				**12078**	
	S.R.	**19.64%**	**72.63%**	**23.74%**	**36.80%**	**48.19%**	**36.13%**	**41.13%**	**58.22%**	**93.19%**	**36.27%**	**78.96%**	**73.87%**	**74.86%**	**79.76%**					0.44825027

Dover / Kent County Metropolitan Planning Organization

Appendix C Table 2.2 (Afternoon Matches)

Kent MPO / South State Street Study
Origin-Destination Survey
License Plate Study
TABLE 2.2
Weighted Expansion
3-Digit Matching
Mid Day Peak Hour Period (Improved Minimum Travel Times) (11:45 am - 12:45 pm)

DHADT = 2001 Directional hourly average daily traffic
Source DelDOT 2000 Traffic Summary
please note that this is NOT the design volume

TOTALO = Total number of matches (from/to)
TOTALD = Total number of matches (to/from)
T.c. = Total number of valid license plates recorded
R.R.O. = Retention rate (%) as ratio of TOTALO to T.c.
R.R.D. = Retention rate (%) as ratio of TOTALD to T.c.
S.R. = Success rate (%) as ratio of T.c. to DHADT

		DESTINATION																		
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	TOTALO	T.c.	R.R.O.	DHADT	S.R.
ORIGIN	Loc.1	N/A	11	4	9	28	50	33	28	0	6	0	17	33	44	262	439	59.72%	1942	22.60%
	Loc. 2	75	N/A	0	4	29	23	33	23	0	8	19	19	23	11	268	327	81.81%	505	64.76%
	Loc. 3	72	0	N/A	37	21	4	57	77	2	26	26	46	52	124	544	312	174.33%	1288	24.22%
	Loc. 4	6	0	0	N/A	14	1	6	1	2	6	0	0	33	12	81	500	16.12%	1112	44.97%
	Loc. 5	4	0	1	6	N/A	6	5	42	4	63	18	3	13	63	226	306	73.96%	731	41.87%
	Loc. 6	4	2	4	0	2	N/A	2	0	2	0	5	4	2	5	30	353	8.63%	1266	27.89%
	Loc. 7	222	23	7	27	30	25	N/A	11	0	5	5	57	2	21	434	426	101.95%	1942	21.93%
	Loc. 8	3	2	2	2	1	0	3	N/A	3	9	45	0	14	7	93	174	53.47%	395	44.07%
	Loc. 9	1	0	0	2	2	1	0	0	N/A	3	2	2	2	5	18	101	17.95%	131	77.23%
	Loc. 10	11	2	20	9	5	2	12	0	0	N/A	23	31	8	86	208	243	85.46%	759	32.02%
	Loc. 11	1	1	0	11	0	3	5	2	0	0	N/A	1	12	3	39	107	36.14%	209	51.08%
	Loc. 12	59	23	2	8	7	5	30	11	0	1	4	N/A	5	15	170	415	40.96%	555	74.72%
	Loc. 13	23	3	1	5	21	5	55	5	0	2	0	8	N/A	6	134	454	29.55%	944	48.07%
	Loc. 14	11	1	11	3	24	1	15	7	3	15	9	11	11	N/A	121	382	31.76%	662	57.69%
	TOTALD	**491**	**67**	**52**	**124**	**182**	**126**	**255**	**208**	**17**	**142**	**156**	**198**	**210**	**401**	**2628**				
	T.c.	**439**	**327**	**312**	**500**	**306**	**353**	**426**	**174**	**101**	**243**	**107**	**415**	**454**	**382**		**4539**			
	R.R.D.	**111.91%**	**20.60%**	**16.57%**	**24.85%**	**59.37%**	**35.64%**	**59.81%**	**119.29%**	**16.37%**	**58.24%**	**145.85%**	**47.80%**	**46.23%**	**105.10%**			0.57904124		
	DHADT	**1942**	**505**	**1288**	**1112**	**731**	**1266**	**1942**	**395**	**131**	**759**	**209**	**555**	**944**	**662**				**12442**	
	S.R.	**22.60%**	**64.76%**	**24.22%**	**44.97%**	**41.87%**	**27.89%**	**21.93%**	**44.07%**	**77.23%**	**32.02%**	**51.08%**	**74.72%**	**48.07%**	**57.69%**					0.36480573

Appendix C Table 2.3 (PM Matches)

Kent MPO / South State Street Study
Origin-Destination Survey
License Plate Study
TABLE 2.3
Weighted Expansion
3-Digit Matching
PM Peak Hour Period (Improved Minimum Travel Times) (4:30 pm - 5:30 pm)

DHADT = 2001 Directional hourly average daily traffic
Source DelDOT 2000 Traffic Summary
please note that this is NOT the design volume

TOTALO = Total number of matches (from/to)
TOTALD = Total number of matches (to/from)
T.c. = Total number of valid license plates recorded
R.R.O. = Retention rate (%) as ratio of TOTALO to T.c.
R.R.D. = Retention rate (%) as ratio of TOTALD to T.c.
S.R. = Success rate (%) as ratio of T.c. to DHADT

		DESTINATION																		
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	TOTALO	T.c.	R.R.O.	DHADT	S.R.
ORIGIN	Loc.1	N/A	6	0	8	208	496	3	224	5	40	112	144	43	37	1327	339	391.50%	2171	15.62%
	Loc. 2	7	N/A	0	1	11	45	5	32	1	0	14	3	1	5	125	277	45.04%	503	55.10%
	Loc. 3	2	1	N/A	1	3	8	5	135	0	16	21	52	109	99	453	308	146.99%	1282	24.02%
	Loc. 4	1	0	0	N/A	11	6	7	4	2	7	3	7	71	5	125	471	26.55%	1346	34.98%
	Loc. 5	0	2	1	3	N/A	11	10	90	2	59	6	15	82	98	379	528	71.82%	1088	48.52%
	Loc. 6	1	1	0	0	0	N/A	0	0	0	1	0	1	0	0	3	616	0.55%	2076	29.67%
	Loc. 7	22	4	0	11	22	20	N/A	18	4	2	0	100	15	20	239	264	90.48%	2336	11.30%
	Loc. 8	0	0	0	1	0	4	0	N/A	1	8	34	1	11	2	60	251	24.07%	528	47.58%
	Loc. 9	0	0	0	1	1	2	1	1	N/A	1	6	4	15	15	47	141	33.56%	169	83.48%
	Loc. 10	1	1	5	0	7	6	0	8	0	N/A	5	5	10	101	148	272	54.29%	1050	25.90%
	Loc. 11	1	0	0	1	0	2	1	1	0	1	N/A	0	3	1	10	241	4.26%	275	87.56%
	Loc. 12	0	3	0	2	3	8	19	5	2	0	0	N/A	4	4	52	364	14.30%	708	51.39%
	Loc. 13	2	4	0	1	5	4	18	2	0	0	1	15	N/A	5	56	409	13.76%	969	42.20%
	Loc. 14	0	0	6	1	2	3	2	17	1	1	7	4	9	N/A	53	412	12.90%	604	68.18%
	TOTALD	**38**	**22**	**11**	**32**	**274**	**616**	**72**	**535**	**18**	**136**	**209**	**351**	**375**	**392**	**3078**				
	T.c.	**339**	**277**	**308**	**471**	**528**	**616**	**264**	**251**	**141**	**272**	**241**	**364**	**409**	**412**		**4893**			
	R.R.D.	**11.13%**	**7.83%**	**3.52%**	**6.73%**	**51.83%**	**99.97%**	**27.09%**	**213.25%**	**13.05%**	**49.96%**	**86.72%**	**96.32%**	**91.59%**	**95.07%**			0.6291465		
	DHADT	**2171**	**503**	**1282**	**1346**	**1088**	**2076**	**2336**	**528**	**169**	**1050**	**275**	**708**	**969**	**604**				**15105**	
	S.R.	**15.62%**	**55.10%**	**24.02%**	**34.98%**	**48.52%**	**29.67%**	**11.30%**	**47.58%**	**83.48%**	**25.90%**	**87.56%**	**51.39%**	**42.20%**	**68.18%**					0.32392327

Appendix C Table 3.1 (AM Percent Matrix)

TABLE 3.1
3-Digit Matching
AM Peak Hour Period (Improved Minimum Travel Times) (7:30 am - 8:30 am)

ORIGIN	DESTINATION															
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	Remain
	Loc.1	N/A	0.9%	0.6%	0.6%	5.2%	12.1%	2.6%	4.5%	0.1%	2.4%	0.7%	1.5%	2.2%	1.9%	**64.9%**
	Loc. 2	14.7%	N/A	0.0%	0.9%	2.1%	9.0%	21.5%	3.2%	0.1%	1.1%	2.9%	0.6%	1.4%	1.8%	**40.8%**
	Loc. 3	2.1%	0.2%	N/A	0.9%	0.2%	0.8%	12.5%	3.0%	0.2%	0.3%	1.7%	2.6%	20.6%	7.7%	**47.3%**
	Loc. 4	0.5%	0.4%	0.2%	N/A	2.0%	0.7%	8.3%	0.2%	0.3%	2.2%	0.2%	2.2%	17.2%	1.6%	**63.9%**
	Loc. 5	0.5%	0.4%	0.0%	0.6%	N/A	0.8%	2.6%	9.4%	0.6%	9.9%	1.0%	2.7%	4.2%	12.6%	**54.6%**
	Loc. 6	0.6%	0.2%	0.3%	0.6%	0.3%	N/A	0.4%	0.3%	0.2%	0.1%	0.1%	0.3%	0.9%	0.3%	**95.3%**
	Loc. 7	1.3%	0.4%	0.4%	0.6%	0.6%	0.7%	N/A	0.2%	0.1%	0.1%	0.2%	4.9%	0.7%	0.3%	**89.7%**
	Loc. 8	0.4%	0.1%	1.0%	0.7%	0.3%	1.8%	1.5%	N/A	1.0%	1.2%	17.1%	0.4%	3.8%	3.4%	**67.3%**
	Loc. 9	1.0%	0.0%	0.5%	1.8%	0.3%	1.1%	15.1%	0.1%	N/A	0.6%	6.3%	3.8%	25.1%	13.2%	**31.2%**
	Loc. 10	0.8%	0.2%	0.2%	0.7%	0.6%	0.7%	14.8%	0.4%	0.1%	N/A	0.8%	6.5%	2.2%	24.1%	**47.8%**
	Loc. 11	1.3%	0.9%	0.4%	3.3%	0.4%	0.6%	17.2%	0.6%	0.1%	0.4%	N/A	0.9%	21.0%	1.3%	**51.3%**
	Loc. 12	1.8%	1.1%	0.9%	0.8%	0.3%	0.7%	2.0%	0.6%	0.4%	0.3%	0.8%	N/A	1.4%	0.8%	**88.2%**
	Loc. 13	0.5%	0.5%	0.3%	0.1%	0.2%	0.3%	10.4%	0.1%	0.6%	0.1%	0.1%	3.3%	N/A	0.3%	**83.1%**
	Loc. 14	1.1%	0.5%	5.4%	0.8%	1.0%	0.6%	10.4%	3.6%	1.0%	0.6%	2.3%	2.9%	16.6%	N/A	**53.1%**
	Remain	**73.3%**	**94.3%**	**89.7%**	**87.6%**	**86.6%**	**70.1%**	**-19.4%**	**73.8%**	**95.2%**	**80.8%**	**65.8%**	**67.5%**	**-17.5%**	**30.7%**	

Table 3.2 (Afternoon Percent Matrix)

TABLE 3.2																
% Splits Matrix																
3-Digit Matching																
Mid Day Peak Hour Period (Improved Minimum Travel Times) (11:45 am - 12:45 pm)																
		DESTINATION														
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	Remain
ORIGIN	Loc.1	N/A	0.6%	0.2%	0.5%	1.4%	2.6%	1.7%	1.4%	0.0%	0.3%	0.0%	0.9%	1.7%	2.3%	**86.5%**
	Loc. 2	14.9%	N/A	0.0%	0.8%	5.7%	4.6%	6.5%	4.6%	0.0%	1.5%	3.8%	3.8%	4.6%	2.1%	**47.0%**
	Loc. 3	5.6%	0.0%	N/A	2.9%	1.6%	0.3%	4.4%	6.0%	0.2%	2.0%	2.0%	3.6%	4.0%	9.6%	**57.8%**
	Loc. 4	0.5%	0.0%	0.0%	N/A	1.3%	0.1%	0.5%	0.1%	0.2%	0.5%	0.0%	0.0%	3.0%	1.1%	**92.8%**
	Loc. 5	0.5%	0.0%	0.2%	0.8%	N/A	0.8%	0.7%	5.7%	0.5%	8.6%	2.5%	0.4%	1.8%	8.6%	**69.0%**
	Loc. 6	0.3%	0.1%	0.3%	0.0%	0.1%	N/A	0.1%	0.0%	0.1%	0.0%	0.4%	0.3%	0.1%	0.4%	**97.6%**
	Loc. 7	11.4%	1.2%	0.4%	1.4%	1.5%	1.3%	N/A	0.6%	0.0%	0.2%	0.2%	2.9%	0.1%	1.1%	**77.6%**
	Loc. 8	0.9%	0.6%	0.6%	0.6%	0.3%	0.0%	0.9%	N/A	0.9%	2.2%	11.5%	0.0%	3.6%	1.7%	**76.4%**
	Loc. 9	0.5%	0.0%	0.0%	1.5%	1.5%	0.5%	0.0%	0.0%	N/A	2.5%	1.2%	1.2%	1.2%	3.7%	**86.1%**
	Loc. 10	1.4%	0.2%	2.6%	1.2%	0.6%	0.2%	1.5%	0.0%	0.0%	N/A	3.1%	4.1%	1.0%	11.3%	**72.6%**
	Loc. 11	0.5%	0.5%	0.0%	5.1%	0.0%	1.4%	2.3%	0.9%	0.0%	0.0%	N/A	0.5%	5.8%	1.4%	**81.5%**
	Loc. 12	10.5%	4.2%	0.4%	1.4%	1.2%	1.0%	5.4%	2.0%	0.0%	0.1%	0.7%	N/A	0.8%	2.7%	**69.4%**
	Loc. 13	2.5%	0.3%	0.1%	0.6%	2.2%	0.6%	5.8%	0.6%	0.0%	0.2%	0.0%	0.8%	N/A	0.7%	**85.8%**
	Loc. 14	1.6%	0.1%	1.6%	0.5%	3.6%	0.1%	2.3%	1.0%	0.5%	2.3%	1.3%	1.6%	1.6%	N/A	**81.7%**
	Remain	**48.8%**	**92.2%**	**93.7%**	**82.7%**	**78.9%**	**86.6%**	**67.9%**	**77.1%**	**97.6%**	**79.6%**	**73.2%**	**79.8%**	**70.5%**	**53.3%**	

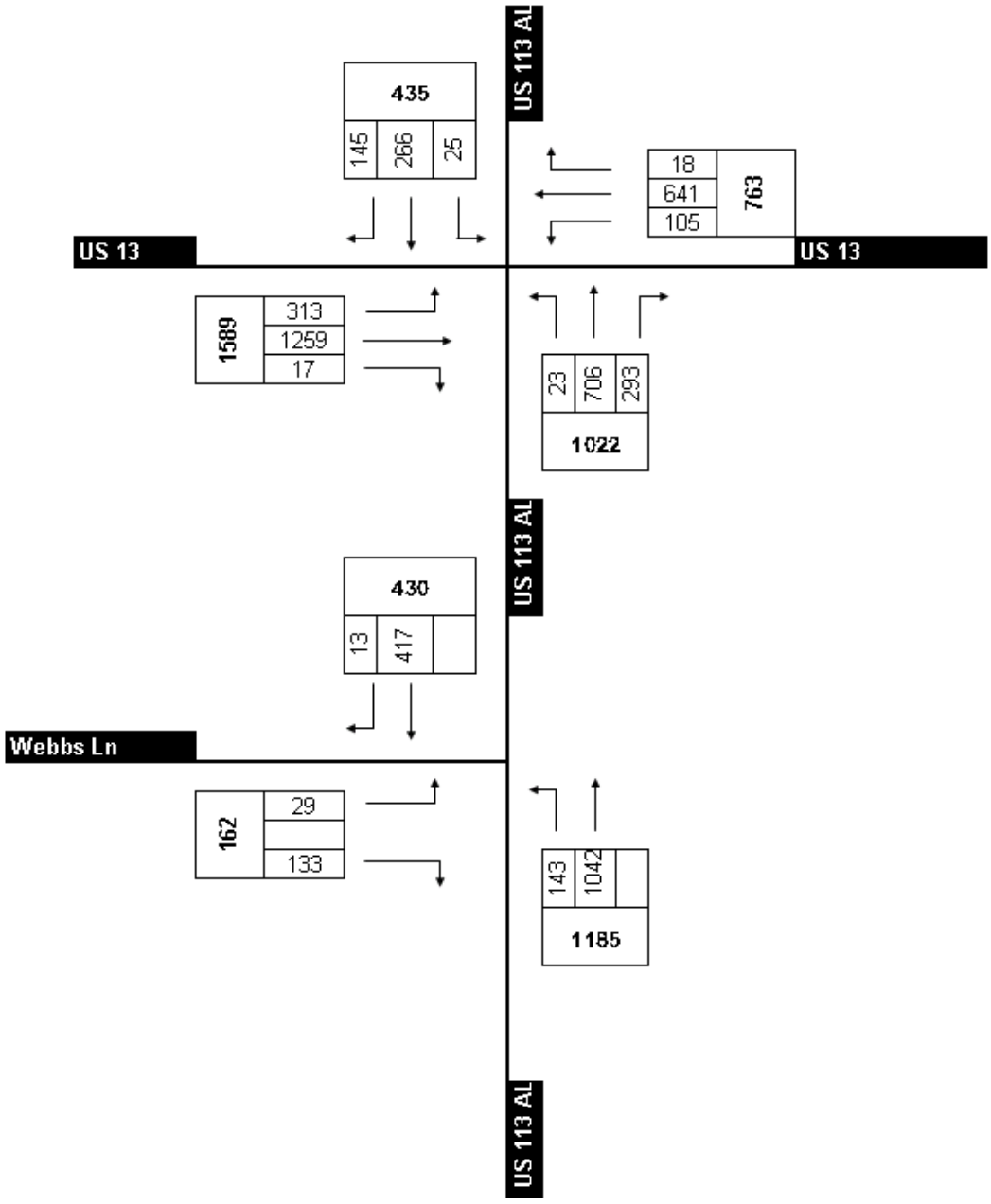
Appendix C Table 3.3 (PM Percent Matrix)

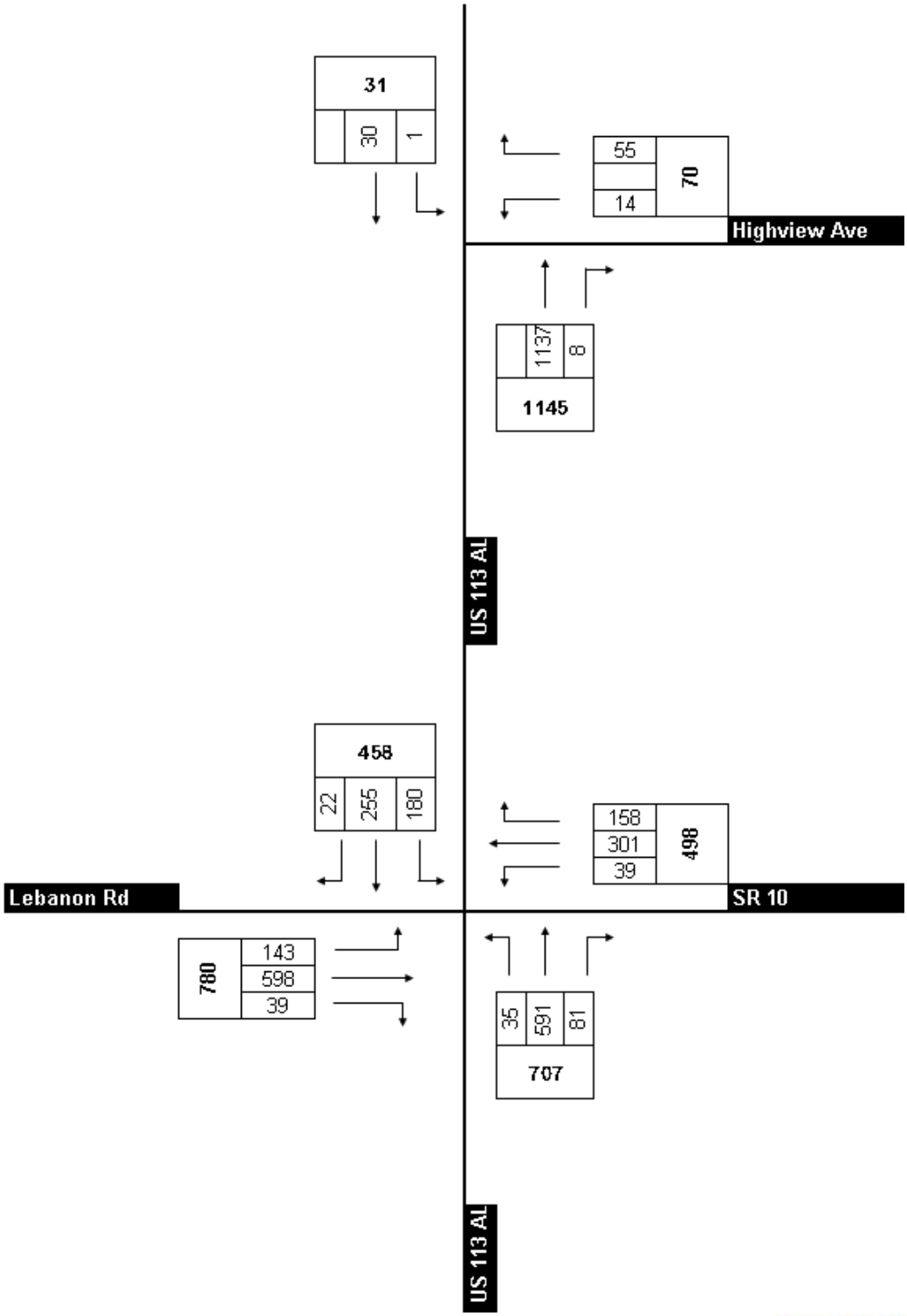
TABLE 3.3																
% Splits Matrix																
3-Digit Matching																
PM Peak Hour Period (Improved Minimum Travel Times) (4:30 pm - 5:30 pm)																
		DESTINATION														
		Loc.1	Loc. 2	Loc. 3	Loc. 4	Loc. 5	Loc. 6	Loc. 7	Loc. 8	Loc. 9	Loc. 10	Loc. 11	Loc. 12	Loc. 13	Loc. 14	**Remain**
ORIGIN	Loc.1	N/A	0.3%	0.0%	0.4%	9.6%	22.9%	0.1%	10.3%	0.2%	1.8%	5.2%	6.6%	2.0%	1.7%	**38.9%**
	Loc. 2	1.4%	N/A	0.0%	0.2%	2.3%	9.0%	0.9%	6.3%	0.2%	0.0%	2.7%	0.6%	0.3%	1.0%	**75.2%**
	Loc. 3	0.2%	0.1%	N/A	0.1%	0.2%	0.6%	0.4%	10.6%	0.0%	1.2%	1.6%	4.1%	8.5%	7.7%	**64.7%**
	Loc. 4	0.1%	0.0%	0.0%	N/A	0.8%	0.5%	0.5%	0.3%	0.2%	0.5%	0.2%	0.5%	5.3%	0.4%	**90.7%**
	Loc. 5	0.0%	0.1%	0.0%	0.3%	N/A	1.0%	0.9%	8.3%	0.2%	5.4%	0.5%	1.4%	7.6%	9.0%	**65.2%**
	Loc. 6	0.0%	0.0%	0.0%	0.0%	0.0%	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**99.8%**
	Loc. 7	0.9%	0.2%	0.0%	0.5%	0.9%	0.9%	N/A	0.8%	0.2%	0.1%	0.0%	4.3%	0.7%	0.9%	**89.8%**
	Loc. 8	0.0%	0.0%	0.0%	0.2%	0.0%	0.7%	0.0%	N/A	0.1%	1.5%	6.5%	0.1%	2.0%	0.4%	**88.5%**
	Loc. 9	0.2%	0.0%	0.0%	0.5%	0.5%	1.2%	0.9%	0.4%	N/A	0.4%	3.5%	2.7%	8.9%	8.9%	**72.0%**
	Loc. 10	0.1%	0.1%	0.5%	0.0%	0.6%	0.6%	0.0%	0.7%	0.0%	N/A	0.5%	0.5%	0.9%	9.7%	**85.9%**
	Loc. 11	0.2%	0.0%	0.0%	0.5%	0.0%	0.7%	0.2%	0.2%	0.0%	0.3%	N/A	0.0%	1.1%	0.4%	**96.3%**
	Loc. 12	0.1%	0.4%	0.0%	0.3%	0.5%	1.2%	2.7%	0.7%	0.3%	0.0%	0.1%	N/A	0.5%	0.5%	**92.7%**
	Loc. 13	0.2%	0.4%	0.0%	0.1%	0.6%	0.4%	1.8%	0.2%	0.0%	0.0%	0.1%	1.5%	N/A	0.5%	**94.2%**
	Loc. 14	0.1%	0.0%	0.9%	0.2%	0.3%	0.5%	0.3%	2.7%	0.2%	0.2%	1.2%	0.6%	1.5%	N/A	**91.2%**
	Remain	**96.6%**	**98.4%**	**98.6%**	**96.8%**	**83.7%**	**59.8%**	**91.1%**	**58.5%**	**98.4%**	**88.4%**	**77.9%**	**77.1%**	**60.7%**	**59.0%**	

APPENDIX D

PROJECTED YEAR 2005 AM PEAK HOUR TRAFFIC VOLUMES

Projected Year 2005 AM Peak Hour Traffic Volumes

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1145
US 113 AL
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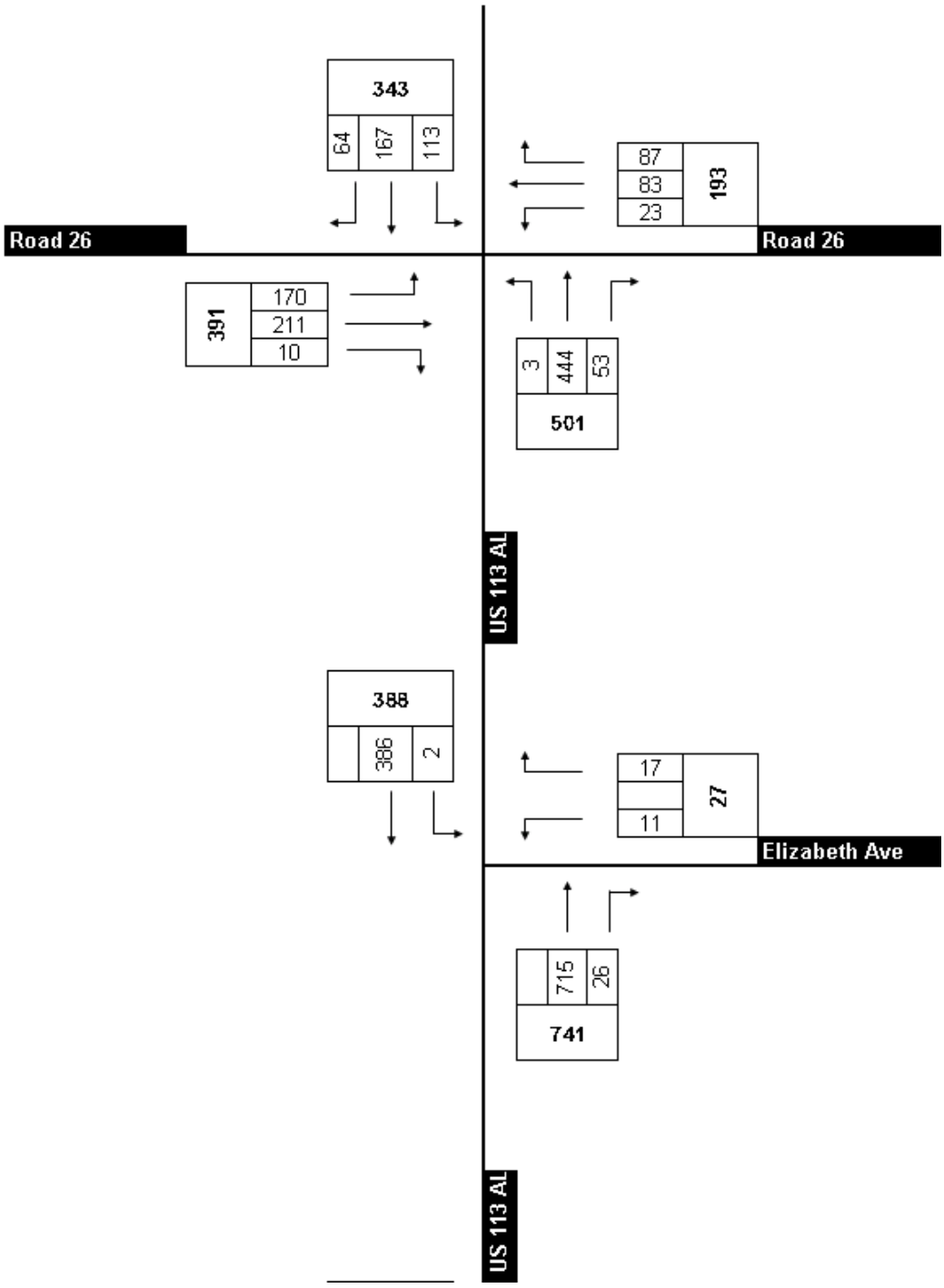
Lebanon Rd
SR 10
780
143
598
39
35
591
81
707
US 113 AL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23
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391
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211
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11
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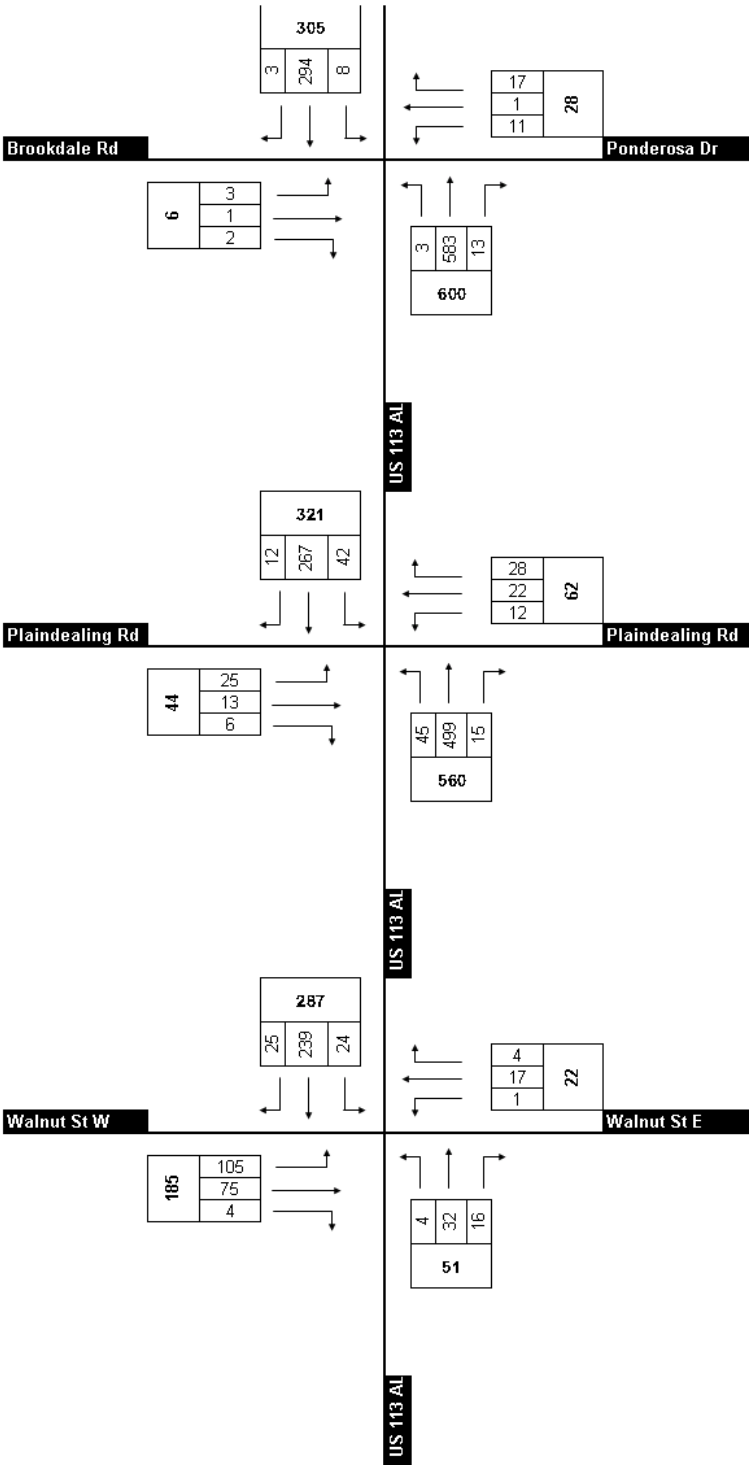
715
26
741
US 113 AL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17
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11
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Ponderosa Dr
6
3
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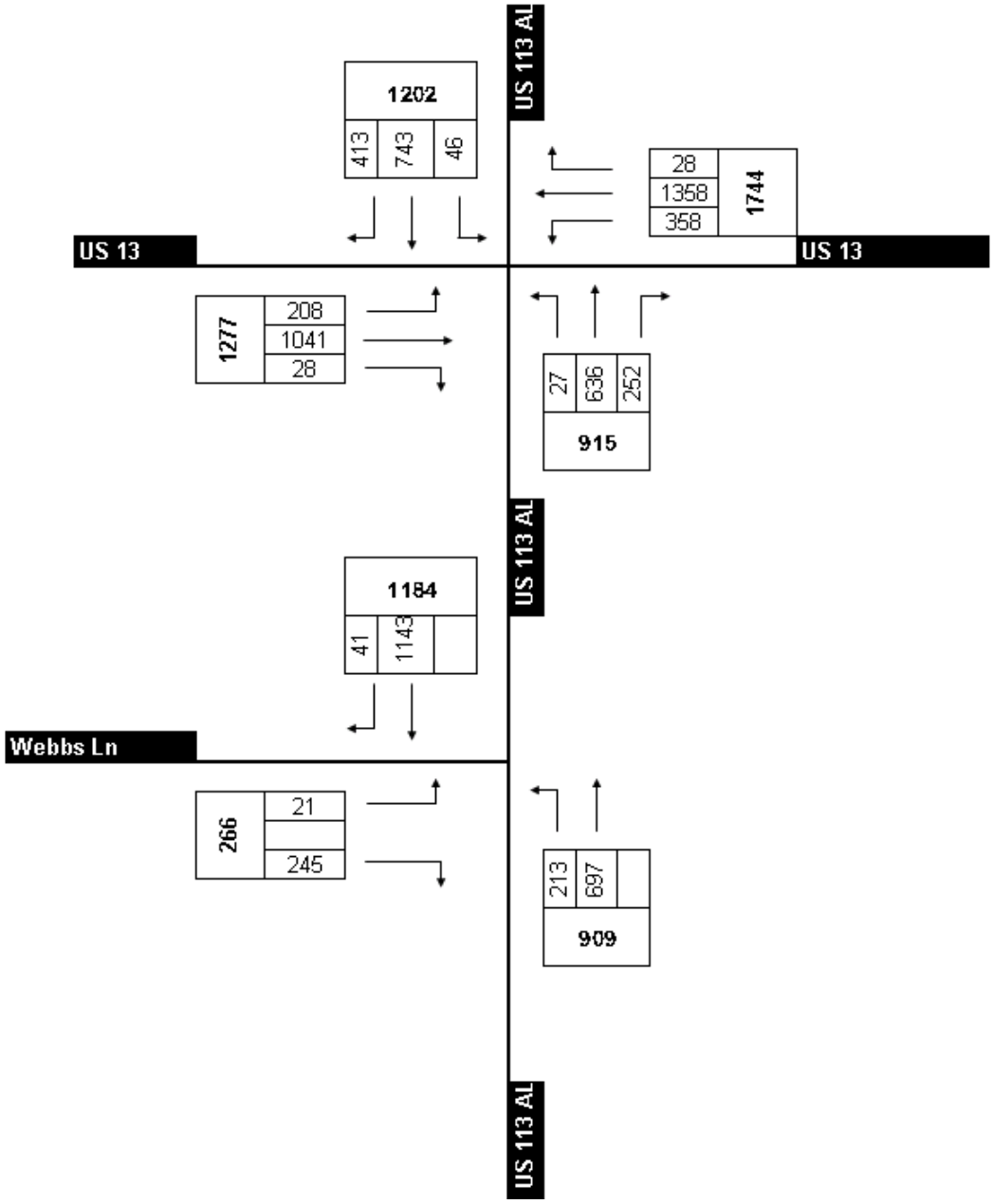
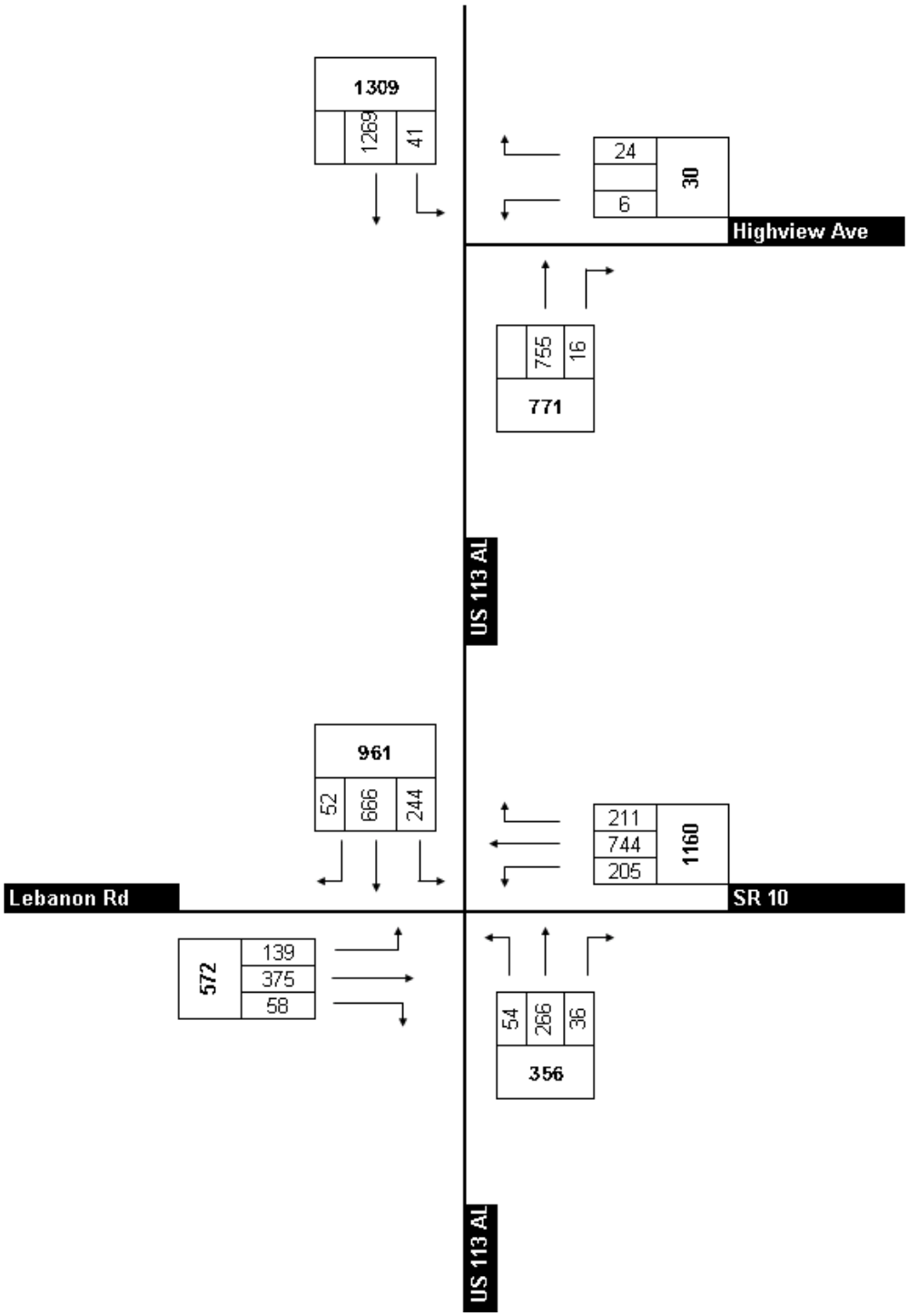
2
3
583
13
600
US 113 Al
321
12
267
42
28
22
12
62
Plaindealing Rd
Plaindealing Rd
44
25
13
6
45
499
15
560
US 113 Al
287
25
239
24
4
17
1
22
Walnut St W
Walnut St E
185
105
75
4
4
32
16
51
US 113 Al

Projected Year 2005 PM Peak Hour Volumes

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1269
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24
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Lebanon Rd
SR 10
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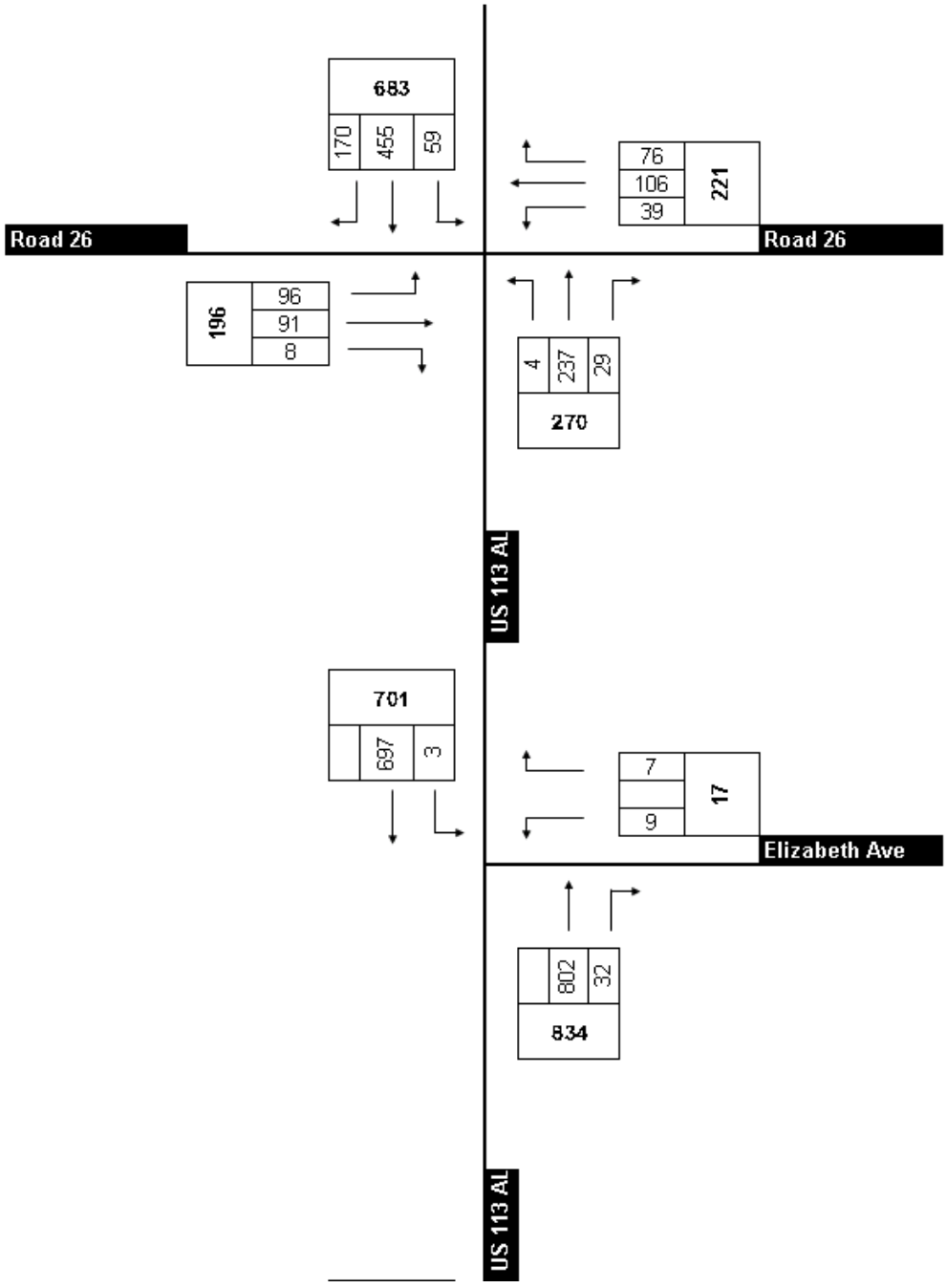
139
375
58
54
266
36
356
US 113 AL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76
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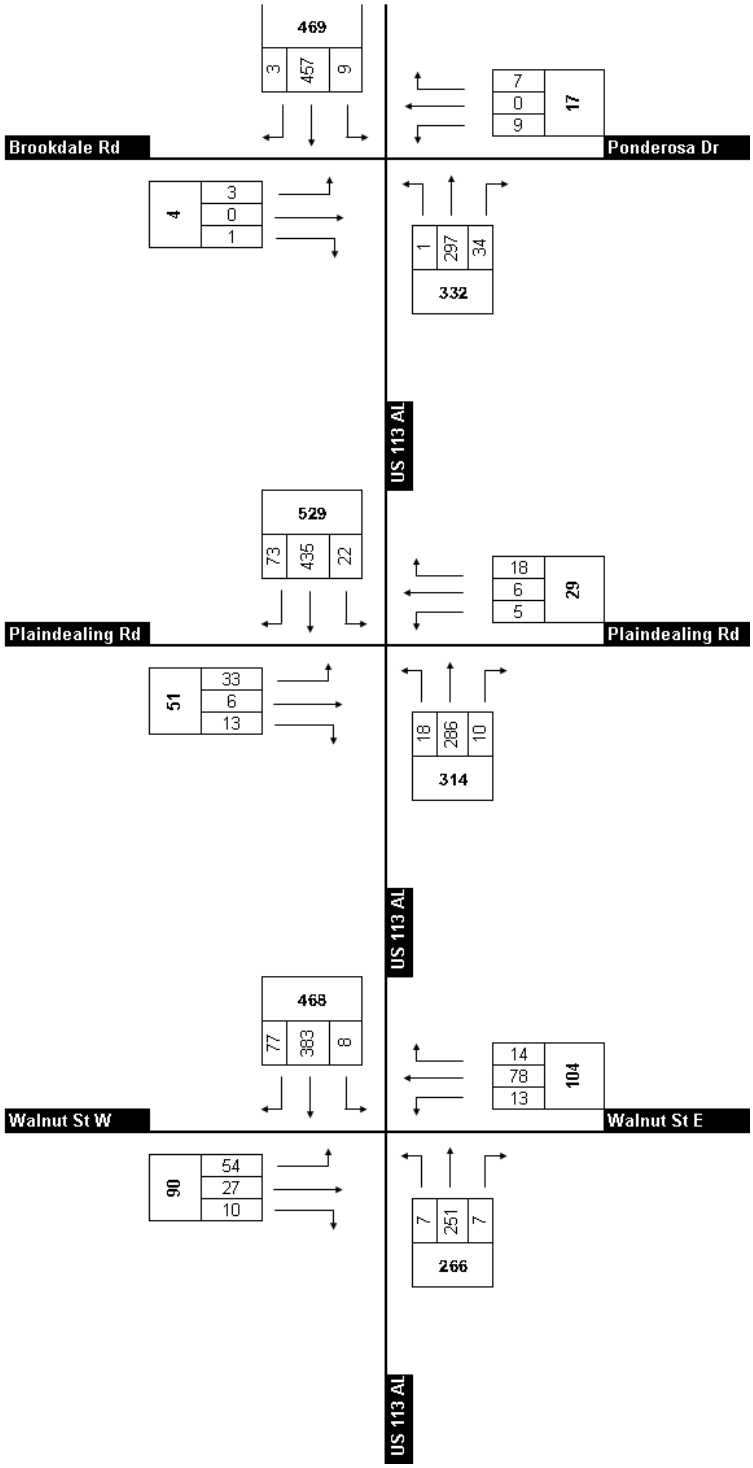
802
32
834
US 113 AL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9
17
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Ponderosa Dr
4
3
0
1
1
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34
332
US 113 AL
529
73
435
22
18
6
5
29
Plaindealing Rd
Plaindealing Rd
51
33
6
13
18
286
10
314
US 113 AL
468
77
383
8
14
78
13
104
Walnut St W
Walnut St E
90
54
27
10
7
251
7
266
US 113 AL

APPENDIX E

EXISTING AND PROJECTED LEVELS OF SERVICE

APPENDIX E TABLE 1.1

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 13 and US Route 113A (South State Street)	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Fully-Actuated Signalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition	E [58.2] (0.80)	F [122.9] (1.03)
Year 2005 Average Traffic Condition	E [73.3] (0.85)	F [127.4] (0.92)
Year 2005 Average Traffic Condition **- with signal improvements** **	D [41.7] (0.79)	E [60.5] (0.93)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for actuated signalized intersections. An overall level of service, delay, and volume-to-capacity (v/c) ratio are provided.

** The intersection was analyzed with improved signal timing and phasing. This improvement is outlined later in the document.

APPENDIX E TABLE 1.2

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Old Mill Road	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Unsignalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition		
Eastbound Left / Right Lane	F [85.3] (0.73)	F [50.5] (0.41)
Northbound Left / Through Lane	A [8.6] (0.01)	B [10.4] (0.02)
Year 2005 Average Traffic Condition		
Eastbound Left / Right Lane	F [119.9] (0.86)	F [51.5] (0.43)
Northbound Left / Through Lane	A [8.6] (0.01)	B [10.4] (0.02)
Year 2005 Average Traffic Condition **- with signal installation** **	B [17.0] (--)	B [14.1] (0.60)
Year 2005 Average Traffic Condition **- with signal installation and lane improvements** ***	B [16.5] (0.71)	B [14.0] (0.56)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for unsignalized intersections. Overall level of service, delay, and volume-to-capacity (v/c) ratio are not defined according the HCM methodology. As such, the individual critical movement measures of effectiveness are provided. Once analyzed as a signalized intersection, overall level of service is provided.

** The intersection was analyzed with the installation of a semi-actuated signalized intersection. This improvement is outlined later in this document.

*** The intersection was analyzed with a traffic signal and lane improvements. This improvement is outlined later in this document.

APPENDIX E TABLE 1.3

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and State Route 10 (Lebanon Road)	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Fully-Actuated Signalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition	E [57.1] (0.83)	F [84.4] (1.06)
Year 2005 Average Traffic Condition	E [75.7] (0.97)	F [107.6] (0.90)
Year 2005 Average Traffic Condition **- with signal improvements** **	D [50.0] (0.81)	E [57.7] (0.90)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for actuated signalized intersections. An overall level of service, delay, and volume-to-capacity (v/c) ratio are provided.

** The intersection was analyzed with improved signal timing and phasing. This improvement is outlined later in the document.

APPENDIX E TABLE 1.4

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Sorghum Mill Road (K26)	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Semi-Actuated Signalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition	D [38.2] (0.73)	C [32.2] (0.48)
Year 2005 Average Traffic Condition	D [49.3] (0.48)	C [32.1] (0.51)
Year 2005 Average Traffic Condition **- with signal improvements** **	D [39.0] (--)	C [32.6] (0.49)
Year 2005 Average Traffic Condition **- with signal and lane improvements** ***	C [32.3] (0.67)	C [29.0] (0.53)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for actuated signalized intersections. An overall level of service, delay, and volume-to-capacity (v/c) ratio are provided.

** The intersection was analyzed with improved signal timing and phasing. This improvement is outlined later in the document.

*** The intersection was analyzed with improved signal timing and phasing as well as improvements to lane geometry. These improvements are outlined later in the document.

APPENDIX E TABLE 1.5

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Locust Grove Road (K362)	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Unsignalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition		
Westbound Left / Right Lane	C [28.6] (0.26)	C [21.6] (0.15)
Southbound Left / Through Lane	B [10.2] (0.00)	A [9.0] (0.05)
Year 2005 Average Traffic Condition		
Westbound Left / Right Lane	D [28.4] (0.29)	C [24.2] (0.17)
Southbound Left / Through Lane	B [10.6] (0.00)	A [9.2] (0.06)
Year 2005 Average Traffic Condition **- with signal installation** **	B [11.0] (0.71)	A [8.4] (0.73)
Year 2005 Average Traffic Condition **- with signal installation and lane improvements** ***	A [8.1] (0.79)	A [8.1] (0.79)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for unsignalized intersections. Overall level of service, delay, and volume-to-capacity (v/c) ratio are not defined according the HCM methodology. As such, the individual critical movement measures of effectiveness are provided. Once analyzed as a signalized intersection, overall level of service is provided.

** The intersection was analyzed with the installation of a semi-actuated signalized intersection. This improvement is outlined later in this document.

*** The intersection was analyzed with a traffic signal and lane improvements. This improvement is outlined later in this document.

APPENDIX E TABLE 1.6

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Brookdale Heights – Ponderosa Drive	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Unsignalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition		
Eastbound Left / Through / Right Lane	C [16.8] (0.02)	C [15.6] (0.01)
Westbound Left / Through / Right Lane	C [16.0] (0.08)	B [14.2] (0.04)
Northbound Left / Through / Right Lane	A [7.9] (0.00)	A [8.3] (0.00)
Southbound Left / Through Lane	A [8.7] (0.01)	A [7.9] (0.01)
Year 2005 Average Traffic Condition		
Eastbound Left / Through / Right Lane	C [18.5] (0.02)	C [17.0] (0.01)
Westbound Left / Through / Right Lane	C [17.5] (0.09)	C [15.3] (0.05)
Northbound Left / Through / Right Lane	A [8.0] (0.00)	A [8.4] (0.00)
Southbound Left / Through Lane	A [8.9] (0.01)	A [8.0] (0.01)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for unsignalized intersections. Overall level of service, delay, and volume-to-capacity (v/c) ratio are not defined according the HCM methodology. As such, the individual critical movement measures of effectiveness are provided. Once analyzed as a signalized intersection, overall level of service is provided.

APPENDIX E TABLE 1.7

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Plaindealing Drive	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Unsignalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition		
Eastbound Left / Through / Right Lane	C [16.6] (0.02)	C [18.5] (0.17)
Westbound Left / Through / Right Lane	C [15.9] (0.08)	B [13.4] (0.07)
Northbound Left / Through / Right Lane	A [7.9] (0.00)	A [8.5] (0.02)
Southbound Left / Through Lane	A [8.6] (0.01)	A [7.9] (0.02)
Year 2005 Average Traffic Condition		
Eastbound Left / Through / Right Lane	D [34.3] (0.28)	C [21.0] (.20)
Westbound Left / Through / Right Lane	C [24.5] (0.28)	B [14.3] (0.08)
Northbound Left / Through / Right Lane	A [8.0] (0.04)	A [8.6] (0.02)
Southbound Left / Through Lane	A [8.9] (0.05)	A [8.0] (0.02)
Year 2005 Average Traffic Condition **- with signal installation** **	A [7.6] (0.45)	A [6.9] (0.43)
Year 2005 Average Traffic Condition **- with signal installation and lane improvements** ***	A [7.2] (0.38)	A [6.7] (0.40)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for unsignalized intersections. Overall level of service, delay, and volume-to-capacity (v/c) ratio are not defined according the HCM methodology. As such, the individual critical movement measures of effectiveness are provided. Once analyzed as a signalized intersection, overall level of service is provided.

** The intersection was analyzed with the installation of a semi-actuated signalized intersection. This improvement is outlined later in this document.

*** The intersection was analyzed with a traffic signal and lane improvements. This improvement is outlined later in this document.

APPENDIX E TABLE 1.8

INTERSECTION LEVEL OF SERVICE AND CAPACITY ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) and Walnut Street (K31)	**LOS [Average Delay] (Volume to Capacity Ratio) per Highway Capacity Manual 2000 Analysis** *	
Existing Fully-Actuated Signalized Intersection	A.M. Peak	P.M. Peak
Year 2001 Average Traffic Condition	B [14.4] (0.34)	B [10.5] (0.39)
Year 2005 Average Traffic Condition	C [23.3] (0.38)	C [25.9] (0.39)
Year 2005 Average Traffic Condition **- with signal improvements** **	B [16.6] (0.40)	C [21.7] (0.53)

Notes

* The analysis was performed according to the methodology prescribed by the Highway Capacity Manual 2000, published by the Transportation Research Board, for actuated signalized intersections. An overall level of service, delay, and volume-to-capacity (v/c) ratio are provided.

** The intersection was analyzed with improved signal timing and phasing. This improvement is outlined later in the document.

APPENDIX F

CORSIM MODEL RESULTS

APPENDIX F TABLE 1.1

NETWORK TRANSPORTATION ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) from US Route 13 in Dover to SR1-US Route 113 in Little Heaven	**VEHICLE-HOURS of Move Time [Delay Time] (Total Time) ***	
Network comprised of TWSC and intersections, including roadway segments, minor approaches, and roadways.	A. M. Peak Hour	P. M. Peak Hour
Year 2001 Average Traffic Condition	**271.2 [105.1] (376.3)**	**289.8 [158.1] (447.9)**
Year 2005 Average Traffic Condition	**286.1 [116.9] (403.0)**	**283.1 [170.6] (453.7)**
Year 2005 Average Traffic Condition Morning Peak Hour Period **-with Traffic Signal Installations and Improvements**	**289.3 [113.6] (402.9)**	**290.4 [164.3] (454.7)**
Year 2005 Average Traffic Condition Evening Peak Hour Period **-with Traffic Signal Installations, Improvements, and Lane Improvements**	**288.2 [112.1] (400.3)**	**287.8 [162.9] (450.7)**
Year 2005 Average Traffic Condition Evening Peak Hour Period **-with Traffic Signal Installations, Improvements, Lane Improvements, and Center Two-Way Left Turn Lane**	**289.1 [110.3] (399.4)**	**291.7 [160.4] (452.1)**

* These network measures of effectiveness were achieved based on a compilation of corridor simulations of South State Street using TSIS CORSIM Version 5.0. CORSIM is a stochastic microscopic traffic simulation package, which attempts to simulate the movement and travel behavior of vehicles under an array of influencing factors, including driver type, roadway characteristics, free-flow speed, traffic control devices, arrival types, and an overall degree of randomness.

APPENDIX F TABLE 2.2

NETWORK TRANSPORTATION ANALYSIS
AVERAGE WEEKDAY PEAK HOUR CONDITIONS

US Route 113A (South State Street) from US Route 13 in Dover to SR1-US Route 113 in Little Heaven	**TOTAL Vehicle-Miles Traveled on Network, [Average Speed in mph], and Move Time to Total Time (M /T) Ratio** *	
Network comprised of TWSC and intersections, including roadway segments, minor approaches, and roadways.	A. M. Peak Hour	P. M. Peak Hour
Year 2001 Average Traffic Condition	**11499.5 [30.6] (0.72)**	**12172.7 [27.2] (0.65)**
Year 2005 Average Traffic Condition	**12070.2 [30.1] (0.71)**	**11725.6 [25.9] (0.63)**
Year 2005 Average Traffic Condition Morning Peak Hour Period **-with Traffic Signal Installations and Improvements**	**12066.1 [30.3] (0.72)**	**11742.1 [26.1] (0.64)**
Year 2005 Average Traffic Condition Evening Peak Hour Period **-with Traffic Signal Installations, Improvements, and Lane Improvements**	**12068.3 [30.4] (0.72)**	**11730.1 [26.5] (0.64)**
Year 2005 Average Traffic Condition Evening Peak Hour Period **-with Traffic Signal Installations, Improvements, Lane Improvements, and Center Two-Way Left Turn Lane**	**12066.2 [30.6] (0.73)**	**11726.8 [26.9] (0.65)**

* These network measures of effectiveness were achieved based on a compilation of corridor simulations of South State Street using TSIS CORSIM Version 5.0. CORSIM is a stochastic microscopic traffic simulation package, which attempts to simulate the movement and travel behavior of vehicles under an array of influencing factors, including driver type, roadway characteristics, free-flow speed, traffic control devices, arrival types, and an overall degree of randomness.