APPENDIX B

Kevin A. Dahl, P.E., R.L.S.
Christopher D. Robins, P.E.
Juan N. Lomeli', R.L.S.
Douglas J. Nicholls, P.E.

DAHL, ROBINS & ASSOCIATES, INC.

CIVIL ENGINEERING ▪ SURVEYING ▪ TRAFFIC

1560 South 5th Avenue
Yuma, Arizona 85364
Phone:(928) 819-0825
Fax:(928) 819-0826
E-mail:dra@dahlrobins.com

May 20, 2002

Development Design Engineering, LLC
1122 State Street, Suite D
El Centro, CA 92243

Attention: Mr. Tom Dubose, Manager

Reference: Imperial Center Traffic Impact Study

Dear Mr. Dubose:

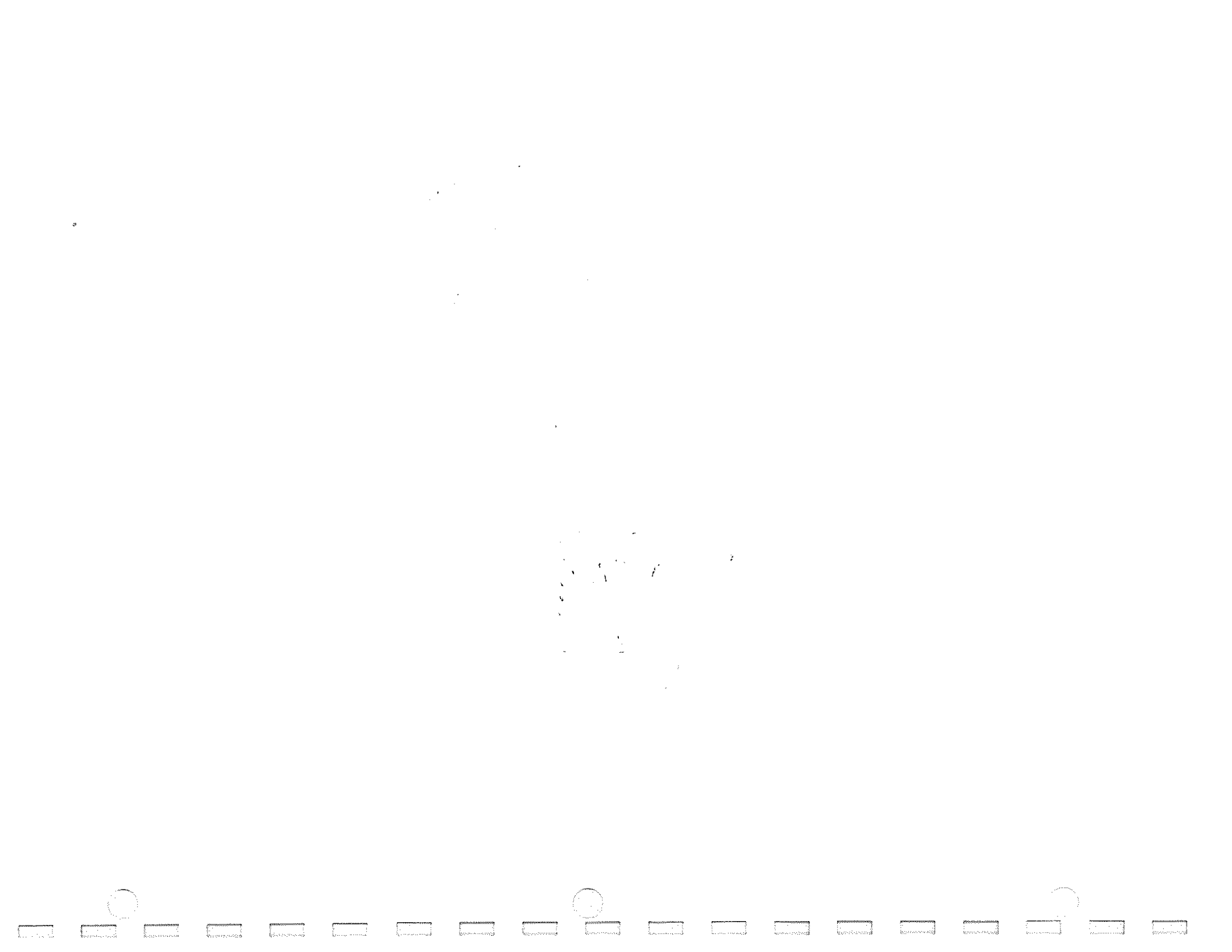
We have received the accident data from the California Department of Transportation to provide a response to Bill Figge's comments on the Imperial Center Traffic Impact Study. The following are our replies to his comments:

- **A review of collision history at all impacted locations with SR-111 should be included and mitigation provided to any increase in collision history as a result of increased volumes from this project. Impacted locations would include Jasper Road and SR-111, McCabe Road and SR-111, Heber Road and SR-111 and Dogwood Road and Heber/SR-86.**

- **All proposed signals on SR-111 or to be coordinated with SR-111 should be analyzed to meet not only volume warrants, but also collision history warrants, and mitigated as necessary.**

The existing accident rate for each intersection was determined using the 1998-2001 data provided by CalTrans. By making the gross assumption this rate would stay constant as traffic volumes increased, the numbers of accidents were projected in to the future years.

At the Heber Road and SR-111 intersection, there are currently about 7 accidents per year. Based on the increased volume, that number could be expected to increase to 15 per year by 2020. The number of accidents correctable by signal installation would be four (realizing signals are already in place at this location). The primary type of accident



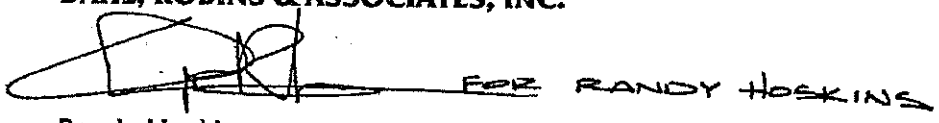
occurring at this intersection is the rear end collision. In order to decrease the frequency of these types of accidents, it is recommended some form of advance flasher be installed notifying motorists when the light is expected to turn red for their approach. Since this intersection is already experiencing 5 of these types of crashes per year, this would be a good mitigation measure to implement immediately, independent of any development at this site.

At the Jasper Road and SR-111 intersection, there are currently about 4 accidents per year. Based on the increased volume, that number could be expected to increase to 7 per year by 2020. The number of accidents correctable by signal installation would be five. This was the only intersection that would warrant a signal based on accidents (in 2010). Since it also meets volume warrants, a signal was previously recommended for this location. The angle accidents are the primary type of crashes occurring, so no other mitigation is expected to be needed.

At the McCabe Road and SR-111 intersection, there are currently about 2 accidents per year. Based on the increased volume, that number could be expected to increase to 3 per year by 2020. The number of accidents correctable by signal installation would be three. The proposal to install a signal at this location when volume warrants are met should adequately mitigate the majority of the accidents occurring here.

At the Heber Road and Dogwood Road intersection, there is currently an average of 1 accident per year. Based on the increased volume, that number could be expected to increase to 2 per year by 2020. None of the accidents are correctable by signal installation. This minimal increase in the number of accidents does not suggest mitigation would be necessary.

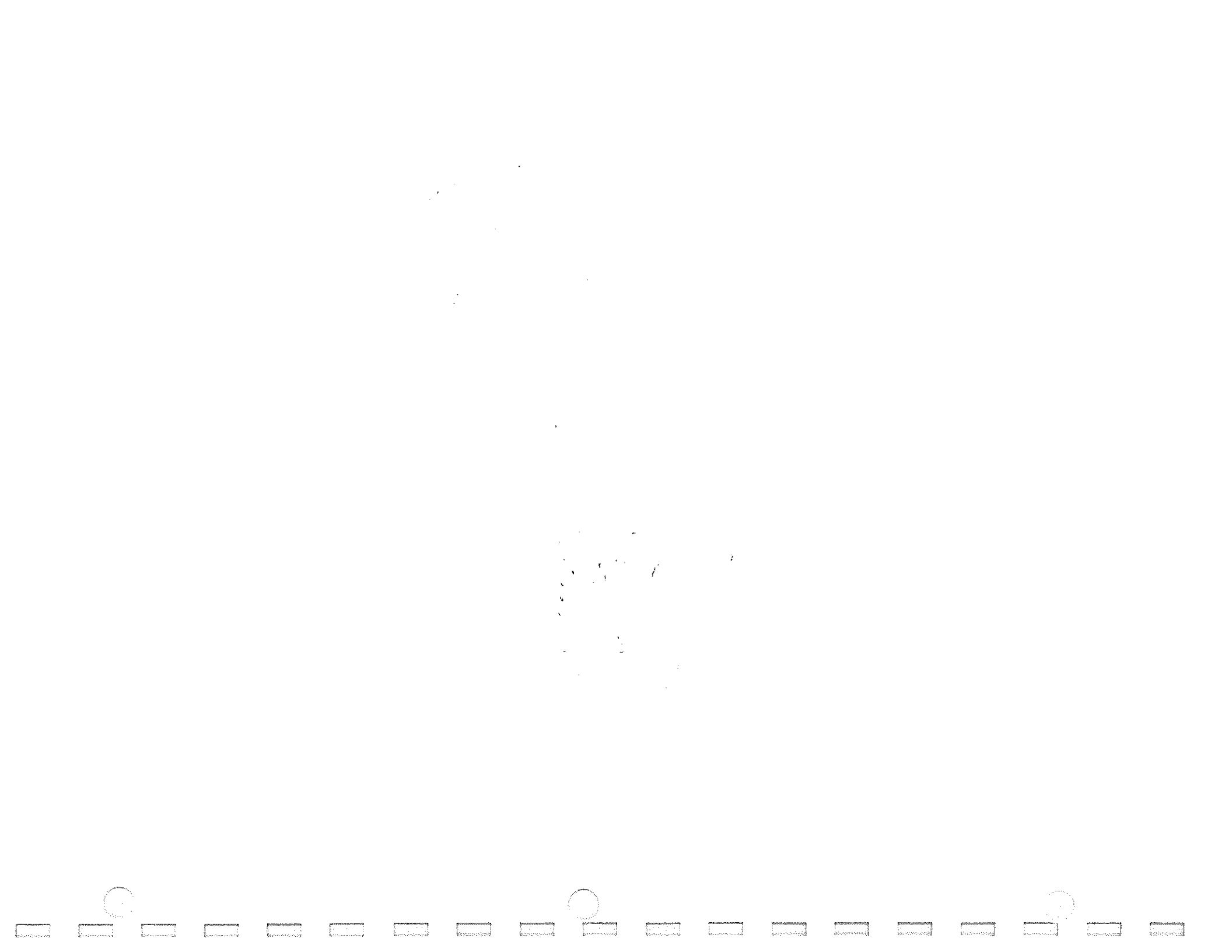
Sincerely,
DAHL, ROBINS & ASSOCIATES, INC.



Randy Hoskins

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)



LIST OF TABLES

LIST OF FIGURES

APPENDICES

I. INTRODUCTION AND SUMMARY

A. Purpose of Report and Study Objectives

At the request of Development Design & Engineering, LLC, **Dahl, Robins & Associates, Inc.**, has prepared this report to present the results of a Traffic Impact Study conducted for the Imperial Center proposed north Calexico in Imperial County, California. The purpose of this study is to determine and analyze the potential traffic impacts of the proposed development and recommend improvements necessary to ensure safe and efficient operation on the major roadway system. This report describes the existing roadway conditions, identifies peak traffic volumes, forecasts and distributes future traffic volumes, and projects the impacts of additional trip generation. Conclusions based on the impacts of any increased traffic on the roadway system have been identified and recommendations for mitigating areas of concern are provided. The specific study objectives are as follows:

- Evaluate the intersection of SR 111 & SR 86/Heber Road, SR 111 & McCabe Road, SR 111 & Jasper Road, SR 86 & Dogwood Road, Bowker Road & Jasper Road, Bowker Road & Heber Road, Bowker Road & McCabe Road and recommend any necessary improvements;

- Evaluate the site access driveways and recommend any necessary improvements.

B. Executive Summary

1. Site Location and Study Area

The proposed development is located in Imperial County north of the City of Calexico on the northeast corner of Highway 111 and Heber Road (Highway 86) (See Figure 1). The study area analyzed for impacts from the proposed development encompasses the intersections of SR 111 & SR 86/Heber Road, SR 111 & McCabe Road, McCabe & Yourman, SR 111 & Jasper Road, SR 86 & Dogwood Road, Bowker Road & Jasper Road, Bowker Road & Heber Road, Bowker Road & McCabe Road

8. Development Description

The Imperial Center is a proposed 75 acre commercial development to be located north of Calexico. The project is bounded by Highway 111 on the west, Correll Road on the north, the Alder Drain on the west and Heber Road on the south (See Figures 2 and 3).

The Imperial Center is expected to have two accesses onto Heber Road. The majority of the access for the site will be provided off of Yourman Road, which is

proposed for realignment within the project boundary. The other access for the site will be off of Correll Road on the north side of the project.

The Imperial Center will consist of a truck stop/gas station, an outlet mall and a number of out lots that will house a variety of comm ercial uses. The project is expected to be developed in five phases. The first phase is expected to be completed in 2002, with each additional phase requiring two years for build-out.

9. Principal Findings

The results of this traffic impact analysis indicate that the area roadway system will require improvements to accommodate the traffic volumes generated by the proposed development. The development should provide for convenient site ingress and egress upon completion of the construction of the recommended improvements.

10. Conclusions

The proposed development is expected to generate a combined 38,377 new daily trips upon completion. These trips will access the site from Heber Road, Yourman Road and Correll Road. For the purposes of this study the complete buildout of the project is anticipated for the year 2010. During the 2010 AM Peak Hour 1,969 trips will be generated with 1,141 of these entering the site and 828 exiting the site. During the 2010 PM Peak Hour 3,614 trips will be generated with 1,811 of these entering the site and 1,803 exiting the site.

11. Recommendations

Based on the results of this traffic impact analysis, it is our opinion that the following recommended improvements will provide for safe, convenient site ingress and egress to this development. It has been shown that at full buildout of the project, the service level of the internal and adjacent streets will be adequate to handle the traffic from this project. For a detailed summary of improvements see Section VII Conclusions and Recommendations.

On-site Improvements

Yourman Road

The preliminary site layout for this project shows the relocation of Yourman Road farther east from its current alignment. The road is also shown as being reconstructed as a two lane roadway with medians and left turn lanes at driveway openings. It will be necessary to clearly sign Yourman Road for northbound traffic where it turns to the west so that through traffic does not end up in the Imperial Center parking lot.

Site Access Driveways

Three driveways are shown from the site onto Heber Road. The easternmost two driveways will allow full turning movements. These driveways should be constructed with one lane in and two lanes out. Due to the close proximity of the western driveway to Yourman Road, it is recommended that this driveway be limited to right turns out only. This will help reduce some of the traffic using the Yourman/Heber intersection, improving the Level Of Service of that intersection.

The other driveways into the site will function adequately with one lane in and one lane out. Traffic volumes will be spread out over these driveways, coupled with the fact that they are onto lower volume roads, providing for high service levels.

Off-site Improvements

Heber Road

It is recommended that Heber Road be widened to five lanes prior to Phase IV (2008) from Scaroni Road on the west to the east edge of the project. This will provide the necessary capacity at the Highway 111 intersection and the project driveways. An additional southbound left turn lane and a northbound right turn lane will be needed to accommodate 2010 traffic.

Jasper Road and Highway 111

A traffic signal will likely be warranted at the Highway 111 and Jasper Road intersection with the addition of Phase I traffic. Though this phase adds little traffic to this intersection, the intersection is currently operating at poor levels of service. This project will add an additional 1,084 trips to this intersection at build-out, or 32%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $40,000.

McCabe Road & Highway 111

A traffic signal will likely be warranted at the Highway 111 and McCabe Road intersection at project build-out. This intersection is currently operating at poor levels of service for eastbound and westbound traffic. This project will add an additional 630 trips to this intersection at build-out, or 18%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $22,500. It is also recommended that McCabe Road be marked with two lanes approaching the intersection, a left turn lane and a combined through/right turn lane.

Yourman Road and Heber Road

In addition to the previously described improvements to Heber Road, a traffic signal will be needed at this intersection with the addition of Phase IV (2008) traffic. The Level Of Service calculations show a northbound Level Of Service of D in 2006, but if the roadway is realigned as proposed,

this will not be the case. Since the need for this signal is due almost entirely to project generated traffic, the entire cost for this signal would be assigned to the developer. It will be important to coordinate this signal with the signal on Highway 111 so that backups do not occur along Heber.

Heber Road & Highway 111
At project build-out, dual southbound left turn lanes will be required, as well as a northbound right turn lane.

Dogwood Road and Heber Road
A traffic signal will likely be warranted at the Dogwood Road and Heber Road intersection at project build-out. This project will add an additional 723 trips to this intersection at build-out, or 43%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $53,750.

Bowker Road and Heber Road
At project build-out, left turn lanes will be needed for northbound and southbound traffic at this intersection.

The design of all intersections and roadways shall be in accordance with Caltrans Standard Drawings, Imperial County guidelines and the latest editions of the MUTCD and AASHTO Green Book.

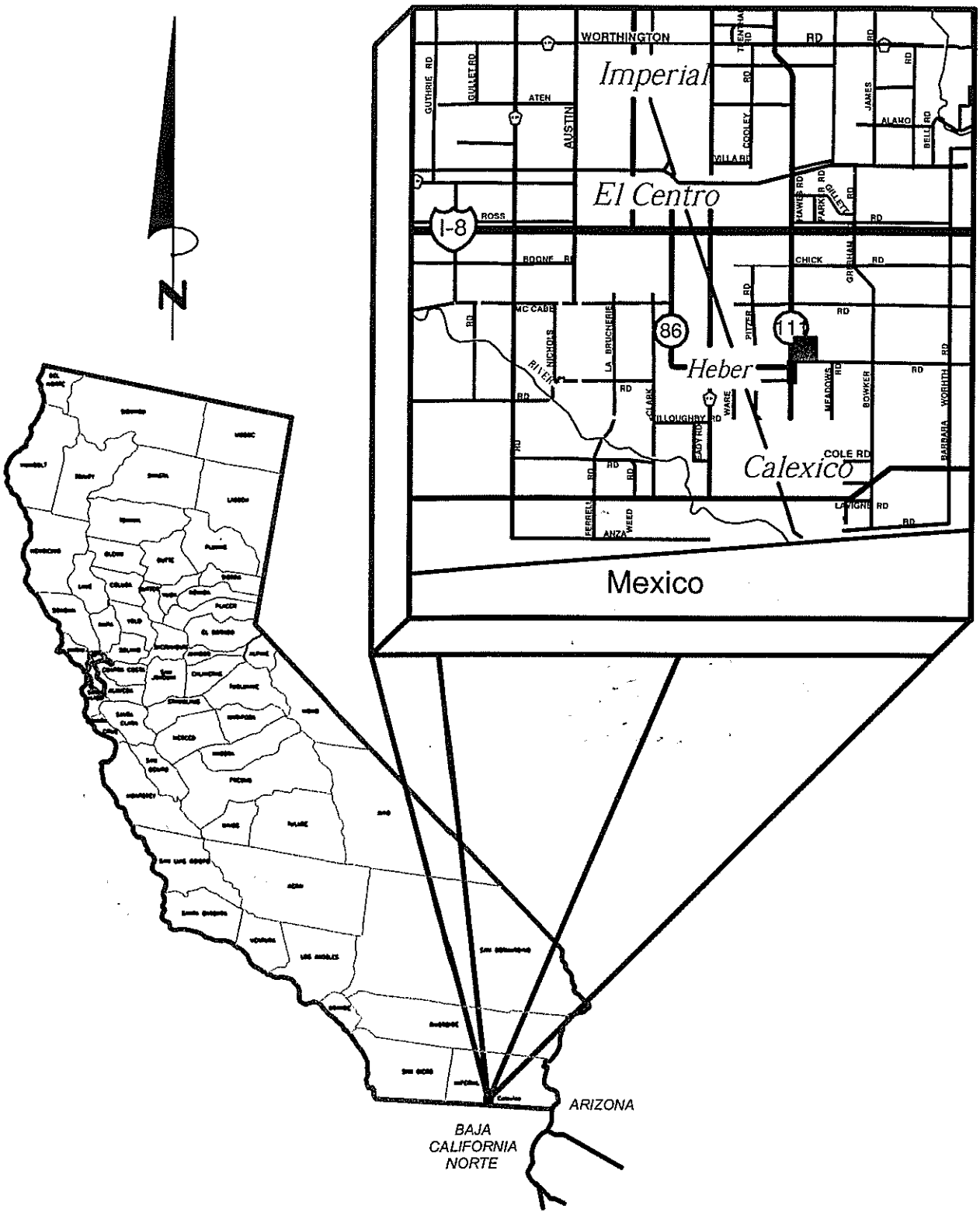


FIGURE 1
VICINITY MAP

II. PROPOSED DEVELOPMENT

A. Off-site Development

With both developed and undeveloped property surrounding this site the potential for future development which could have an impact on the existing roadway network is fairly significant. Traffic is expected to increase considerably on Heber Road over the next ten years.

B. On-site Development

1. Land Use and Intensity

Anticipated land use within the proposed development is shown in Figure 2 and broken down as follows:

Hotel	200	Rooms
Movie w/Matinee	16	Screens
Specialty Retail Center	15	KSF
Discount Store	5	KSF
Factory Outlet Center	460	KSF
Quality Restaurant	5	KSF
High Turnover Sit-Down Restaurant	5	KSF
Fast Food w/Drive Through	10	KSF
Fast Food w/o Drive Through	13	KSF
Gas w/Convenience Market	18	Fueling Positions
Quick Lube Shop	5	Service Positions
Tire Store	5	KSF
Video Rental	5	KSF
Drive-In Bank	10	KSF

2. Location

The proposed development is located on the northeast corner of Heber Road and SR 111.

3. Site Plan

The Proposed Development Site Plan shown in Figure 2 depicts the commercial subdivision lot layout and internal street layout for the project.

4. Phasing and Timing

It is anticipated that construction on the proposed development will begin in the

year 2002. For the purposes of this study it was assumed that construction of the overall project would occur in five phases. Beginning in the year 2002 the four remaining phases would come "on line" in the years 2004, 2006, 2008 and 2010.

Phase I of the Imperial Center will be built out and generating traffic from a gas station/convenience market/truck stop, a tire store and a quick lube facility. Phase II, analyzed for the year 2004 includes the hotel. Phase III, analyzed for the year 2006 includes build out of half of the out-lots and the following phase, Phase IV, analyzed for the year 2008 would include the rest of the out- lots. Phase V is expected in the year 2010 and would include the outlet mall and theater.

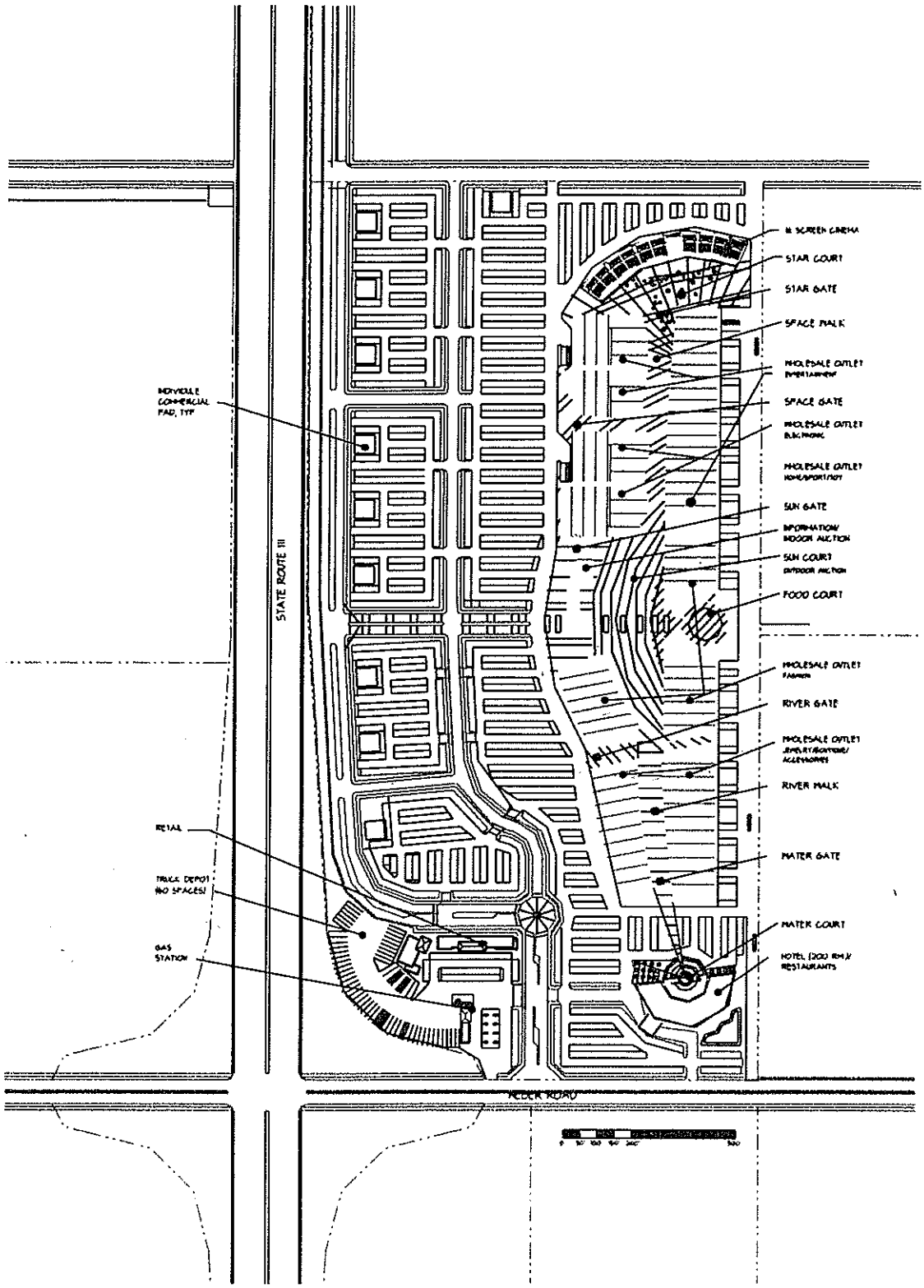


FIGURE 2
PROPOSED DEVELOPMENT SITE PLAN

III. AREA CONDITIONS

A. Study Area

1. Area of Influence

For the purposes of this study, the geographic area of influence will be defined roughly by southern Imperial County. It was assumed that a majority of the site trips generated will begin or end within this region. The existing street network located in the area of significant traffic impact is depicted in Figure 3. The intersections within this area which were analyzed as part of this study are also shown.

2. Scope of Study

The scope of this study was determined during meetings with staff from Imperial County. For the preparation of this Traffic Impact Study we have used the methodology set forth in the *Guidelines for Traffic Impact Studies* and *Traffic Access and Impact Studies for Site Development,* published by the Institute of Transportation Engineers (ITE), establish uniform guidelines for conducting traffic impact analyses.

3. Area of Significant Traffic Impact

Roadway and intersection geometric information was also gathered.

B. Study Area Land Use

1. Existing Land Uses

Land Use surrounding the proposed development is comprised of mostly agricultural and industrial uses. A trucking company is located adjacent to the subject property on the south side of Heber Road.

2. Anticipated Future Development

With both developed and undeveloped property surrounding this site the potential for future development which could have an impact on the existing roadway network is fairly significant. The current land use in the area of the Imperial Center is primarily agricultural in nature. Future uses in this area will likely be industrial or commercial in nature. Other uses at this intersection have been discussed with the County in the past, though none appear to be actively moving forward at this time.

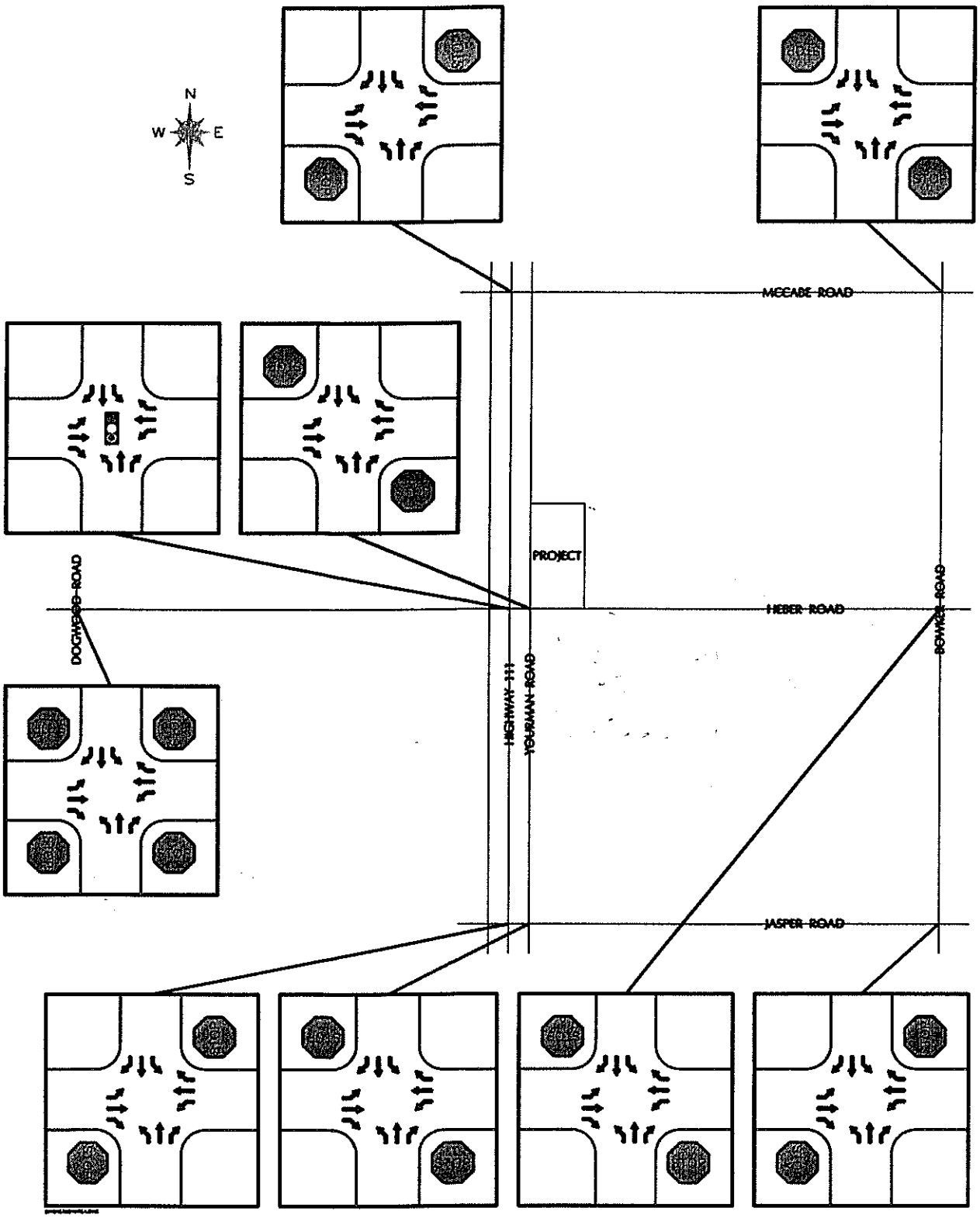


FIGURE 3
STUDY AREA

C. Site Accessibility

1. Existing Area Roadway System

Direct access to the site will be gained via Heber Road on the south, Correll Road on the north and Yourman Road on the west. Three driveways into the site are proposed off of Heber Road and Correll Road, with 5 accesses located along Yourman Road.

Heber Road is a two lane, paved street on the south side of this development. Heber widens out to add an exclusive right turn lane at its intersection with Highway 111. West of Highway 111, Heber is designated as Highway 86. On the west edge of the town of Heber, Heber Road intersects with Dogwood Road at a 4-way stop. Both roads have one lane in each direction, with an additional right turn lane for westbound Heber.

Yourman Road is currently a two-lane road on the west side of the development. It functions as a frontage road for Highway 111. Yourman road is offset approximately 500' from Highway 111 where it intersects Jasper and Heber. At its intersection with McCabe, there is only about 30' separating the two roads. Yourman is stop controlled at its intersection with all three main cross streets in the study area.

Correll Road is currently a farm access road on the north side of the Imperial Center development. Correll Road tees into Yourman, where it is stop controlled, and does not access Highway 111.

The Alder Drain forms the eastern boundary of the project site. It is not expected that a the crossing of the Alder Drain will be necessary for traffic purposes. Any gains in improved traffic handling of such a crossing would likely not be sufficient enough to outweigh the considerable cost of building such a crossing.

Highway 111 is a four-lane, divided, access controlled roadway adjacent to the project site. There are intersections on Highway 111 approximately every mile. Jasper and McCabe are stop controlled at their intersections with Highway 111, while the Heber Road intersection is controlled by a traffic signal. Left turn lanes are provided at every median crossing in 111.

Jasper Road, located one mile south of the project, is a two-laned road with exclusive right turn lanes at its intersection with Highway 111. McCabe Road, which is approximately 1 mile north of the project site, has one lane in each direction. It widens out at the Highway 111 intersection, but specific turning lanes are not designated.

Bowker Road is a two-laned road approximately 2 miles east of the site. Bowker stops for McCabe Road and Heber Road, while Jasper Road is stop controlled at

its intersection with Bowker.

2. Average Traffic Volumes and Conditions

Average weekday traffic volumes were determined for the roadway network in the vicinity of the site. A review of daily traffic volumes was used in determining area traffic flows, annual growth and seasonal fluctuations.

3. Peak Hour Traffic Volumes

In order to accurately assess roadway capacities and Level of Service, hourly traffic volumes during the peak periods of travel were obtained. Peak hour traffic volume data was collected during the peak weekday periods at the intersections.

Initial turning movement counts were conducted in late July of 2001. Following a meeting with Imperial County staff, additional analysis was requested. Counts for the additional intersections were taken in November. Counts were taken for the peak twelve hours through the day, from 6 AM to 6 PM. From this data the AM Peak Hour, Midday Peak Hour and PM Peak Hour were determined at the locations. All turning movements were recorded in 15 minute intervals. Traffic count data sheets are presented in Appendix A. Typical peak periods generally occur in the morning between 7:00 am and 9:00 am and again in the evening between 4:00 pm and 6:00 pm. Due to the nature of the proposed development and the existing traffic characteristics the development was analyzed using both the AM and PM Peak Hour. The AM Peak Hour traffic volumes and PM Peak Hour traffic volumes were combined with the AM and PM Peak Hour site generated traffic to determine intersection Level of Service.

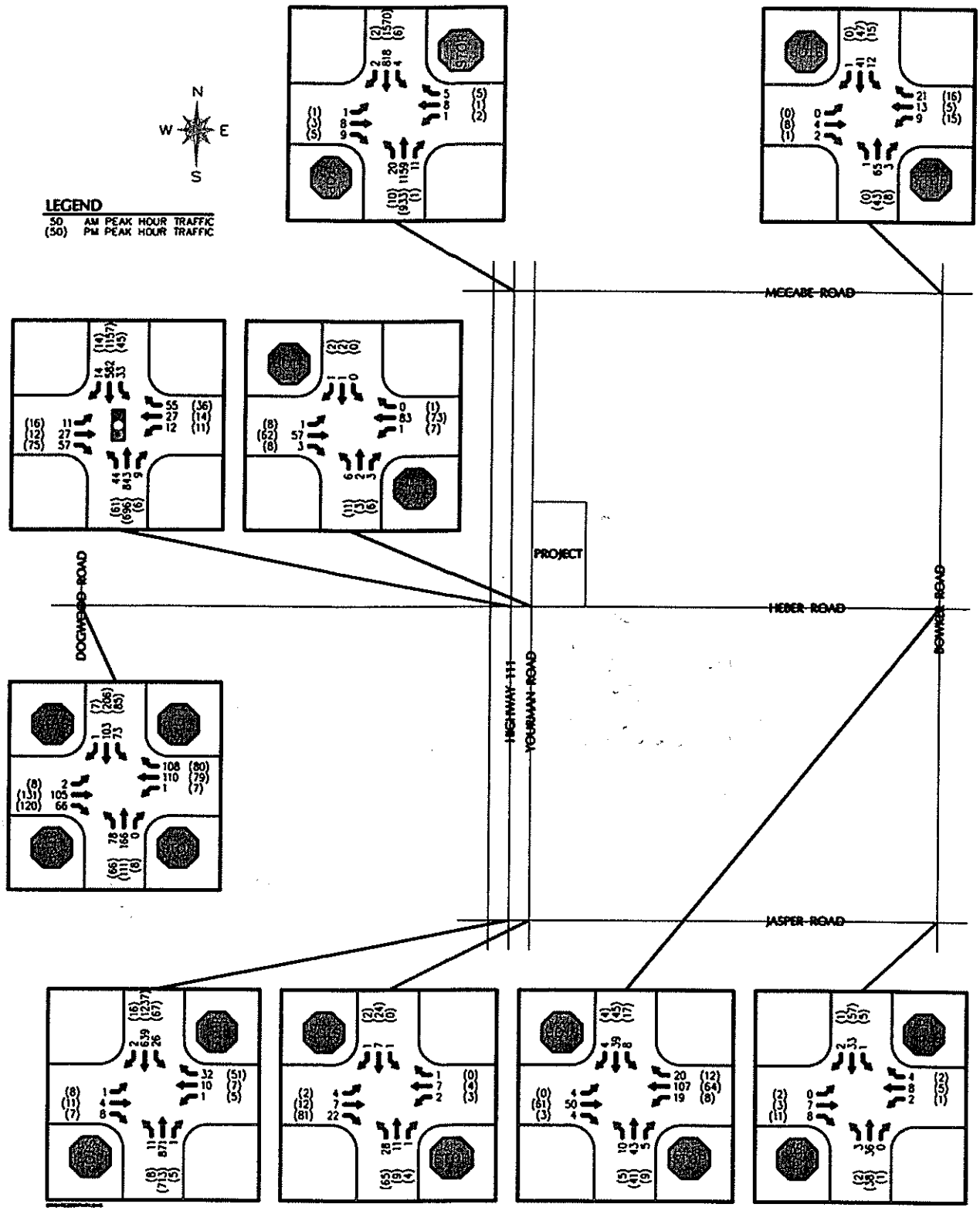


FIGURE 4
NOVEMBER 2001 PEAK HOUR BACKGROUND TRAFFIC VOLUMES

IV. PROJECTED TRAFFIC

A. Site Traffic

1. Trip Generation

In order to evaluate the traffic impacts of the site, the amount of traffic from the proposed project needs to be generated and assigned to the surrounding roadway network. Trip generation information for the proposed project was determined using the Institute of Transportation Engineer's *Trip Generation*, Sixth Edition, 1997. Peak hour volumes represent the highest volume of traffic generated during a one-hour period for the morning and evening peak. The various ITE land use codes were used for this study. Trip generation for the proposed land use was developed based on the trip rates presented in Table 1 below:

TABLE 1
LAND USE TRIP GENERATOR

Land Use	Category Code	Units	Daily Rate	AM Peak	Enter	Exit	PM Peak	Enter	Exit
Hotel	310	Rooms	8.23	0.56	61%	39%	0.61	53%	47%
Movie w/ Matinee	444	Screens	153.33	---	---	---	44.53	52%	48%
Spec. Retail Center	814	KSF	40.67	6.41	48%	52%	2.59	43%	57%
Discount Store	815	KSF	56.63	0.99	66%	34%	4.24	50%	50%
Factory Outlet	823	KSF	26.59	0.67	73%	27%	2.29	47%	53%
Quality Rest	831	KSF	89.95	0.81	50%	50%	7.49	67%	33%
High TO Sit Down Rest	832	KSF	130.34	9.27	52%	48%	10.86	60%	40%
FF Rest. w/o Drive Thru	833	KSF	716	43.87	60%	40%	26.15	51%	49%
FF Rest. w/ Drive Thru	834	KSF	496.12	49.86	51%	49%	33.48	52%	48%
Quick Lube Shop	837	Service Positions	40.00	3.00	67%	33%	5.19	55%	45%

Gas w/Conv Mart	**845**	Fueling Positions	162.78	10.06	50%	50%	13.38	50%	50%
Tire Store	**848**	Bays	---	2.24	65%	35%	3.47	42%	58%
Video Rental	**896**	KSF	---	---	---	---	13.60	46%	54%
Drive-In Bank	**912**	KSF	265.21	12.63	56%	44%	54.77	50%	50%

KSF - 1000 Square Feet of Gross Floor Area
FF - Fast Food

TABLE 2
SITE GENERATED TRAFFIC

Phase	AM Peak	Enter	Exit	PM Peak	Enter	Exit
I	207	108	99	284	142	142
I - II	319	176	143	406	207	199
I - III	990	546	444	1,127	576	551
I - IV	1,661	916	745	1,848	945	903
I - V	1,969	1,141	828	3,614	1,811	1,803

2. Directional Distribution

Before the impact of site traffic can be determined, it is necessary to develop a reasonable approximation of the directional distribution of the site traffic. The directions by which vehicles approach or leave this development have been estimated by evaluation of area traffic flows, review of the local roadway network, as well as knowing the existing and future attractions in the area. It is assumed that the number of trips originating or terminating at the site in each direction is roughly proportional to the population of that area and the proportion of traffic that currently exists. Based on existing traffic patterns and the location of residential and commercial centers, traffic to and from the site is expected to be

distributed as shown in Figure 5.

3. Primary Trip Traffic

Primary Trip Traffic Volumes are estimated to account for the majority of the total site generated traffic.

4. Pass-By/Diverted Link Trip Traffic

Pass-by traffic varies relative to the specific land use and location under consideration. Because of the nature and location of this development, it was assumed that not all of the traffic would be making primary trips. Since this area is not located near a residential area, 60% of the trips to the gas station (phase I) from Highway 111are expected to be either linked or diverted trips. When the center builds out more, 40% of the out-lot traffic (phases III & IV) will likely be linked trips, where people will use more than one of the site stores on each trip.

5. Traffic Assignment

Total site generated traffic was assigned according to the directional distributions and Linked/Diverted trips mentioned previously. Total Site Generated Traffic added to Peak Hour Background traffic less Linked/Diverted trips is shown in Figures 6, 7, 8 and 9.

6. Annual Growth Factor

Future growth in this area is expected to increase the amount of existing traffic by two percent per year. Using 2002 as the opening year of the Imperial Center, traffic volumes that will use the existing streets were determined. It was assumed that each phase of the project would be built out over the course of two years.

7. Delivery Traffic

For the purposes of this study, it was assumed that most of the delivery truck traffic would use the easternmost access off of Heber Road. Some delivery traffic was also assigned to the driveway to the west of that. Additional delivery traffic would be expected to use Correll Road and the easternmost driveway from the project site.

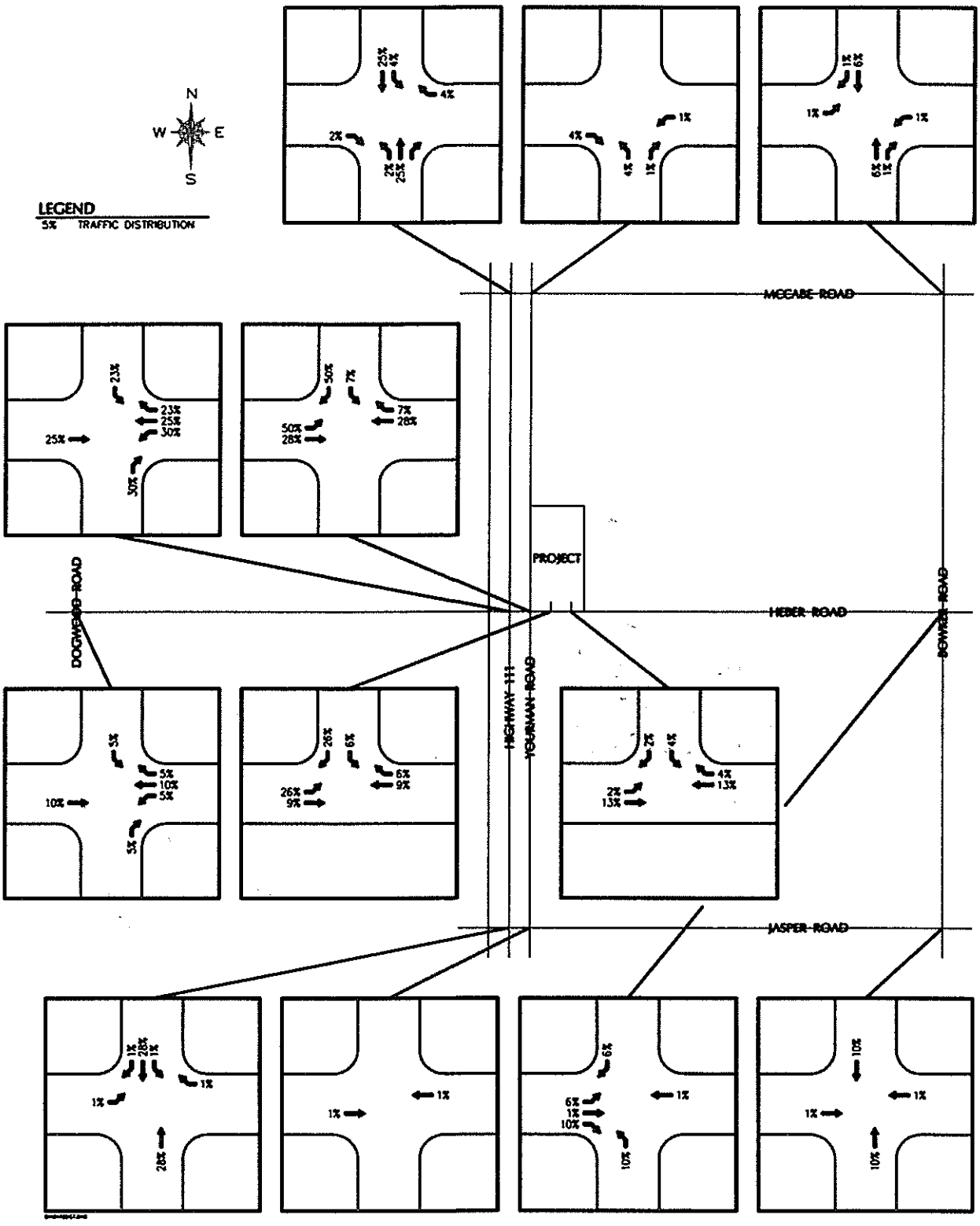


FIGURE 5
DIRECTIONAL DISTRIBUTION
SITE GENERATED TRAFFIC VOLUMES

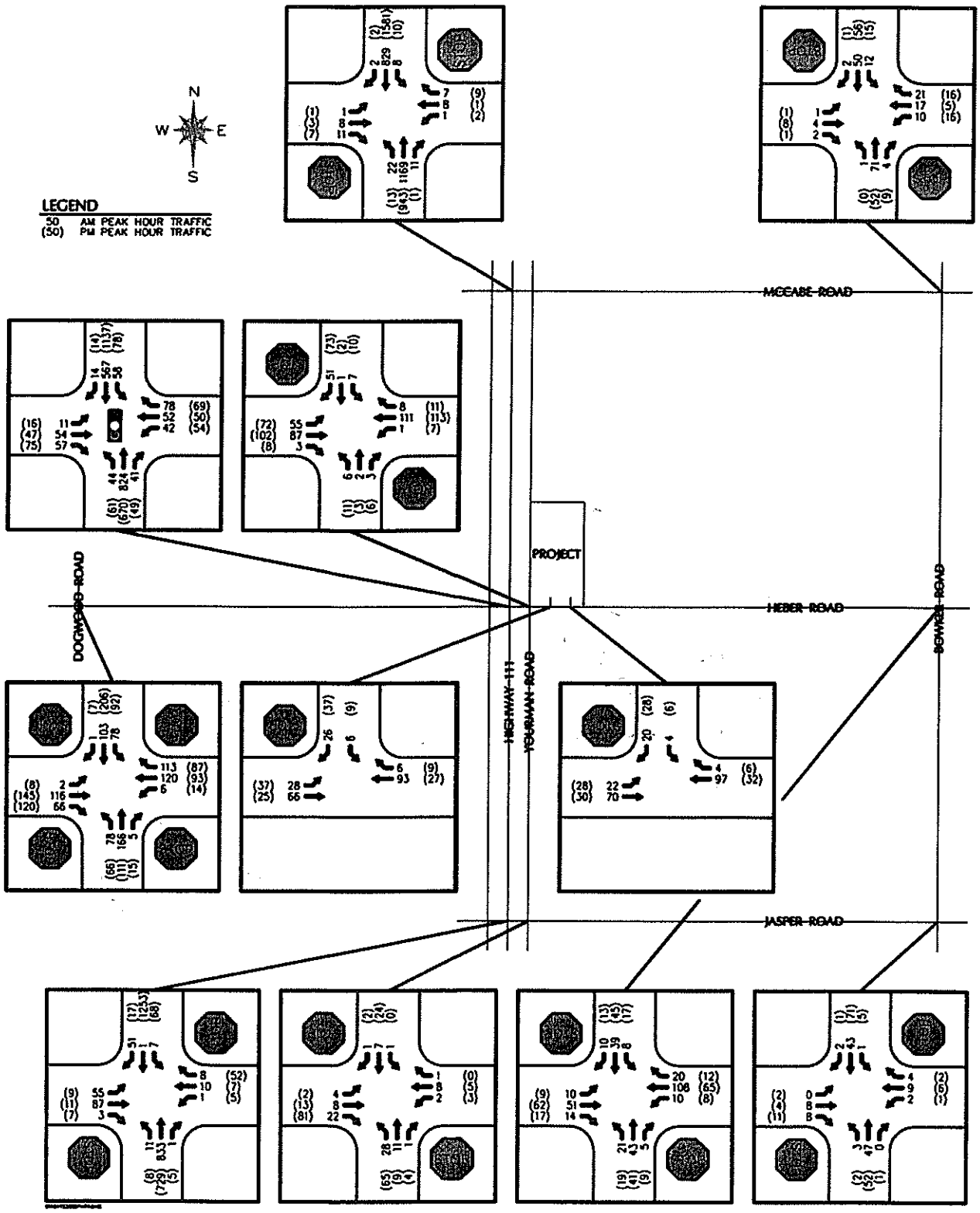


FIGURE 6
2002 PEAK HOUR TRAFFIC VOLUMES

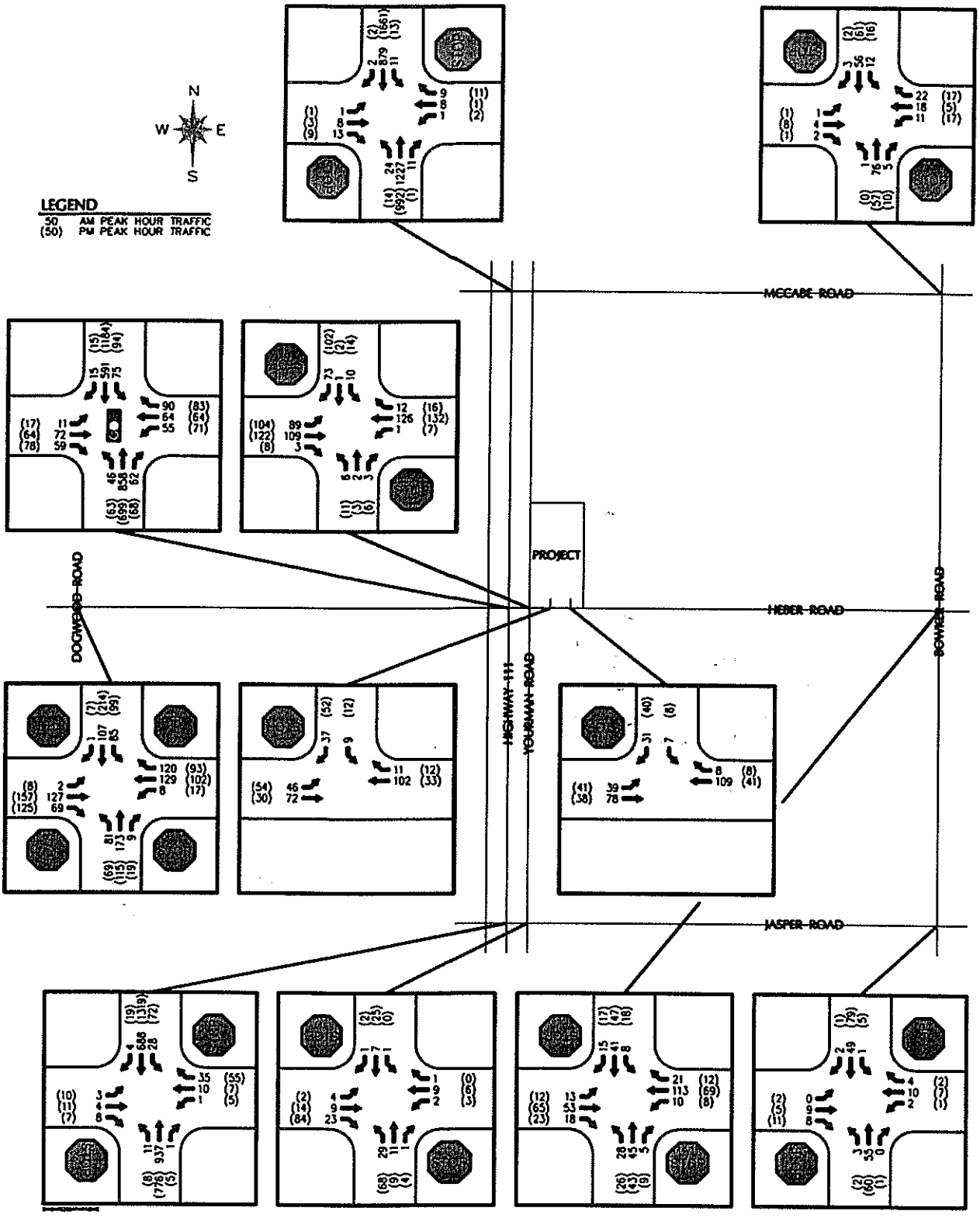


FIGURE 7
2004 PEAK HOUR TRAFFIC VOLUMES

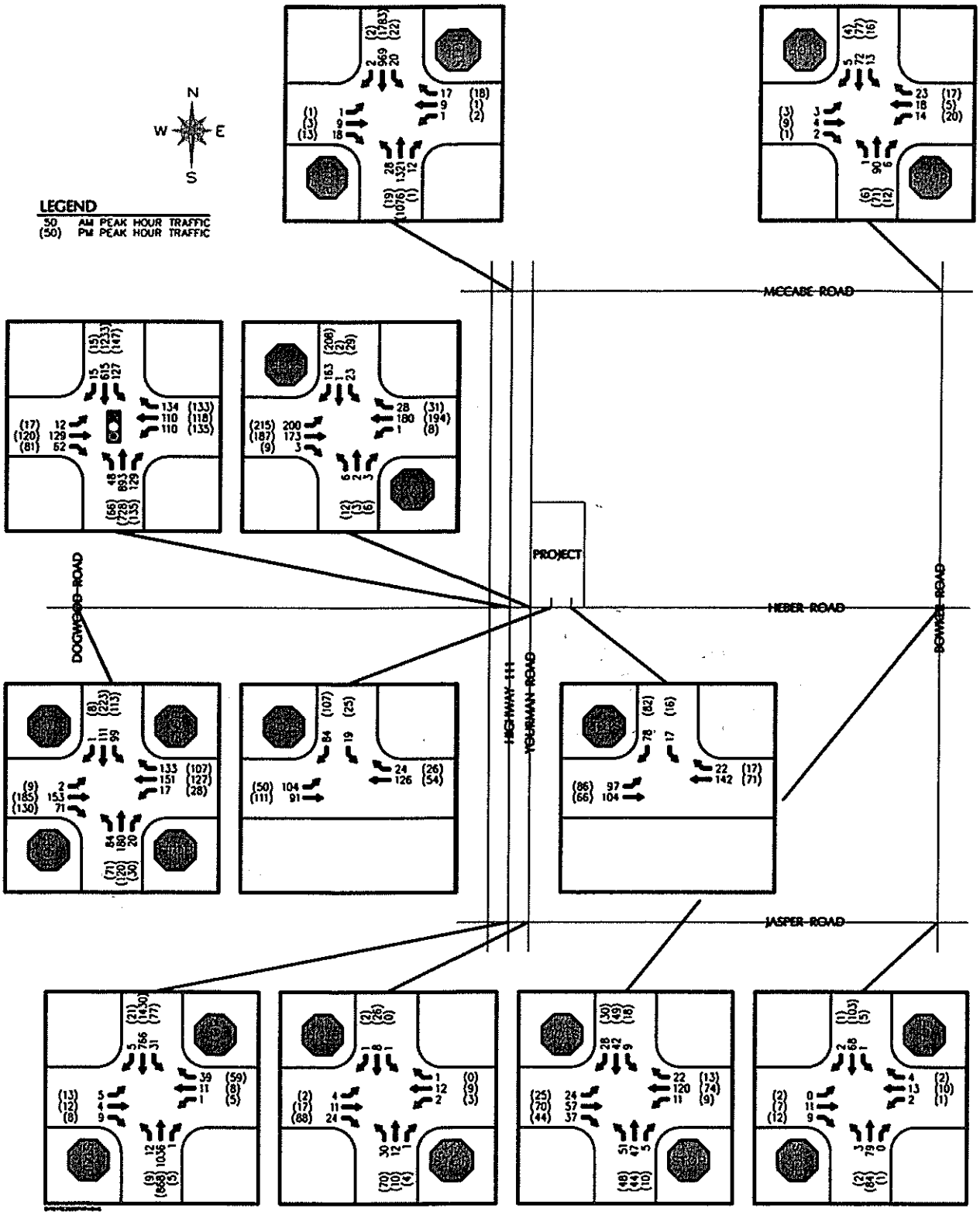


FIGURE 8
2006 PEAK HOUR TRAFFIC VOLUMES

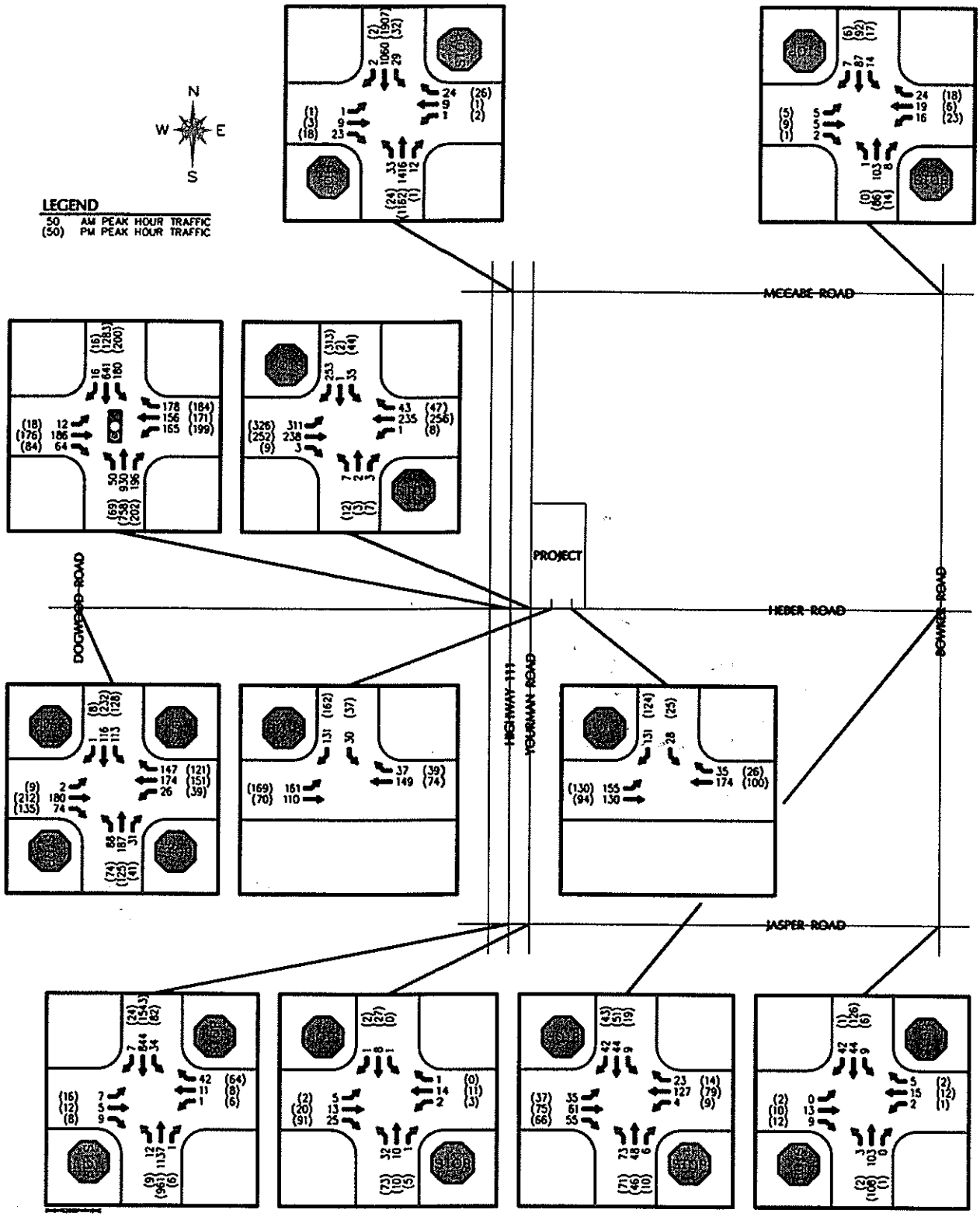


FIGURE 9
2008 PEAK HOUR TRAFFIC VOLUMES

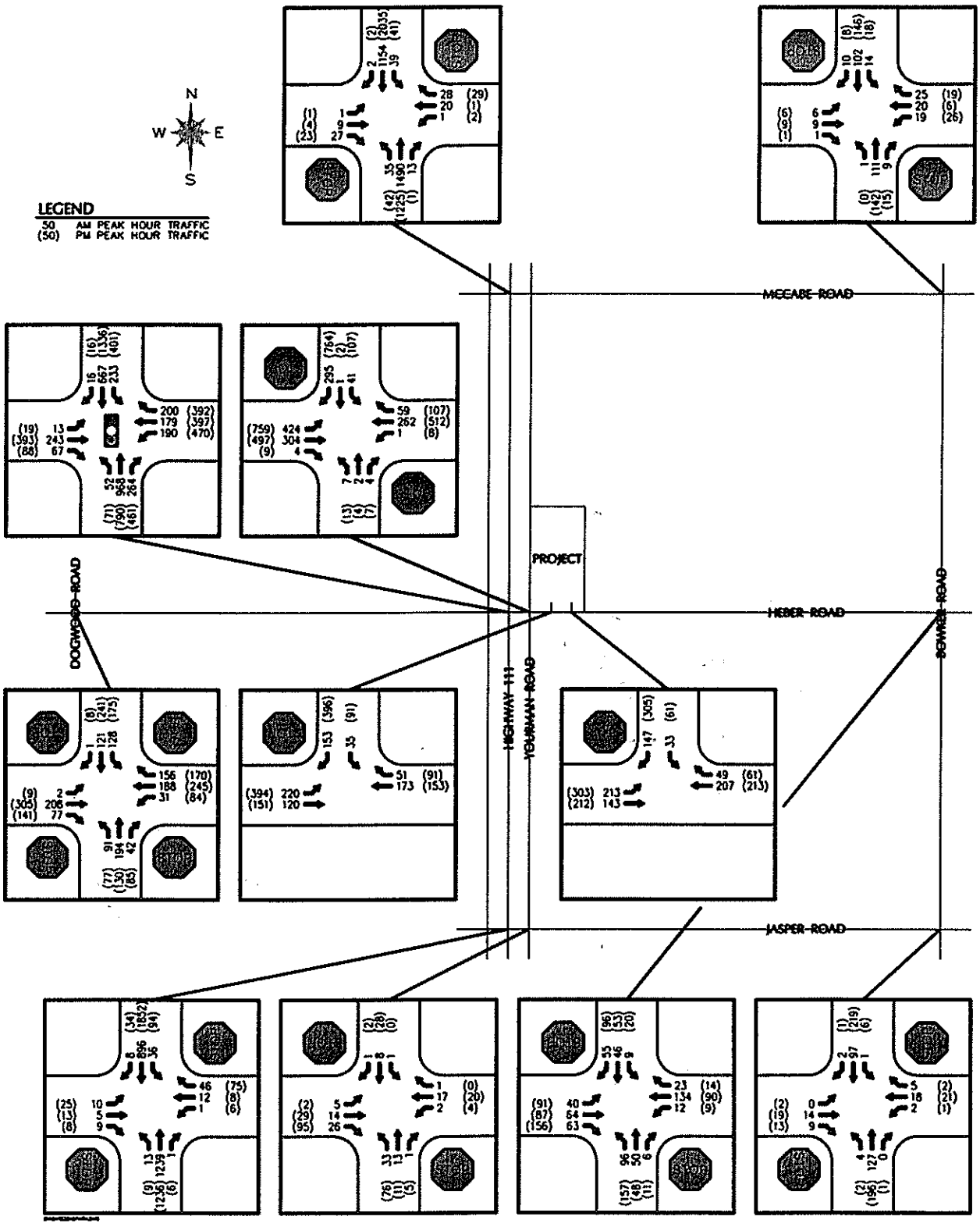


FIGURE 10
2010 PEAK HOUR TRAFFIC VOLUMES

V. TRAFFIC ANALYSIS

Level of Service (LOS) is a standard technique used in traffic engineering to evaluate the performance of roadways and intersections. Briefly defined, it is the qualitative measure of operating conditions of a roadway. These conditions incorporate several variables that affect the quality of traffic flow: speed and travel time, freedom of maneuver, traffic interruptions, comfort and convenience, vehicular delays, and safety. In practice, six Levels of Service ranging from A at best to F at worst are defined and used to describe the traffic flow in terms of delays experienced by motorists. Each of the six service levels defines a subjective range of traffic operating characteristics. The criteria for signalized intersections are shown in Table 3 and for unsignalized intersections are shown in Table 4. Further amplification of LOS A through LOS F for both types of intersection is given in Appendix C.

TABLE 3
LEVEL OF SERVICE DEFINITIONS
SIGNALIZED INTERSECTIONS

Level of Service	Stopped Delay per Vehicle (sec)	Qualitative Description
A	≤ 5.0	Drivers can maintain speed with little or no delay
B	5.1 to 15.0	Drivers have reasonable freedom to select speed
C	15.1 to 25.0	Drivers feel somewhat restricted
D	25.1 to 40.0	Drivers have little freedom to maneuver
E	40.1 to 60.0	Substantial restriction and delay
F	> 60.0	Long delays and stoppages - Drivers frequently divert to other routes

TABLE 4
LEVEL OF SERVICE DEFINITIONS
UNSIGNALIZED INTERSECTIONS

Level of Capacity Service	Average Total Delay(Sec/Veh)	Qualitative Description
A	≤5	Little or no delays
B	>5 and ≤10	Short traffic delays
C	>10 and ≤20	Average traffic delays
D	>20 and ≤30	Long traffic delays
E	>30 and ≤45	Very long traffic delays
F	>45	*

* When demand volume exceeds the capacity of the lane extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection.

Level of Service analysis was conducted for traffic flows at the intersections using techniques described in the 2000 *Highway Capacity Manual* (HCM). HiCAP 2000 was used to determine Level of Service for signalized and unsignalized intersections.

Unsignalized Analyses (Chapter 10, HCM) typically result in problems in interpretation of the Level of Service. Capacities defined by unsignalized methodology understate the actual capacity of the minor street. Levels of Service defined by Chapter 17 of the HCM are typically E for any intersecting street of an arterial regardless of the minor street volumes. This does not imply unacceptable operations but should be expected due to arterial street volumes.

Regional transportation studies commonly concentrated on the Levels of Service of the various roadway segments within a study area. Those are often the segments which are designated as having a desirable level of service of C. However, the critical locations within the circulation system are the intersections. The intersections will typically have

a lower Level of Service than the segments between intersections. It will often be true that Level of Service C can be maintained on the roadway segments even though the adjacent intersections may operate at Level of Service D, or in some cases E.

In consideration of the above, the Institute of Transportation Engineers, representing transportational professionals throughout the country, have conducted a number of studies to determine the appropriate Levels of Service. The result has been the recommendation for the maintenance of urbanized intersections at Level of Service D. That level represents an acceptable compromise between the exorbitant costs of the higher Levels of Service and the increasing delays to traffic at the lower Levels of Service.

A. Capacity and Level of Service

The term Level Of Service (LOS) is a standard method used to quantify the operational efficiency of an intersection. The efficiency of the intersection takes into account several variables that affect the quality of traffic flow, namely speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, vehicular delays and safety. The service levels range from LOS A (free flowing traffic) to LOS F (intersection failure). For initial construction, LOS C or better is generally the project's targeted designed level of operation. LOS D is generally considered the lowest advisable service level based on future traffic increases. A summary of the meanings of the various service levels is included in the appendix.

Unsignalized intersection LOS was calculated using the Highway Capacity Software. Analysis of unsignalized intersections typically result in problems in interpretation of the LOS. Capacities defined by unsignalized methodology understate the actual capacity of the minor street. Service levels defined by Chapter 17 of the Highway Capacity Manual are typically LOS E for any street intersecting an arterial, regardless of the minor street volumes. This does not necessarily imply unacceptable operations, but should be expected due to arterial street volumes. When certain movements reach unacceptable levels, traffic will often find other routes of travel.

Level of Service (LOS) analyses were conducted for the intersections using Peak Hour traffic volumes for six separate cases:

- ☐ **2001 Peak Hour Traffic Volumes** — Existing Peak Hour volumes (See Figure 4).
- ☐ **2002 Peak Hour Traffic Volumes** — Peak Hour projected into the 2002 Peak Season with the addition of traffic generated by Phase I (See Figure 6).
- ☐ **2004 Peak Hour Traffic Volumes** — Peak Hour projected to the 2004 Peak Season with the addition of traffic generated by Phase I & II (See Figure 7).

- **2006 Peak Hour Traffic Volumes** — Peak Hour projected into the 2006 Peak Season with the addition of traffic generated by Phase I, II and III (See Figure 8).
- **2008 Peak Hour Traffic Volumes** — Peak Hour projected into the 2008 Peak Season with the addition of traffic generated by Phase I, II, III and IV (See Figure 9).
- **2010 Peak Hour Traffic Volumes** — Peak Hour projected into the 2010 Peak Season with the addition of traffic generated by Phase I, II, III, IV (See Figure 10).
- **2020 Peak Hour Traffic Volumes** — Peak Hour projected into the 2020 Peak Season with the addition of traffic generated by Phase I, II, III, IV.

The Level of Service calculation sheets for traffic flows at the intersections are provided in the Appendices and Level of Service impacts are summarized in Tables 5 - 9 on the following pages.

Service levels were initially completed for the existing volumes. These are shown in the column for 2001. The next step was calculating the Level Of Service for each of the other conditions. It was then determined whether or not the service level had depreciated substantially to the point where mitigation measures were required. Additional analyses were performed when necessary to determine what measures of mitigation would be necessary to bring the degraded levels up.

As shown in the attached chart, five of the studied intersections do not need any mitigation at all. At both project driveways onto Heber, Yourman & Jasper, McCabe & Bowker, and Jasper & Bowker, all turning movements are found to have acceptable service levels through the project build-out.

Based on the analysis, four intersections will need traffic signals at project build-out. These intersections are Jasper & Highway 111, Heber & Yourman, McCabe & Highway 111, and Heber & Dogwood. While the Jasper & Highway 111 intersection and the Heber & Yourman intersection show individual movements below Level Of Service C, the overall intersection Level Of Service is C or better. By making minor changes to the signal timings to improve these lower service levels, the required Level Of Service C can still be maintained for the intersection as a whole.

The mitigation measures needed to bring the other intersections to Level Of Service C or better are described in Section VII.

TABLE 5
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	2001		2002		2004		2006		2008		2010	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
McCabe Rd & Highway 111	WB	F	F	F	F	F	F	F	F	F	F	F	F
	EB	F	F	F	F	F	F	F	F	F	F	F	F
	NBLT	A	C	C	C	C	C	C	C	C	C	B	D
	SBLT	B	B	B	B	B	B	B	B	B	B	C	B
Highway 111 & Jasper Rd	NBLT	A	B	A	B	A	B	A	B	A	B	B	C
	SBLT	B	A	B	A	B	B	B	A	B	A	B	B
	EB	D	F	E	F	E	F	E	F	E	F	F	F
	WB	C	E	D	F	D	F	D	F	D	F	F	F
Yourman Rd & Heber Rd	NB	A	A	B	B	B	B	C	D	F	F	F	F
	SB	A	A	A	A	A	B	B	C	D	F	D	F
	EBLT	A	A	A	A	A	A	A	A	A	A	A	E
	WBLT	A	A	A	A	A	A	A	A	A	A	A	A
Yourman Rd & Jasper Rd	NBLT	A	A	A	A	A	A	A	A	A	A	A	B
	SBLT	A	A	A	A	A	A	A	A	A	A	A	B
	EB	A	A	A	A	A	A	A	A	A	A	A	A
	WB	A	A	A	A	A	A	A	A	A	A	A	A
Heber Rd & Bowker Rd	NBLT	B	B	B	B	B	B	B	B	B	B	C	D
	SBLT	B	B	B	B	B	B	B	B	B	B	B	B
	EB	A	A	A	A	A	A	A	A	A	A	A	A
	WB	A	A	A	A	A	A	A	A	A	A	A	A
McCabe Rd & Bowker Rd	NB	A	A	A	A	A	A	A	A	A	A	B	B
	SB	A	A	A	A	A	A	A	A	A	A	B	B
	EBLT	A	A	A	A	A	A	A	A	A	A	A	A
	WBLT	A	A	A	A	A	A	A	A	A	A	A	A
Dogwood Rd & Heber Rd	NBLT	B	B	B	B	B	B	B	B	B	B	C	C
	SBLT	B	B	B	B	B	B	B	B	B	B	B	D
	EBLT	B	B	B	B	B	B	B	B	B	C	B	D

	WBLT	A	B	A	B	A	B	A	B	A	B	B	D
	INT	B	B	B	B	B	B	B	B	B	C	B	D
Jasper Rd & Bowker Rd	NBLT	A	A	A	A	A	A	A	A	A	A	A	A
	SBLT	A	A	A	A	A	A	A	A	A	A	A	A
	EB	A	A	A	A	A	A	A	A	A	A	B	B
	WB	A	A	A	A	A	A	A	A	A	A	B	B
Heber Rd & West Dr.	SB	-	-	B	C	B	C	B	C	B	C	B	C
	EBLT	-	-	A	A	A	A	A	A	A	A	A	A
Heber Rd & East Dr.	SB	-	-	B	C	B	C	B	C	B	C	B	C
	EBLT	-	-	A	A	A	A	A	A	A	A	A	A

A LEVEL OF SERVICE
– NOT ANALYZED

TABLE 6
SIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	2001	2002	2004	2006	2008	2010
Heber Road & Highway 111	SB	A/A	-	A/B	B/C	C/B	B/D
	WB	C/C	-	C/D	C/C	C/C	C/B
	NB	A/A	-	B/B	B/B	C/B	B/C
	EB	C/D	-	C/D	C/C	C/C	C/B
	INT	A/A	-	B/B	B/B	C/C	B/C

TABLE 7
SIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	Jasper & Hwy 111	Heber & Yourman	McCabe & Hwy 111	Heber & Dogwood
2010	SB	B/B	B/C	A/A	B/C
	WB	D/E	D/C	C/C	B/B
	NB	A/A	B/C	A/A	B/C
	EB	C/C	C/C	C/C	B/B
	INT	A/B	C/C	A/A	B/B

A/B AM PEAK HOUR LOS or DELAY/PM PEAK HOUR LOS or DELAY
– NOT ANALYZED

TABLE 8
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	2020	
		AM	PM
Yourman Rd & Jasper Rd	NBLT	A	B
	SBLT	A	B
	EB	A	A
	WB	A	A
Heber Rd & Bowker Rd	NBLT	C	D
	SBLT	B	B
	EB	A	A
	WB	A	A
McCabe Rd & Bowker Rd	NB	B	B
	SB	B	B
	EBLT	A	A
	WBLT	A	A
Jasper Rd & Bowker Rd	NBLT	B	B
	SBLT	B	B
	EB	A	A
	WB	A	A
Heber Rd & West Dr.	SB	B	D
	EBLT	A	A
Heber Rd & East Dr.	SB	B	C
	EBLT	A	A

TABLE 9
SIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	Jasper & Hwy 111	Heber & Yourman	McCabe & Hwy 111	Heber & Hwy 111	Heber & Dogwood
2020	SB	C/C	C/C	C/C	D/B	C/B
	WB	D/F	E/C	C/C	C/C	C/B
	NB	A/B	B/C	A/A	C/D	B/C
	EB	A/D	B/C	A/C	B/C	C/D
	INT	A/C	C/C	A/B	C/C	C/C

B. Accident Analysis

The existing accident rate for each intersection was determined using the 1998-2001 data provided by CalTrans. By making the gross assumption this rate would stay constant as traffic volumes increased, the numbers of accidents were projected in to the future years.

At the Heber Road and SR-111 intersection, there are currently about 7 accidents per year. Based on the increased volume, that number could be expected to increase to 15 per year by 2020. The number of accidents correctable by signal installation would be four (realizing signals are already in place at this location). The primary type of accident occurring at this intersection is the rear end collision. In order to decrease the frequency of these types of accidents, it is recommended some form of advance flasher be installed notifying motorists when the light is expected to turn red for their approach. Since this intersection is already experiencing 5 of these types of crashes per year, this would be a good mitigation measure to implement immediately, independent of any development at this site.

At the Jasper Road and SR-111 intersection, there are currently about 4 accidents per year. Based on the increased volume, that number could be expected to increase to 7 per year by 2020. The number of accidents correctable by signal installation would be five. This was the only intersection that would warrant a signal based on accidents (in 2010). Since it also meets volume warrants, a signal was previously recommended for this location. The angle accidents are the primary type of crashes occurring, so no other mitigation is expected to be needed.

At the McCabe Road and SR-111 intersection, there are currently about 2 accidents per year. Based on the increased volume, that number could be expected to increase to 3 per year by 2020. The number of accidents correctable by signal installation would be three. The proposal to install a signal at this location when volume warrants are met should adequately mitigate the majority of the accidents occurring here.

At the Heber Road and Dogwood Road intersection, there is currently an average of 1 accident per year. Based on the increased volume, that number could be expected to increase to 2 per year by 2020. None of the accidents are correctable by signal installation. This minimal increase in the number of accidents does not suggest mitigation would be necessary.

VI. Findings

A. Site Accessibility

The conceptual site development plan for this proposed project was reviewed to ensure that external access points onto adjacent roadways would provide for proper vehicle, pedestrian and bicycle safety. Upon construction of the recommended improvements, this development should provide for convenient access to and from the adjacent roadways.

B. Traffic Impacts

The proposed development is expected to generate a combined 38,377 new daily trips upon completion. These trips will access the site from Heber Road, Yourman Road and Correll Road. For the purposes of this study the complete buildout of the project is anticipated for the year 2010. During the 2010 AM Peak Hour 1,969 trips will be generated with 1,141 of these entering the site and 828 exiting the site. During the 2010 PM Peak Hour 3,614 trips will be generated with 1,811 of these entering the site and 1,803 exiting the site.

VII. CONCLUSIONS AND RECOMMENDATIONS

A. Site Access

This report has analyzed and evaluated the traffic impacts of the proposed development for the opening year of each unit of the project. Improvements are required to mitigate the traffic impacts due to this development. Based on the results of this traffic impact analysis, it is our opinion that these proposed improvements will provide for safe, convenient site ingress and egress to and from this development.

The Imperial Center will create approximately 38,377 new trips each day. These trips will access the site from Heber Road, Yourman Road and Correll Road. It has been shown that at full build-out of the project, the service level of the internal and adjacent streets will be adequate to handle the traffic from this project. The following recommendations will ensure safe and efficient handling of the traffic:

On-site Improvements

Yourman Road

The preliminary site layout for this project shows the relocation of Yourman Road farther east from its current alignment. The road is also shown as being reconstructed as a two lane roadway with medians and left turn lanes at driveway openings. It will be necessary to clearly sign Yourman Road for northbound traffic where it turns to the west so that through traffic does not end up in the Imperial Center parking lot.

Site Access Driveways

Three driveways are shown from the site onto Heber Road. The easternmost two driveways will allow full turning movements. These driveways should be constructed with one lane in and two lanes out. Due to the close proximity of the western driveway to Yourman Road, it is recommended that this driveway be limited to right turns out only. This will help reduce some of the traffic using the Yourman/Heber intersection, improving the Level Of Service of that intersection. It is noted that in 2020, the southbound movement at this intersection drops to Level Of Service D. Since this location is not suitable for signalization, southbound traffic will have to endure the longer delay.

The other driveways into the site will function adequately with one lane in and one lane out. Traffic volumes will be spread out over these driveways, coupled with the fact that they are onto lower volume roads, providing for high service levels.

Off-site Improvements

Heber Road
It is recommended that Heber Road be widened to five lanes prior to Phase IV (2008) from Scaroni Road on the west to the east edge of the project. This will provide the necessary capacity at the Highway 111 intersection and the project driveways. An additional southbound left turn lane and a northbound right turn lane will be needed to accommodate 2010 traffic.

Jasper Road and Highway 111
A traffic signal will likely be warranted at the Highway 111 and Jasper Road intersection with the addition of Phase I traffic. Though this phase adds little traffic to this intersection, the intersection is currently operating at poor levels of service. This project will add an additional 1,084 trips to this intersection at build-out, or 32%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $40,000.

McCabe Road & Highway 111
A traffic signal will likely be warranted at the Highway 111 and McCabe Road intersection at project build-out. This intersection is currently operating at poor levels of service for eastbound and westbound traffic. This project will add an additional 630 trips to this intersection at build-out, or 18%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $22,500. It is also recommended that McCabe Road be marked with two lanes approaching the intersection, a left turn lane and a combined through/right turn lane.

Yourman Road and Heber Road
In addition to the previously described improvements to Heber Road, a traffic signal will be needed at this intersection with the addition of Phase IV (2008) traffic. The Level Of Service calculations show a northbound Level Of Service of D in 2006, but if the roadway is realigned as proposed, this will not be the case. Since the need for this signal is due almost entirely to project generated traffic, the entire cost for this signal would be assigned to the developer. It will be important to coordinate this signal with the signal on Highway 111 so that backups do not occur along Heber.

Heber Road & Highway 111
At project build-out, dual southbound left turn lanes will be required, as well as a northbound right turn lane.

Based on existing accident data, it is recommended that some form of advance notice be given to Highway 111 traffic of impending signal changes. This will help to reduce the number of rear end accidents occurring at this location. Since this is a pre-existing condition, it would not be the responsibility of this development.

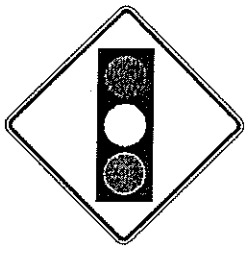
Dogwood Road and Heber Road
A traffic signal will likely be warranted at the Dogwood Road and Heber Road intersection at project build-out. This project will add an additional 723 trips to this intersection at build-out, or 43%. Based on a signal cost of $125,000, the fair share cost to the Imperial Center project towards this signal would be $53,750.

Bowker Road and Heber Road
At project build-out, left turn lanes will be needed for northbound and southbound traffic at this intersection.

The design of all intersections and roadways shall be in accordance with Caltrans Standard Drawings, Imperial County guidelines, City of Calexico Standards and the latest editions of the MUTCD and AASHTO Green Book.

APPENDIX B

LEVEL OF SERVICE ANALYSIS



DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowjas
Site Code : 0000000
Start Date : 11/13/20
Page No : 3

	BOWKER RD From North					JASPER RD From East					BOWKER RD From South					JASPER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																					
Intersection	15:45																				
Volume	1	57	5	0	63	2	5	1	0	8	1	38	2	0	41	11	3	2	0	16	128
Percent	1.6	90.5	7.9	0.0		25.0	62.5	12.5	0.0		2.4	92.7	4.9	0.0		68.8	18.8	12.5	0.0		
Volume	1	57	5	0	63	2	5	1	0	8	1	38	2	0	41	11	3	2	0	16	128
Volume Peak Factor	0	13	3	0	16	0	0	1	0	1	0	14	0	0	14	3	0	0	0	3	34
																					0.941
High Int.	16:00					15:45					16:00					16:15					
Volume	0	13	3	0	16	0	4	0	0	4	0	14	0	0	14	3	1	1	0	5	
Peak Factor					0.984					0.500					0.732					0.800	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowjas
Site Code : 0000000
Start Date : 11/13/20
Page No : 2

Groups Printed- Unshifted

	BOWKER RD From North				JASPER RD From East				BOWKER RD From South				JASPER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	0	13	3	0	0	0	1	0	0	14	0	0	3	0	0	0	34
16:15	0	15	1	0	2	1	0	0	0	8	0	0	3	1	1	0	32
16:30	1	15	0	0	0	0	0	0	1	9	1	0	1	2	1	0	31
16:45	0	10	0	0	3	0	0	0	0	7	0	0	0	3	0	0	23
Total	1	53	4	0	5	1	1	0	1	38	1	0	7	6	2	0	120
17:00	0	10	1	0	2	0	2	0	0	12	1	0	0	5	0	0	33
17:15	0	11	0	0	0	1	1	0	0	5	0	0	0	0	0	0	18
17:30	1	6	1	0	0	0	1	0	0	9	0	0	1	4	0	0	23
17:45	1	4	0	0	0	2	0	0	0	7	0	0	0	2	1	0	17
Total	2	31	2	0	2	3	4	0	0	33	1	0	1	11	1	0	91
Grand Total	11	338	14	0	16	37	14	0	11	302	19	0	33	45	10	0	850
Apprch %	3.0	93.1	3.9	0.0	23.9	55.2	20.9	0.0	3.3	91.0	5.7	0.0	37.5	51.1	11.4	0.0	
Total %	1.3	39.8	1.6	0.0	1.9	4.4	1.6	0.0	1.3	35.5	2.2	0.0	3.9	5.3	1.2	0.0	

	BOWKER RD From North					JASPER RD From East					BOWKER RD From South					JASPER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																					
Intersection	06:45																				
Volume	2	33	1	0	36	4	8	2	0	14	0	36	3	0	39	8	7	0	0	15	104
Percent	5.6	91.7	2.8	0.0		28.6	57.1	14.3	0.0		0.0	92.3	7.7	0.0		53.3	46.7	0.0	0.0		
Volume	2	33	1	0	36	4	8	2	0	14	0	36	3	0	39	8	7	0	0	15	104
Volume Peak Factor	2	11	0	0	13	1	2	0	0	3	0	14	1	0	15	2	2	0	0	4	35
																					0.743
High Int.	07:15					07:30					07:15					06:45					
Volume	2	11	0	0	13	1	3	1	0	5	0	14	1	0	15	5	0	0	0	5	
Peak Factor					0.692					0.700					0.650					0.750	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	13:00																				
Volume	0	44	0	0	44	2	5	0	0	7	2	26	2	0	30	3	4	1	0	8	89
Percent	0.0	100.0	0.0	0.0		28.6	71.4	0.0	0.0		6.7	86.7	6.7	0.0		37.5	50.0	12.5	0.0		
Volume	0	44	0	0	44	2	5	0	0	7	2	26	2	0	30	3	4	1	0	8	89
Volume Peak Factor	0	20	0	0	20	0	1	0	0	1	1	4	1	0	6	0	0	1	0	1	28
																					0.795
High Int.	13:30					13:00					13:00					13:15					
Volume	0	20	0	0	20	1	1	0	0	2	0	9	1	0	10	3	1	0	0	4	
Peak Factor					0.550					0.875					0.750					0.500	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

o's Shopping Center
r ffic Impact Study

File Name : 01104bowjas
Site Code : 00000000
Start Date : 11/13/200
Page No : 1

Groups Printed- Unshifted

	BOWKER RD From North				JASPER RD From East				BOWKER RD From South				JASPER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	0	3	0	0	0	0	0	0	1	5	0	0	0	2	0	0	11
06:15	1	5	0	0	0	1	0	0	0	11	1	0	1	0	1	0	21
06:30	0	10	0	0	0	2	0	0	0	7	0	0	0	2	0	0	21
06:45	0	10	0	0	1	2	1	0	0	7	1	0	5	0	0	0	27
Total	1	28	0	0	1	5	1	0	1	30	2	0	6	4	1	0	80
07:00	0	3	0	0	1	1	0	0	0	4	1	0	1	2	0	0	13
07:15	2	11	0	0	1	2	0	0	0	14	1	0	2	2	0	0	35
07:30	0	9	1	0	1	3	1	0	0	11	0	0	0	3	0	0	29
07:45	0	8	0	0	0	1	0	0	2	9	0	0	0	1	0	0	21
Total	2	31	1	0	3	7	1	0	2	38	2	0	3	8	0	0	98
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	8	0	0	0	0	0	0	0	5	0	0	0	0	0	0	13
09:15	1	3	0	0	0	0	0	0	0	3	1	0	0	0	0	0	8
09:30	0	7	0	0	0	1	0	0	0	7	0	0	2	0	0	0	17
09:45	0	9	0	0	0	2	0	0	3	7	2	0	1	1	0	0	25
Total	1	27	0	0	0	3	0	0	3	22	3	0	3	1	0	0	
10:00	0	3	0	0	0	0	0	0	0	12	1	0	0	1	0	0	17
10:15	0	7	0	0	2	1	0	0	1	12	2	0	1	1	0	0	27
10:30	2	5	1	0	0	1	1	0	0	8	2	0	0	1	2	0	23
10:45	0	3	0	0	0	1	3	0	0	7	0	0	0	0	0	0	14
Total	2	18	1	0	2	3	4	0	1	39	5	0	1	3	2	0	81
11:00	1	4	1	0	0	1	0	0	0	1	0	0	0	3	0	0	11
11:15	0	8	1	0	0	0	0	0	1	7	0	0	0	0	1	0	18
11:30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
11:45	0	11	1	0	0	0	0	0	0	3	0	0	0	1	1	0	17
Total	1	23	3	0	0	1	0	0	1	12	0	0	0	4	2	0	47
12:00	0	5	0	0	0	2	1	0	0	5	0	0	1	0	0	0	14
12:15	0	8	0	0	0	1	0	0	0	10	0	0	0	2	0	0	21
12:30	1	9	1	0	0	0	0	0	0	6	1	0	0	0	0	0	18
12:45	0	8	0	0	0	1	1	0	0	7	0	0	0	0	1	0	18
Total	1	30	1	0	0	4	2	0	0	28	1	0	1	2	1	0	71
13:00	0	6	0	0	1	1	0	0	0	9	1	0	0	1	0	0	19
13:15	0	8	0	0	0	2	0	0	1	8	0	0	3	1	0	0	23
13:30	0	20	0	0	0	1	0	0	1	4	1	0	0	0	1	0	28
13:45	0	10	0	0	1	1	0	0	0	5	0	0	0	2	0	0	19
Total	0	44	0	0	2	5	0	0	2	26	2	0	3	4	1	0	89
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15:00	0	9	0	0	0	0	1	0	0	9	0	0	2	0	0	0	21
15:15	0	16	0	0	1	1	0	0	0	13	0	0	2	2	0	0	35
15:30	0	14	1	0	0	0	0	0	0	7	1	0	0	0	0	0	23
15:45	0	14	1	0	0	4	0	0	0	7	1	0	4	0	0	0	31
Total	0	53	2	0	1	5	1	0	0	36	2	0	8	2	0	0	110

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowheb
Site Code : 0000000
Start Date : 11/14/2001
Page No : 3

	BOWKER RD From North					HEBER RD From East					BOWKER RD From South					HEBER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																					
Intersection	16:00																				
Volume	4	45	17	0	66	12	64	8	0	84	9	41	5	0	55	3	61	0	0	64	269
Percent	6.1	68.2	25.8	0.0		14.3	76.2	9.5	0.0		16.4	74.5	9.1	0.0		4.7	95.3	0.0	0.0		
Volume	4	45	17	0	66	12	64	8	0	84	9	41	5	0	55	3	61	0	0	64	269
Volume	2	8	5	0	15	6	20	3	0	29	2	9	2	0	13	1	19	0	0	20	77
Peak Factor																					0.873
High Int.	16:15					16:00					16:45					16:00					
Volume	1	12	4	0	17	6	20	3	0	29	3	14	2	0	19	1	19	0	0	20	
Peak Factor					0.971					0.724					0.724					0.800	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowheb
Site Code : 00000000
Start Date : 11/14/200
Page No : 2

Groups Printed- Unshifted

	BOWKER RD From North				HEBER RD From East				BOWKER RD From South				HEBER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	2	8	5	0	6	20	3	0	2	9	2	0	1	19	0	0	77
16:15	1	12	4	0	1	12	1	0	2	8	1	0	1	11	0	0	54
16:30	0	12	5	0	3	17	1	0	2	10	0	0	1	17	0	0	68
16:45	1	13	3	0	2	15	3	0	3	14	2	0	0	14	0	0	70
Total	4	45	17	0	12	64	8	0	9	41	5	0	3	61	0	0	269
17:00	0	14	3	0	1	13	7	0	1	6	1	0	0	10	2	0	58
17:15	0	8	7	0	5	12	5	0	2	8	2	0	0	18	0	0	67
17:30	1	4	2	0	1	12	4	0	3	5	1	0	0	19	0	0	52
17:45	1	6	5	0	3	11	1	0	0	6	2	0	0	13	1	0	49
Total	2	32	17	0	10	48	17	0	6	25	6	0	0	60	3	0	226
Grand Total	38	325	101	0	114	623	76	0	53	317	59	0	23	451	26	0	2206
Apprch %	8.2	70.0	21.8	0.0	14.0	76.6	9.3	0.0	12.4	73.9	13.8	0.0	4.6	90.2	5.2	0.0	
Total %	1.7	14.7	4.6	0.0	5.2	28.2	3.4	0.0	2.4	14.4	2.7	0.0	1.0	20.4	1.2	0.0	

	BOWKER RD From North					HEBER RD From East					BOWKER RD From South					HEBER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																					
Intersection	07:00																				
Volume	4	39	8	0	51	20	107	10	0	137	5	43	10	0	58	4	50	4	0	58	304
Percent	7.8	76.5	15.7	0.0		14.6	78.1	7.3	0.0		8.6	74.1	17.2	0.0		6.9	86.2	6.9	0.0		
Volume	4	39	8	0	51	20	107	10	0	137	5	43	10	0	58	4	50	4	0	58	304
Volume Peak Factor	1	13	2	0	16	5	29	3	0	37	2	14	3	0	19	1	11	2	0	14	86 0.884
High Int.	07:45					07:45					07:45					07:30					
Volume	1	13	2	0	16	5	29	3	0	37	2	14	3	0	19	2	17	1	0	20	
Peak Factor					0.797					0.926					0.763					0.725	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	13:00																				
Volume	3	48	8	0	59	7	55	9	0	71	4	27	3	0	34	2	41	2	0	45	209
Percent	5.1	81.4	13.6	0.0		9.9	77.5	12.7	0.0		11.8	79.4	8.8	0.0		4.4	91.1	4.4	0.0		
Volume	3	48	8	0	59	7	55	9	0	71	4	27	3	0	34	2	41	2	0	45	209
Volume Peak Factor	0	15	2	0	17	3	14	1	0	18	0	11	1	0	12	0	11	1	0	12	59 0.886
High Int.	13:45					13:45					13:15					13:00					
Volume	0	17	3	0	20	2	20	3	0	25	1	10	1	0	12	1	12	0	0	13	
Peak Factor					0.738					0.710					0.708					0.865	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

Lo's Shopping Center
Traffic Impact Study

File Name : 01104bowheb
Site Code : 0000000(
Start Date : 11/14/2001
Page No : 1

Groups Printed- Unshifted

	BOWKER RD From North				HEBER RD From East				BOWKER RD From South				HEBER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	1	2	0	0	1	0	3	0	0	5	0	0	0	8	3	0	23
06:15	1	7	2	0	3	18	1	0	1	7	1	0	0	10	1	0	52
06:30	0	11	2	0	5	25	2	0	0	9	1	0	0	13	1	0	69
06:45	2	9	2	0	4	28	2	0	1	8	1	0	0	16	0	0	73
Total	4	29	6	0	13	71	8	0	2	29	3	0	0	47	5	0	217
07:00	1	9	2	0	5	30	1	0	2	6	1	0	0	9	0	0	66
07:15	1	8	0	0	3	26	2	0	1	9	3	0	1	13	1	0	68
07:30	1	9	4	0	7	22	4	0	0	14	3	0	2	17	1	0	84
07:45	1	13	2	0	5	29	3	0	2	14	3	0	1	11	2	0	86
Total	4	39	8	0	20	107	10	0	5	43	10	0	4	50	4	0	304
08:00	2	5	7	0	5	21	1	0	0	9	2	0	0	9	1	0	62
08:15	2	7	0	0	3	21	1	0	1	8	3	0	0	6	3	0	55
08:30	0	7	2	0	3	14	1	0	1	9	2	0	1	4	0	0	44
08:45	1	5	1	0	2	12	1	0	0	5	0	0	1	8	1	0	37
Total	5	24	10	0	13	68	4	0	2	31	7	0	2	27	5	0	198
09:00	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	4
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	
10:00	1	5	3	0	0	10	0	0	2	8	2	0	0	5	0	0	36
10:15	0	7	0	0	2	12	0	0	1	8	0	0	0	13	0	0	43
10:30	0	1	2	0	1	13	1	0	1	9	4	0	0	3	0	0	35
10:45	1	2	2	0	3	18	0	0	1	4	2	0	0	12	0	0	45
Total	2	15	7	0	6	53	1	0	5	29	8	0	0	33	0	0	159
11:00	1	3	4	0	4	18	0	0	0	12	2	0	1	9	0	0	54
11:15	0	4	5	0	5	16	1	0	2	5	2	0	4	12	0	0	56
11:30	1	9	2	0	4	15	1	0	0	6	0	0	0	9	2	0	49
11:45	1	5	0	0	2	13	2	0	3	8	1	0	0	13	1	0	49
Total	3	21	11	0	15	62	4	0	5	31	5	0	5	43	3	0	208
12:00	3	2	1	0	1	9	2	0	1	7	1	0	0	12	0	0	39
12:15	1	4	0	0	4	10	1	0	1	8	0	0	2	7	3	0	41
12:30	1	9	1	0	4	9	2	0	3	4	2	0	0	7	0	0	42
12:45	2	8	1	0	2	8	4	0	0	7	0	0	1	7	0	0	40
Total	7	23	3	0	11	36	9	0	5	26	3	0	3	33	3	0	162
13:00	1	5	0	0	1	13	3	0	1	6	1	0	1	12	0	0	44
13:15	2	11	3	0	1	8	2	0	1	10	1	0	1	11	1	0	52
13:30	0	15	2	0	3	14	1	0	0	11	1	0	0	11	1	0	59
13:45	0	17	3	0	2	20	3	0	2	0	0	0	0	7	0	0	54
Total	3	48	8	0	7	55	9	0	4	27	3	0	2	41	2	0	209
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15:00	2	12	4	0	3	14	1	0	2	11	2	0	0	15	0	0	66
15:15	0	12	2	0	0	13	1	0	2	7	2	0	0	13	1	0	53
15:30	2	13	4	0	2	10	3	0	4	11	5	0	1	12	0	0	67
15:45	0	12	4	0	2	20	1	0	2	6	0	0	3	14	0	0	64
Total	4	49	14	0	7	57	6	0	10	35	9	0	4	54	1	0	250

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowmcc
Site Code : 00000000
Start Date : 11/14/2001
Page No : 3

	BOWKER RD From North					MCCABE RD From East					BOWKER RD From South					MCCABE RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																					
Intersection	16:30																				
Volume	0	47	15	0	62	16	5	15	0	36	8	43	0	0	51	1	8	0	0	9	158
Percent	0.0	75.8	24.2	0.0		44.4	13.9	41.7	0.0		15.7	84.3	0.0	0.0		11.1	88.9	0.0	0.0		
Volume	0	47	15	0	62	16	5	15	0	36	8	43	0	0	51	1	8	0	0	9	158
Volume Peak Factor	0	10	1	0	11	6	0	6	0	12	2	15	0	0	17	1	2	0	0	3	43 0.919
High Int.	16:30					16:45					16:45					17:15					
Volume	0	14	3	0	17	6	0	6	0	12	2	15	0	0	17	0	5	0	0	5	
Peak Factor					0.912					0.750					0.750					0.450	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104bowmcc
Site Code : 0000000[illegible]
Start Date : 11/14/200[illegible]
Page No : 2

Groups Printed- Unshifted

	BOWKER RD From North				MCCABE RD From East				BOWKER RD From South				MCCABE RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	0	13	3	0	3	0	2	0	0	12	0	0	0	1	0	0	34
16:15	0	9	1	0	3	1	7	0	2	8	1	0	0	2	0	0	34
16:30	0	14	3	0	4	1	3	0	3	9	0	0	0	0	0	0	37
16:45	0	10	1	0	6	0	6	0	2	15	0	0	1	2	0	0	43
Total	0	46	8	0	16	2	18	0	7	44	1	0	1	5	0	0	148
17:00	0	11	6	0	5	2	4	0	1	7	0	0	0	1	0	0	37
17:15	0	12	5	0	1	2	2	0	2	12	0	0	0	5	0	0	41
17:30	0	7	6	0	3	2	3	0	2	5	1	0	0	1	0	0	30
17:45	0	8	0	0	3	2	0	0	2	6	1	0	0	1	0	0	23
Total	0	38	17	0	12	8	9	0	7	30	2	0	0	8	0	0	131
Grand Total	5	352	90	0	113	85	86	0	56	382	12	0	16	57	5	0	1259
Apprch %	1.1	78.7	20.1	0.0	39.8	29.9	30.3	0.0	12.4	84.9	2.7	0.0	20.5	73.1	6.4	0.0	
Total %	0.4	28.0	7.1	0.0	9.0	6.8	6.8	0.0	4.4	30.3	1.0	0.0	1.3	4.5	0.4	0.0	

	BOWKER RD From North					MCCABE RD From East					BOWKER RD From South					MCCABE RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																					
Intersection	07:15																				
Volume	1	44	12	0	57	21	17	9	0	47	3	65	1	0	69	2	4	0	0	6	179
Percent	1.8	77.2	21.1	0.0		44.7	36.2	19.1	0.0		4.3	94.2	1.4	0.0		33.3	66.7	0.0	0.0		
Volume	1	44	12	0	57	21	17	9	0	47	3	65	1	0	69	2	4	0	0	6	179
Volume Peak Factor	0	12	3	0	15	5	9	1	0	15	1	21	0	0	22	1	0	0	0	1	53
																					0.844
High Int.	08:00					07:30					07:30					07:15					
Volume	1	15	3	0	19	5	9	1	0	15	1	21	0	0	22	0	3	0	0	3	
Peak Factor					0.750					0.783					0.784					0.500	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	13:00																				
Volume	0	42	11	0	53	8	9	14	0	31	5	27	2	0	34	2	5	0	0	7	125
Percent	0.0	79.2	20.8	0.0		25.8	29.0	45.2	0.0		14.7	79.4	5.9	0.0		28.6	71.4	0.0	0.0		
Volume	0	42	11	0	53	8	9	14	0	31	5	27	2	0	34	2	5	0	0	7	125
Volume Peak Factor	0	13	2	0	15	0	2	5	0	7	2	10	1	0	13	0	1	0	0	1	36
																					0.868
High Int.	13:45					13:15					13:30					13:45					
Volume	0	15	7	0	22	3	3	5	0	11	2	10	1	0	13	1	2	0	0	3	
Peak Factor					0.602					0.705					0.654					0.583	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

Lo's Shopping Center
Traffic Impact Study

File Name : 01104bowmcc
Site Code : 00000000
Start Date : 11/14/200.
Page No : 1

Groups Printed- Unshifted

	BOWKER RD From North				MCCABE RD From East				BOWKER RD From South				MCCABE RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	1	5	1	0	0	0	0	0	3	6	0	0	0	0	0	0	16
06:15	0	10	3	0	4	0	0	0	4	6	0	0	2	4	1	0	34
06:30	0	11	4	0	4	1	1	0	2	10	0	0	0	1	0	0	34
06:45	0	9	1	0	2	4	3	0	3	8	1	0	0	1	0	0	32
Total	1	35	9	0	10	5	4	0	12	30	1	0	2	6	1	0	116
07:00	0	10	5	0	7	3	2	0	0	13	0	0	0	0	0	0	40
07:15	0	6	2	0	7	1	3	0	1	8	0	0	0	3	0	0	31
07:30	0	12	3	0	5	9	1	0	1	21	0	0	1	0	0	0	53
07:45	0	11	4	0	4	3	4	0	0	20	1	0	1	1	0	0	49
Total	0	39	14	0	23	16	10	0	2	62	1	0	2	4	0	0	173
08:00	1	15	3	0	5	4	1	0	1	16	0	0	0	0	0	0	46
08:15	0	6	1	0	3	4	1	0	2	11	0	0	0	2	0	0	30
08:30	0	9	1	0	1	0	1	0	2	10	1	0	0	1	1	0	27
08:45	0	5	0	0	2	2	0	0	0	8	0	0	0	0	0	0	17
Total	1	35	5	0	11	10	3	0	5	45	1	0	0	3	1	0	120
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:00	0	2	2	0	2	3	3	0	1	8	0	0	2	1	0	0	24
10:15	0	2	3	0	3	2	3	0	1	7	0	0	0	0	0	0	21
10:30	0	4	1	0	3	4	1	0	1	7	0	0	0	1	1	0	23
10:45	1	6	2	0	4	5	1	0	1	8	0	0	0	1	0	0	29
Total	1	14	8	0	12	14	8	0	4	30	0	0	2	3	1	0	97
11:00	0	3	1	0	0	2	2	0	1	14	0	0	2	3	1	0	29
11:15	0	9	1	0	1	0	0	0	1	10	0	0	2	3	0	0	27
11:30	0	7	1	0	1	2	1	0	2	12	1	0	0	4	0	0	31
11:45	0	5	2	0	0	2	1	0	0	8	1	0	0	1	0	0	20
Total	0	24	5	0	2	6	4	0	4	44	2	0	4	11	1	0	107
12:00	1	4	1	0	2	3	1	0	1	8	0	0	0	0	0	0	21
12:15	0	5	3	0	4	0	0	0	3	12	1	0	1	1	0	0	30
12:30	1	9	1	0	2	2	1	0	1	6	0	0	0	2	0	0	25
12:45	0	10	0	0	1	1	1	0	2	5	1	0	0	2	0	0	23
Total	2	28	5	0	9	6	3	0	7	31	2	0	1	5	0	0	99
13:00	0	6	0	0	1	3	3	0	3	5	0	0	0	1	0	0	22
13:15	0	8	2	0	3	3	5	0	0	10	1	0	1	1	0	0	34
13:30	0	13	2	0	0	2	5	0	2	10	1	0	0	1	0	0	36
13:45	0	15	7	0	4	1	1	0	0	2	0	0	1	2	0	0	33
Total	0	42	11	0	8	9	14	0	5	27	2	0	2	5	0	0	125
14:00	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	
15:00	0	11	1	0	1	3	4	0	0	13	0	0	0	3	1	0	37
15:15	0	13	2	0	1	2	2	0	2	8	0	0	1	0	0	0	31
15:30	0	15	4	0	3	1	3	0	1	10	0	0	0	2	0	0	39
15:45	0	12	1	0	5	2	4	0	0	8	0	0	0	2	0	0	34
Total	0	51	8	0	10.	8	13	0	3	39	0	0	1	7	1	0	141

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104yrmjas
Site Code : 0000000
Start Date : 08/02/2
Page No : 2

Groups Printed- Traffic Volumes

	YOURMAN RD From North			JASPER RD From East			YOURMAN RD From South			JASPER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	3	4	0	0	1	0	1	4	19	23	1	0	56
16:15	0	7	0	0	1	0	3	3	15	6	1	0	36
16:30	0	5	0	0	2	2	0	5	9	9	3	0	35
16:45	0	6	0	0	1	2	1	3	15	22	3	1	54
Total	3	22	0	0	5	4	5	15	58	60	8	1	181
17:00	0	8	0	0	0	0	1	3	22	17	4	0	55
17:15	0	6	0	0	1	1	2	2	14	19	1	0	46
17:30	2	4	0	0	2	0	0	1	14	23	4	1	51
17:45	0	3	0	0	1	2	0	2	15	13	1	0	37
Total	2	21	0	0	4	3	3	8	65	72	10	1	189
Grand Total	15	114	3	3	56	22	24	101	555	431	64	22	1410
Apprch %	11.4	86.4	2.3	3.7	69.1	27.2	3.5	14.9	81.6	83.4	12.4	4.3	
Total %	1.1	8.1	0.2	0.2	4.0	1.6	1.7	7.2	39.4	30.6	4.5	1.6	

	YOURMAN RD From North				JASPER RD From East				YOURMAN RD From South				JASPER RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																	
Intersection 07:15																	
Volume	1	7	1	9	1	7	2	10	1	11	28	40	22	7	4	33	
Percent	11.1	77.8	11.1		10.0	70.0	20.0		2.5	27.5	70.0		66.7	21.2	12.1		
Volume	1	7	1	9	1	7	2	10	1	11	28	40	22	7	4	33	92
Volume	0	1	0	1	1	3	0	4	0	1	10	11	5	2	2	9	25
Peak Factor																	0.920
High Int.	07:15				07:45				07:30				08:00				
Volume	0	4	0	4	1	3	0	4	0	5	7	12	7	4	0	11	
Peak Factor				0.563				0.625				0.833				0.750	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																	
Intersection 12:15																	
Volume	0	11	0	11	0	4	6	10	5	12	86	103	50	4	4	58	182
Percent	0.0	100.0	0.0		0.0	40.0	60.0		4.9	11.7	83.5		86.2	6.9	6.9		
Volume	0	11	0	11	0	4	6	10	5	12	86	103	50	4	4	58	182
Volume	0	4	0	4	0	1	3	4	1	1	28	30	11	2	0	13	51
Peak Factor																	0.892
High Int.	13:00				13:00				13:00				12:15				
Volume	0	4	0	4	0	1	3	4	1	1	28	30	17	1	2	20	
Peak Factor				0.688				0.625				0.858				0.725	
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																	
Intersection 16:45																	
Volume	2	24	0	26	0	4	3	7	4	9	65	78	81	12	2	95	206
Percent	7.7	92.3	0.0		0.0	57.1	42.9		5.1	11.5	83.3		85.3	12.6	2.1		
Volume	2	24	0	26	0	4	3	7	4	9	65	78	81	12	2	95	206
Volume	0	8	0	8	0	0	0	0	1	3	22	26	17	4	0	21	55
Peak Factor																	0.936
High Int.	17:00				16:45				17:00				17:30				
Volume	0	8	0	8	0	1	2	3	1	3	22	26	23	4	1	28	
Peak Factor				0.813				0.583				0.750				0.848	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

.o's Shopping Center
Traffic Impact Study

File Name : 01104yrmjas
Site Code : 0000000(
Start Date : 08/02/20(
Page No : 1

Groups Printed- Traffic Volumes

	YOURMAN RD From North			JASPER RD From East			YOURMAN RD From South			JASPER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	0	0	0	0	1	1	0	1	1	5	1	0	10
06:15	0	1	0	0	0	0	0	1	5	0	1	0	8
06:30	0	1	0	0	2	0	0	1	3	4	1	2	14
06:45	1	1	0	0	0	2	0	2	5	5	0	0	16
Total	1	3	0	0	3	3	0	5	14	14	3	2	48
07:00	1	1	0	0	4	0	1	1	6	2	1	3	20
07:15	0	4	0	0	1	1	1	4	6	3	1	1	22
07:30	0	0	0	0	2	1	0	5	7	7	0	1	23
07:45	0	1	0	1	3	0	0	1	10	5	2	2	25
Total	1	6	0	1	10	2	2	11	29	17	4	7	90
08:00	1	2	1	0	1	0	0	1	5	7	4	0	22
08:15	1	1	0	0	1	0	0	3	8	6	0	0	20
08:30	0	2	0	0	2	0	1	1	5	9	1	0	21
08:45	0	2	0	0	2	0	2	2	11	6	0	0	25
Total	2	7	1	0	6	0	3	7	29	28	5	0	88
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	3	0	0	1	0	0	1	16	19	2	0	[illegible]
10:15	0	2	0	0	0	1	0	0	13	12	3	0	31
10:30	0	1	0	0	3	1	1	1	12	15	4	1	39
10:45	1	1	0	0	2	0	1	3	22	7	1	1	39
Total	1	7	0	0	6	2	2	5	63	53	10	2	151
11:00	0	5	0	0	0	0	1	5	15	14	1	1	42
11:15	1	3	1	0	2	0	0	0	24	11	1	1	44
11:30	1	4	0	0	3	0	0	4	16	10	2	0	40
11:45	0	3	0	0	1	0	0	4	16	13	0	0	37
Total	2	15	1	0	6	0	1	13	71	48	4	2	163
12:00	1	1	0	0	0	1	0	7	15	11	3	0	39
12:15	0	2	0	0	1	1	0	4	19	17	1	2	47
12:30	0	3	0	0	1	2	2	2	18	13	0	2	43
12:45	0	2	0	0	1	0	2	5	21	9	1	0	41
Total	1	8	0	0	3	4	4	18	73	50	5	4	170
13:00	0	4	0	0	1	3	1	1	28	11	2	0	51
13:15	0	0	0	1	1	0	0	4	15	13	2	1	37
13:30	0	5	0	0	1	0	0	4	16	4	1	1	32
13:45	0	3	0	0	2	0	0	0	17	7	1	0	30
Total	0	12	0	1	5	3	1	9	76	35	6	2	150
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	1	3	0	0	1	0	0	2	15	16	3	0	[illegible]
15:15	0	4	0	0	1	0	0	3	13	13	2	0	36
15:30	0	2	0	0	5	1	0	3	18	12	2	0	43
15:45	1	4	1	1	1	0	3	2	31	13	2	1	60
Total	2	13	1	1	8	1	3	10	77	54	9	1	180

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104yrmheb
Site Code : 0000000
Start Date : 07/24/20
Page No : 2

Groups Printed- Traffic Volumes

	YOURMAN RD From North			HEBER RD From East			YOURMAN RD From South			HEBER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	1	0	0	0	20	0	3	1	2	2	15	0	44
16:15	1	0	0	1	13	0	1	1	2	0	14	0	33
16:30	2	0	0	0	17	0	0	0	1	1	8	0	29
16:45	0	0	2	0	7	0	1	0	2	3	11	0	26
Total	4	0	2	1	57	0	5	2	7	6	48	0	132
17:00	0	1	0	0	13	1	0	0	3	4	13	1	36
17:15	1	0	0	0	15	2	0	0	1	4	14	1	38
17:30	0	0	0	0	14	0	0	0	2	2	18	1	37
17:45	0	0	0	0	11	2	1	1	1	3	17	0	36
Total	1	1	0	0	53	5	1	1	7	13	62	3	147
Grand Total	25	17	3	8	589	40	36	42	67	62	418	13	1320
Apprch %	55.6	37.8	6.7	1.3	92.5	6.3	24.8	29.0	46.2	12.6	84.8	2.6	
Total %	1.9	1.3	0.2	0.6	44.6	3.0	2.7	3.2	5.1	4.7	31.7	1.0	

	YOURMAN RD From North				HEBER RD From East				YOURMAN RD From South				HEBER RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																	
Intersection	07:00																
Volume	1	1	0	2	0	83	1	84	3	2	6	11	3	57	1	61	
Percent	50.0	50.0	0.0		0.0	98.8	1.2		27.3	18.2	54.5		4.9	93.4	1.6		
Volume	1	1	0	2	0	83	1	84	3	2	6	11	3	57	1	61	158
Volume	1	1	0	2	0	22	1	23	2	1	2	5	2	15	0	17	47
Peak Factor																	0.840
High Int.	07:30				07:15				07:30				07:45				
Volume	1	1	0	2	0	23	0	23	2	1	2	5	1	18	1	20	
Peak Factor				0.250				0.913				0.550				0.763	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																	
Intersection	10:45																
Volume	4	3	0	7	1	62	7	70	7	21	10	38	13	27	1	41	156
Percent	57.1	42.9	0.0		1.4	88.6	10.0		18.4	55.3	26.3		31.7	65.9	2.4		
Volume	4	3	0	7	1	62	7	70	7	21	10	38	13	27	1	41	156
Volume	1	0	0	1	1	24	4	29	1	4	2	7	5	10	0	15	52
Peak Factor																	0.750
High Int.	11:00				10:45				11:30				10:45				
Volume	2	1	0	3	1	24	4	29	0	16	5	21	5	10	0	15	
Peak Factor				0.583				0.603				0.452				0.683	
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																	
Intersection	15:15																
Volume	2	2	0	4	1	73	7	81	6	3	11	20	8	62	1	71	176
Percent	50.0	50.0	0.0		1.2	90.1	8.6		30.0	15.0	55.0		11.3	87.3	1.4		
Volume	2	2	0	4	1	73	7	81	6	3	11	20	8	62	1	71	176
Volume	0	0	0	0	1	19	4	24	1	1	2	4	1	25	1	27	55
Peak Factor																	0.800
High Int.	15:15				15:45				15:15				15:45				
Volume	0	2	0	2	1	19	4	24	1	0	5	6	1	25	1	27	
Peak Factor				0.500				0.844				0.833				0.657	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

.o's Shopping Center
'raffic Impact Study

File Name : 01104yrmheb
Site Code : 00000000
Start Date : 07/24/200
Page No : 1

Groups Printed- Traffic Volumes

	YOURMAN RD From North			HEBER RD From East			YOURMAN RD From South			HEBER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	1	0	0	2	9	1	1	0	1	0	7	1	23
06:15	0	2	0	0	10	0	0	0	1	0	5	0	18
06:30	0	0	0	0	19	0	0	0	1	0	6	0	26
06:45	1	0	0	2	16	1	1	0	0	0	8	1	30
Total	2	2	0	4	54	2	2	0	3	0	26	2	97
07:00	0	0	0	0	17	0	0	0	1	0	14	0	32
07:15	0	0	0	0	23	0	0	0	0	0	10	0	33
07:30	1	1	0	0	22	1	2	1	2	2	15	0	47
07:45	0	0	0	0	21	0	1	1	3	1	18	1	46
Total	1	1	0	0	83	1	3	2	6	3	57	1	158
08:00	0	0	0	0	13	2	1	0	0	0	16	0	32
08:15	1	0	0	0	19	0	0	0	1	0	12	0	33
08:30	0	1	0	0	16	0	2	0	0	0	10	2	31
08:45	0	0	0	0	13	1	0	0	1	1	7	0	23
Total	1	1	0	0	61	3	3	0	2	1	45	2	119
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	1	1	0	0	6	2	0	2	2	3	3	0	[illegible]
10:15	1	1	0	0	13	0	2	0	3	0	9	0	29
10:30	1	0	0	1	16	1	0	3	1	1	6	0	30
10:45	1	0	0	1	24	4	1	4	2	5	10	0	52
Total	4	2	0	2	59	7	3	9	8	9	28	0	131
11:00	2	1	0	0	20	2	4	1	2	2	6	0	40
11:15	0	1	0	0	8	1	2	0	1	5	6	1	25
11:30	1	1	0	0	10	0	0	16	5	1	5	0	39
11:45	0	0	0	0	15	3	1	0	2	1	10	0	32
Total	3	3	0	0	53	6	7	17	10	9	27	1	136
12:00	3	0	0	0	16	2	1	1	1	1	7	0	32
12:15	0	1	0	0	15	0	1	3	1	0	3	0	24
12:30	0	3	0	0	2	0	1	0	2	4	7	0	19
12:45	0	0	0	0	14	1	0	0	3	1	8	1	28
Total	3	4	0	0	47	3	3	4	7	6	25	1	103
13:00	5	1	1	0	21	2	0	1	1	0	12	1	45
13:15	0	0	0	0	11	0	1	2	2	6	10	0	32
13:30	0	0	0	0	9	2	2	0	3	0	12	0	28
13:45	0	0	0	0	21	1	2	1	2	1	9	0	37
Total	5	1	1	0	62	5	5	4	8	7	43	1	142
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	7	1	1	1	0	2	10	1	2
15:15	0	2	0	0	15	0	1	0	5	3	12	0	38
15:30	1	0	0	0	19	3	1	1	2	2	10	0	39
15:45	0	0	0	1	19	4	1	1	2	1	25	1	55
Total	1	2	0	1	60	8	4	3	9	8	57	2	155

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104111jas
Site Code : 0000000
Start Date : 08/02/2
Page No : 2

Groups Printed- Traffic Volumes

	HWY 111 From North			JASPER RD From East			HWY 111 From South			JASPER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	4	245	20	14	4	0	2	165	2	3	0	3	462
16:15	4	293	9	16	1	0	0	208	4	3	0	2	540
16:30	6	280	12	6	1	0	0	145	6	2	1	2	461
16:45	1	295	15	9	2	2	1	181	1	2	2	1	512
Total	15	1113	56	45	8	2	3	699	13	10	3	8	1975
17:00	4	318	15	20	0	0	1	201	3	2	3	2	569
17:15	1	354	18	12	1	0	0	180	2	2	2	3	575
17:30	10	270	19	10	4	3	3	151	2	1	4	2	479
17:45	1	296	11	14	2	1	0	156	0	1	0	5	487
Total	16	1238	63	56	7	4	4	688	7	6	9	12	2110
Grand Total	69	7664	378	488	79	15	50	7167	136	92	61	36	16235
Apprch %	0.9	94.5	4.7	83.8	13.6	2.6	0.7	97.5	1.8	48.7	32.3	19.0	
Total %	0.4	47.2	2.3	3.0	0.5	0.1	0.3	44.1	0.8	0.6	0.4	0.2	

	HWY 111 From North				JASPER RD From East				HWY 111 From South				JASPER RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																	
Intersection	07:30																
Volume	2	639	26	667	32	10	1	43	1	871	11	883	8	4	1	13	1
Percent	0.3	95.8	3.9		74.4	23.3	2.3		0.1	98.6	1.2		61.5	30.8	7.7		
Volume	2	639	26	667	32	10	1	43	1	871	11	883	8	4	1	13	1606
Volume	0	165	6	171	10	1	0	11	1	278	4	283	2	0	1	3	468
Peak Factor																	0.858
High Int.	07:45				07:45				07:30				08:00				
Volume	0	174	6	180	12	3	0	15	1	278	4	283	3	3	0	6	
Peak Factor				0.926				0.717				0.780				0.542	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																	
Intersection	11:30																
Volume	4	705	43	752	60	12	1	73	6	797	12	815	8	5	2	15	1655
Percent	0.5	93.8	5.7		82.2	16.4	1.4		0.7	97.8	1.5		53.3	33.3	13.3		
Volume	4	705	43	752	60	12	1	73	6	797	12	815	8	5	2	15	1655
Volume	2	189	9	200	14	6	0	20	1	207	2	210	2	1	0	3	433
Peak Factor																	0.956
High Int.	11:45				11:30				12:15				12:00				
Volume	0	197	9	206	14	6	0	20	2	209	5	216	2	2	2	6	
Peak Factor				0.913				0.913				0.943				0.625	
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																	
Intersection	16:45																
Volume	16	1237	67	1320	51	7	5	63	5	713	8	726	7	11	8	26	2135
Percent	1.2	93.7	5.1		81.0	11.1	7.9		0.7	98.2	1.1		26.9	42.3	30.8		
Volume	16	1237	67	1320	51	7	5	63	5	713	8	726	7	11	8	26	2135
Volume	1	354	18	373	12	1	0	13	0	180	2	182	2	2	3	7	575
Peak Factor																	0.928
High Int.	17:15				17:00				17:00				17:00				
Volume	1	354	18	373	20	0	0	20	1	201	3	205	2	3	2	7	
Peak Factor				0.885				0.788				0.885				0.929	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

o's Shopping Center
raffic Impact Study

File Name : 01104111jas
Site Code : 00000000
Start Date : 08/02/200
Page No : 1

Groups Printed- Traffic Volumes

	HWY 111 From North			JASPER RD From East			HWY 111 From South			JASPER RD From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	1	58	3	2	0	0	0	121	2	2	3	0	192
06:15	0	59	2	5	0	0	0	132	4	2	0	0	204
06:30	0	89	5	3	2	0	0	188	6	0	2	0	295
06:45	2	82	2	5	1	0	1	181	4	3	3	0	284
Total	3	288	12	15	3	0	1	622	16	7	8	0	975
07:00	1	111	1	6	2	1	2	150	3	1	3	0	281
07:15	0	131	3	6	2	0	1	182	6	1	1	0	333
07:30	0	165	6	10	1	0	1	278	4	2	0	1	468
07:45	0	174	6	12	3	0	0	235	1	1	1	0	433
Total	1	581	16	34	8	1	4	845	14	5	5	1	1515
08:00	0	150	8	5	2	0	0	187	3	3	3	0	361
08:15	2	150	6	5	4	1	0	171	3	2	0	0	344
08:30	1	160	6	3	1	1	0	177	4	5	2	1	361
08:45	0	172	3	9	1	0	0	157	5	3	1	0	351
Total	3	632	23	22	8	2	0	692	15	13	6	1	1417
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	2	149	14	14	2	0	3	172	8	1	3	1	36
10:15	1	151	16	11	2	0	3	168	3	1	1	0	357
10:30	1	165	15	15	2	0	2	168	5	1	2	0	376
10:45	0	178	8	19	4	1	1	158	3	3	1	0	376
Total	4	643	53	59	10	1	9	666	19	6	7	1	1478
11:00	0	155	11	10	0	0	2	186	3	3	2	1	373
11:15	0	184	9	22	1	1	2	169	2	5	1	1	397
11:30	2	189	9	14	6	0	1	207	2	2	1	0	433
11:45	0	197	9	12	2	1	2	180	1	4	0	0	408
Total	2	725	38	58	9	2	7	742	8	14	4	2	1611
12:00	1	167	12	19	1	0	1	201	4	2	2	2	412
12:15	1	152	13	15	3	0	2	209	5	0	2	0	402
12:30	1	181	8	20	1	0	2	167	5	6	3	0	394
12:45	5	195	6	16	1	0	1	184	2	3	3	0	416
Total	8	695	39	70	6	0	6	761	16	11	10	2	1624
13:00	2	185	7	24	3	0	4	179	6	3	1	1	415
13:15	1	189	13	12	1	0	1	137	2	2	1	1	360
13:30	1	210	3	14	4	0	1	195	3	1	0	1	433
13:45	4	207	3	15	5	0	4	188	4	1	2	2	435
Total	8	791	26	65	13	0	10	699	15	7	4	5	1643
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	3	221	16	12	0	0	1	192	5	5	3	2	46
15:15	3	239	13	16	1	0	1	202	3	4	0	0	482
15:30	1	261	11	14	4	2	3	208	4	3	0	1	512
15:45	2	237	12	22	2	1	1	151	1	1	2	1	433
Total	9	958	52	64	7	3	6	753	13	13	5	4	1887

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 0110411186
Site Code : 0000000
Start Date : 07/24/20
Page No : 2

Groups Printed- Traffic Volumes

	HWY 111 From North			HEBER RD From East			HWY 111 From South			HWY 86 From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	5	227	10	16	2	3	3	186	13	21	9	5	500
16:15	4	241	7	4	5	1	0	175	11	25	7	5	485
16:30	1	248	9	8	6	4	1	200	11	17	1	5	511
16:45	4	223	8	6	1	2	1	147	18	17	5	2	434
Total	14	939	34	34	14	10	5	708	53	80	22	17	1930
17:00	5	337	10	9	3	3	3	193	18	23	5	2	611
17:15	4	349	18	13	4	2	1	156	14	18	1	7	587
17:30	0	243	9	8	2	2	3	184	14	20	8	2	495
17:45	0	220	16	4	2	2	3	141	11	12	6	2	419
Total	9	1149	53	34	11	9	10	674	57	73	20	13	2112
Grand Total	128	6910	265	361	217	111	81	7065	499	593	192	136	16558
Apprch %	1.8	94.6	3.6	52.4	31.5	16.1	1.1	92.4	6.5	64.4	20.8	14.8	
Total %	0.8	41.7	1.6	2.2	1.3	0.7	0.5	42.7	3.0	3.6	1.2	0.8	

	HWY 111 From North				HEBER RD From East				HWY 111 From South				HWY 86 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																	
Intersection	07:15																
Volume	14	582	33	629	55	27	12	94	9	843	44	896	57	27	11	95	17
Percent	2.2	92.5	5.2		58.5	28.7	12.8		1.0	94.1	4.9		60.0	28.4	11.6		
Volume	14	582	33	629	55	27	12	94	9	843	44	896	57	27	11	95	1714
Volume	4	165	10	179	17	4	3	24	2	252	17	271	20	7	1	28	502
Peak Factor																	0.854
High Int.	07:30				07:15				07:30				07:45				
Volume	4	165	10	179	17	17	1	35	2	252	17	271	17	10	4	31	
Peak Factor				0.878				0.671				0.827				0.766	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																	
Intersection	13:00																
Volume	13	735	26	774	28	27	13	68	14	705	60	779	71	15	15	101	1722
Percent	1.7	95.0	3.4		41.2	39.7	19.1		1.8	90.5	7.7		70.3	14.9	14.9		
Volume	13	735	26	774	28	27	13	68	14	705	60	779	71	15	15	101	1722
Volume	3	185	5	193	10	7	5	22	4	215	15	234	18	5	2	25	474
Peak Factor																	0.908
High Int.	13:30				13:45				13:45				13:15				
Volume	2	197	6	205	10	7	5	22	4	215	15	234	23	3	7	33	
Peak Factor				0.944				0.773				0.832				0.765	
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																	
Intersection	16:30																
Volume	14	1157	45	1216	36	14	11	61	6	696	61	763	75	12	16	103	2143
Percent	1.2	95.1	3.7		59.0	23.0	18.0		0.8	91.2	8.0		72.8	11.7	15.5		
Volume	14	1157	45	1216	36	14	11	61	6	696	61	763	75	12	16	103	2143
Volume	5	337	10	352	9	3	3	15	3	193	18	214	23	5	2	30	611
Peak Factor																	0.877
High Int.	17:15				17:15				17:00				17:00				
Volume	4	349	18	371	13	4	2	19	3	193	18	214	23	5	2	30	
Peak Factor				0.819				0.803				0.891				0.858	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

.o's Shopping Center
Traffic Impact Study

File Name : 0110411186
Site Code : 00000000
Start Date : 07/24/20
Page No : 1

Groups Printed- Traffic Volumes

	HWY 111 From North			HEBER RD From East			HWY 111 From South			HWY 86 From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	3	69	3	7	6	1	1	114	6	2	5	2	219
06:15	2	75	5	15	8	1	0	135	4	6	3	2	256
06:30	1	94	2	15	5	0	2	190	11	6	1	0	327
06:45	4	79	10	9	7	0	0	188	8	7	2	4	318
Total	10	317	20	46	26	2	3	627	29	21	11	8	1120
07:00	4	105	6	13	6	1	1	207	17	10	6	3	379
07:15	2	135	8	17	17	1	3	200	5	11	7	3	409
07:30	4	165	10	17	4	3	2	252	17	20	7	1	502
07:45	5	130	7	13	4	6	3	187	13	17	10	4	399
Total	15	535	31	60	31	11	9	846	52	58	30	11	1689
08:00	3	152	8	8	2	2	1	204	9	9	3	3	404
08:15	6	147	6	12	7	1	0	156	9	21	9	3	377
08:30	0	145	3	7	6	2	2	165	10	20	6	3	369
08:45	1	156	6	10	2	1	1	164	14	15	1	2	373
Total	10	600	23	37	17	6	4	689	42	65	19	11	1523
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	3	144	3	5	9	2	4	167	9	4	3	2	3
10:15	4	143	4	12	3	3	2	166	8	9	0	4	358
10:30	5	155	3	11	5	2	4	182	12	4	4	5	392
10:45	9	123	5	11	10	6	1	187	18	16	3	3	392
Total	21	565	15	39	27	13	11	702	47	33	10	14	1497
11:00	0	129	6	14	6	3	2	202	17	5	5	5	394
11:15	0	140	0	4	4	2	4	139	12	17	4	4	330
11:30	2	161	2	6	6	2	1	184	10	18	2	1	395
11:45	5	139	3	3	5	5	2	167	13	13	4	4	363
Total	7	569	11	27	21	12	9	692	52	53	15	14	1482
12:00	1	148	2	3	4	11	1	173	11	14	9	3	380
12:15	4	158	4	7	10	4	0	227	14	20	2	7	457
12:30	6	148	4	1	2	2	3	177	18	23	7	1	392
12:45	4	170	5	8	9	8	3	171	16	16	3	3	416
Total	15	624	15	19	25	25	7	748	59	73	21	14	1645
13:00	6	161	7	8	6	3	1	156	17	15	5	2	387
13:15	2	192	8	3	5	2	3	169	16	23	3	7	433
13:30	2	197	6	7	9	3	6	165	12	15	2	4	428
13:45	3	185	5	10	7	5	4	215	15	18	5	2	474
Total	13	735	26	28	27	13	14	705	60	71	15	15	1722
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	4	188	9	4	2	0	3	171	12	17	11	9	43
15:15	3	229	7	7	9	5	3	173	13	15	3	3	47
15:30	3	241	11	12	7	4	2	165	12	15	5	3	480
15:45	4	219	10	14	0	1	1	165	11	19	10	4	458
Total	14	877	37	37	18	10	9	674	48	66	29	19	1838

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104111mcc
Site Code : 0000000(
Start Date : 11/15/200,
Page No : 3

	HWY 111 From North					MCCABE RD From East					HWY 111 From South					MCCABE RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																					
Intersection	16:30																				
Volume	2	1570	6	0	1578	5	1	2	0	8	1	933	10	0	944	5	3	1	0	9	2539
Percent	0.1	99.5	0.4	0.0		62.5	12.5	25.0	0.0		0.1	98.8	1.1	0.0		55.6	33.3	11.1	0.0		
Volume	2	1570	6	0	1578	5	1	2	0	8	1	933	10	0	944	5	3	1	0	9	2539
Volume Peak Factor	0	435	1	0	436	2	1	0	0	3	0	251	2	0	253	0	0	0	0	0	692 0.917
High Int.	17:00					17:00					17:00					16:45					
Volume	0	435	1	0	436	2	1	0	0	3	0	251	2	0	253	2	2	0	0	4	
Peak Factor					0.905					0.667					0.933					0.563	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01104111mcc
Site Code : 00000000
Start Date : 11/15/2001
Page No : 2

Groups Printed- 1 - Unshifted

	HWY 111 From North				MCCABE RD From East				HWY 111 From South				MCCABE RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	0	339	2	0	0	3	1	0	1	225	1	0	7	0	0	0	579
16:15	4	353	1	0	2	0	0	0	0	241	5	0	3	2	0	0	611
16:30	0	392	1	0	0	0	2	0	0	220	5	0	0	0	1	0	621
16:45	1	372	1	0	1	0	0	0	1	212	1	0	2	2	0	0	593
Total	5	1456	5	0	3	3	3	0	2	898	12	0	12	4	1	0	2404
17:00	0	435	1	0	2	1	0	0	0	251	2	0	0	0	0	0	692
17:15	1	371	3	0	2	0	0	0	0	250	2	0	3	1	0	0	633
17:30	0	361	1	0	0	0	0	0	0	226	1	0	2	1	0	0	592
17:45	0	323	0	0	0	0	0	0	0	195	0	0	1	0	0	0	519
Total	1	1490	5	0	4	1	0	0	0	922	5	0	6	2	0	0	2436
Grand Total	22	9398	39	0	43	42	14	0	28	9051	107	1	64	44	9	0	18862
Apprch %	0.2	99.4	0.4	0.0	43.4	42.4	14.1	0.0	0.3	98.5	1.2	0.0	54.7	37.6	7.7	0.0	
Total %	0.1	49.8	0.2	0.0	0.2	0.2	0.1	0.0	0.1	48.0	0.6	0.0	0.3	0.2	0.0	0.0	

	HWY 111 From North					MCCABE RD From East					HWY 111 From South					MCCABE RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																					
Intersection	07:30																				
Volume	2	818	4	0	824	5	8	1	0	14	11	1159	20	0	1190	9	8	1	0	18	2046
Percent	0.2	99.3	0.5	0.0		35.7	57.1	7.1	0.0		0.9	97.4	1.7	0.0		50.0	44.4	5.6	0.0		
Volume	2	818	4	0	824	5	8	1	0	14	11	1159	20	0	1190	9	8	1	0	18	2046
Volume Peak Factor	0	222	2	0	224	0	0	0	0	0	0	360	6	0	366	3	2	1	0	6	596 0.858
High Int.	07:45					08:15					07:45					07:45					
Volume	0	222	2	0	224	3	4	0	0	7	0	360	6	0	366	3	2	1	0	6	
Peak Factor					0.920					0.500					0.813					0.750	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	13:00																				
Volume	1	908	3	0	912	3	5	0	0	8	0	870	10	0	880	6	4	0	0	10	1810
Percent	0.1	99.6	0.3	0.0		37.5	62.5	0.0	0.0		0.0	98.9	1.1	0.0		60.0	40.0	0.0	0.0		
Volume	1	908	3	0	912	3	5	0	0	8	0	870	10	0	880	6	4	0	0	10	1810
Volume Peak Factor	0	265	1	0	266	0	0	0	0	0	0	215	5	0	220	1	1	0	0	2	488 0.927
High Int.	13:45					13:00					13:15					13:15					
Volume	0	265	1	0	266	1	3	0	0	4	0	240	2	0	242	2	2	0	0	4	
Peak Factor					0.857					0.500					0.909					0.625	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

Lo's Shopping Center
Traffic Impact Study

File Name : 01104111mcc
Site Code : 0000000C
Start Date : 11/15/2001
Page No : 1

Groups Printed- 1 - Unshifted

	HWY 111 From North				MCCABE RD From East				HWY 111 From South				MCCABE RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	1	67	0	0	1	5	0	0	0	141	3	0	0	2	0	0	
06:15	2	89	1	0	1	0	0	0	0	220	3	0	0	1	0	0	220
06:30	0	106	0	0	2	2	1	0	0	235	3	0	0	1	1	0	317
06:45	0	142	1	0	2	0	0	0	0	210	3	0	2	1	0	0	351
Total	3	404	2	0	6	7	1	0	0	806	12	0	2	5	1	0	361
																	1249
07:00	0	117	1	0	1	1	0	0	0	205	1	0	0	0	1	0	
07:15	0	150	0	0	3	2	1	0	0	259	2	0	2	2	0	0	327
07:30	1	221	1	0	1	1	1	0	0	328	3	0	2	2	0	0	421
07:45	0	222	2	0	0	0	0	0	0	360	6	0	3	2	1	0	561
Total	1	710	4	0	5	4	2	0	0	1152	12	0	7	6	2	0	596
																	1905
08:00	0	201	1	0	1	3	0	0	9	233	8	0	2	1	0	0	
08:15	1	174	0	0	3	4	0	0	2	238	3	0	2	3	0	0	459
08:30	0	180	1	0	2	1	0	0	11	210	1	0	0	1	0	0	430
08:45	1	188	0	0	1	0	0	0	0	212	3	0	0	2	1	0	407
Total	2	743	2	0	7	8	0	0	22	893	15	0	4	7	1	0	408
																	1704
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:00	0	177	1	0	0	2	0	0	0	186	3	0	1	2	1	0	
10:15	1	153	2	0	3	0	0	0	0	222	1	0	1	1	0	0	373
10:30	0	181	2	0	0	1	0	0	0	193	7	0	3	0	0	0	384
10:45	0	185	0	0	0	1	2	0	0	220	2	0	0	1	1	0	387
Total	1	696	5	0	3	4	2	0	0	821	13	0	5	4	2	0	412
																	1556
11:00	1	189	2	0	1	2	0	0	0	190	1	0	0	0	0	0	
11:15	0	211	1	0	3	1	0	0	0	196	1	0	1	1	1	0	386
11:30	1	195	1	0	1	0	1	0	1	227	2	0	2	2	0	0	416
11:45	1	222	0	0	1	1	3	0	1	193	0	0	1	1	0	0	433
Total	3	817	4	0	6	4	4	0	2	806	4	0	4	4	1	0	424
																	1659
12:00	1	212	0	0	0	1	0	0	0	210	1	0	1	1	0	0	
12:15	0	215	0	0	0	0	0	0	0	217	2	1	1	2	0	0	427
12:30	0	234	1	0	0	1	0	0	0	252	2	0	2	2	1	0	438
12:45	0	225	1	0	0	1	0	0	0	187	1	0	0	0	0	0	495
Total	1	886	2	0	0	3	0	0	0	866	6	1	4	5	1	0	415
																	1775
13:00	0	212	0	0	1	3	0	0	0	189	2	0	2	0	0	0	
13:15	1	202	1	0	1	2	0	0	0	240	2	0	2	2	0	0	409
13:30	0	229	1	0	1	0	0	0	0	226	1	0	1	1	0	0	453
13:45	0	265	1	0	0	0	0	0	0	215	5	0	1	1	0	0	460
Total	1	908	3	0	3	5	0	0	0	870	10	0	6	4	0	0	488
																	1810
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15:00	0	320	4	0	0	1	1	0	0	241	4	0	2	0	0	0	
15:15	1	307	0	0	1	1	0	0	0	281	3	0	2	1	0	0	573
15:30	0	349	2	0	3	0	0	0	1	232	9	0	5	1	0	0	597
15:45	2	311	1	0	2	1	1	0	1	263	2	0	5	1	0	0	602
Total	3	1287	7	0	6	3	2	0	2	1017	18	0	14	3	0	0	590
																	2362

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01220dogheb
Site Code : 00000000
Start Date : 11/15/200
Page No : 3

	DOGWOOD RD From North					HEBER RD From East					DOGWOOD RD From South					HEBER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 14:00 to 17:45 - Peak 1 of 1																					
Intersection	15:30																				
Volume	7	206	85	0	298	80	79	7	0	166	8	111	66	0	185	120	131	8	0	259	908
Percent	2.3	69.1	28.5	0.0		48.2	47.6	4.2	0.0		4.3	60.0	35.7	0.0		46.3	50.6	3.1	0.0		
Volume	7	206	85	0	298	80	79	7	0	166	8	111	66	0	185	120	131	8	0	259	908
Volume Peak Factor	0	63	17	0	80	20	21	0	0	41	2	29	23	0	54	29	29	1	0	59	234 0.970
High Int.	16:00					15:45					15:30					15:45					
Volume	1	54	28	0	83	24	24	0	0	48	2	29	23	0	54	27	46	2	0	75	
Peak Factor					0.898					0.865					0.856					0.863	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

File Name : 01220dogheb
Site Code : 0000000(
Start Date : 11/15/20(.
Page No : 2

Groups Printed- Unshifted

	DOGWOOD RD From North				HEBER RD From East				DOGWOOD RD From South				HEBER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
16:00	1	54	28	0	22	16	3	0	2	26	18	0	27	25	3	0	225
16:15	4	50	19	0	14	18	4	0	1	33	12	0	37	31	2	0	225
16:30	1	47	18	0	9	12	1	0	1	36	20	0	36	20	0	0	201
16:45	2	57	16	0	13	20	0	0	1	27	10	0	41	23	1	0	211
Total	8	208	81	0	58	66	8	0	5	122	60	0	141	99	6	0	862
17:00	0	68	23	0	5	25	3	0	2	20	12	0	44	35	1	0	238
17:15	0	54	20	0	17	25	2	0	2	22	17	0	40	28	2	1	230
17:30	0	42	15	0	7	16	1	0	0	23	9	0	28	29	2	0	172
17:45	1	40	15	0	14	20	1	0	2	26	11	0	34	20	3	0	187
Total	1	204	73	0	43	86	7	0	6	91	49	0	146	112	8	1	827
Grand Total	34	1254	550	0	567	723	48	0	46	1164	585	0	898	894	34	1	6798
Apprch %	1.8	68.2	29.9	0.0	42.4	54.0	3.6	0.0	2.6	64.8	32.6	0.0	49.2	48.9	1.9	0.1	
Total %	0.5	18.4	8.1	0.0	8.3	10.6	0.7	0.0	0.7	17.1	8.6	0.0	13.2	13.2	0.5	0.0	

	DOGWOOD RD From North					HEBER RD From East					DOGWOOD RD From South					HEBER RD From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour From 06:00 to 09:45 - Peak 1 of 1																					
Intersection	07:30																				
Volume	1	103	73	0	177	108	110	1	0	219	0	166	78	0	244	66	105	2	0	173	813
Percent	0.6	58.2	41.2	0.0		49.3	50.2	0.5	0.0		0.0	68.0	32.0	0.0		38.2	60.7	1.2	0.0		
Volume	1	103	73	0	177	108	110	1	0	219	0	166	78	0	244	66	105	2	0	173	813
Volume Peak Factor	0	25	19	0	44	38	28	0	0	66	0	57	27	0	84	25	37	1	0	63	257
																					0.791
High Int.	08:00					07:45					07:45					07:45					
Volume	0	27	19	0	46	38	28	0	0	66	0	57	27	0	84	25	37	1	0	63	
Peak Factor					0.962					0.830					0.726					0.687	
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	11:45																				
Volume	9	120	60	0	189	71	80	5	0	156	10	122	61	0	193	103	91	4	0	198	736
Percent	4.8	63.5	31.7	0.0		45.5	51.3	3.2	0.0		5.2	63.2	31.6	0.0		52.0	46.0	2.0	0.0		
Volume	9	120	60	0	189	71	80	5	0	156	10	122	61	0	193	103	91	4	0	198	736
Volume Peak Factor	1	33	19	0	53	18	24	1	0	43	0	34	13	0	47	24	27	1	0	52	195
																					0.944
High Int.	12:00					12:00					11:45					12:00					
Volume	1	33	19	0	53	18	24	1	0	43	6	39	18	0	63	24	27	1	0	52	
Peak Factor					0.892					0.907					0.766					0.952	

DAHL, ROBINS & ASSOCIATES, INC.
Turning Movement Counts

o's Shopping Center
r[illegible]c Impact Study

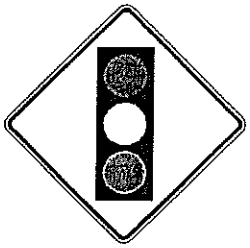
File Name : 01220dogheb
Site Code : 00000000
Start Date : 11/15/200[illegible]
Page No : 1

Groups Printed- Unshifted

	DOGWOOD RD From North				HEBER RD From East				DOGWOOD RD From South				HEBER RD From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:15	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
06:30	1	20	5	0	8	10	1	0	1	36	17	0	5	8	1	0	113
06:45	0	19	5	0	6	15	0	0	0	39	7	0	4	19	0	0	114
Total	1	42	10	0	14	25	1	0	1	75	24	0	9	27	1	0	230
07:00	0	12	6	0	6	21	1	0	0	38	8	0	11	20	1	0	124
07:15	0	19	8	0	18	22	3	0	1	33	18	0	16	24	0	0	162
07:30	1	25	15	0	29	35	0	0	0	47	18	0	11	23	0	0	204
07:45	0	25	19	0	38	28	0	0	0	57	27	0	25	37	1	0	257
Total	1	81	48	0	91	106	4	0	1	175	71	0	63	104	2	0	747
08:00	0	27	19	0	23	24	1	0	0	31	16	0	14	26	0	0	181
08:15	0	26	20	0	18	23	0	0	0	31	17	0	16	19	1	0	171
08:30	0	24	16	0	11	21	1	0	2	27	14	0	22	19	1	0	158
08:45	0	19	15	0	10	21	3	0	2	28	17	0	15	20	1	0	151
Total	0	96	70	0	62	89	5	0	4	117	64	0	67	84	3	0	661
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:00	2	22	9	0	12	8	1	0	0	33	14	0	30	19	1	0	151
10:15	0	24	21	0	14	15	0	0	1	31	24	0	19	16	0	0	165
10:30	2	36	9	0	17	14	1	0	2	19	17	0	17	21	0	0	155
10:45	1	22	12	0	12	18	4	0	1	36	14	0	29	19	0	0	168
Total	5	104	51	0	55	55	6	0	4	119	69	0	95	75	1	0	639
11:00	0	25	16	0	7	16	0	0	0	32	12	0	19	22	0	0	149
11:15	1	26	9	0	20	24	3	0	4	37	19	0	26	30	1	0	200
11:30	0	29	6	0	11	11	3	0	0	32	10	0	24	19	0	0	145
11:45	2	27	12	0	19	21	0	0	6	39	18	0	25	23	1	0	193
Total	3	107	43	0	57	72	6	0	10	140	59	0	94	94	2	0	687
12:00	1	33	19	0	18	24	1	0	0	34	13	0	24	27	1	0	195
12:15	4	26	18	0	14	24	3	0	3	27	10	0	28	18	1	0	176
12:30	2	34	11	0	20	11	1	0	1	22	20	0	26	23	1	0	172
12:45	2	33	9	0	11	15	3	0	0	21	22	0	19	29	0	0	164
Total	9	126	57	0	63	74	8	0	4	104	65	0	97	97	3	0	707
13:00	1	27	12	0	19	18	0	0	1	33	12	0	15	26	1	0	165
13:15	1	35	14	0	12	16	0	0	1	36	17	0	19	18	1	0	170
13:30	0	32	22	0	16	18	2	0	0	18	15	0	25	14	3	0	165
13:45	0	10	3	0	6	5	0	0	1	11	5	0	8	10	0	0	59
Total	2	104	51	0	53	57	2	0	3	98	49	0	67	68	5	0	559
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15:00	2	29	17	0	10	30	1	0	2	31	28	0	27	33	0	0	210
15:15	0	51	11	0	17	18	0	0	1	40	11	0	36	26	0	0	211
15:30	0	63	17	0	20	21	0	0	2	29	23	0	29	29	1	0	234
15:45	2	39	21	0	24	24	0	0	3	23	13	0	27	46	2	0	224
Total	4	182	66	0	71	93	1	0	8	123	75	0	119	134	3	0	879

APPENDIX A

TRAFFIC COUNT DATA



REFERENCES

Institute of Transportation Engineers (ITE), *Manual of Transportation Engineering Studies,* 1994.

Institute of Transportation Engineers (ITE), *Transportation and Land Development,* 1988.

Institute of Transportation Engineers (ITE), *Traffic Access and Impact Studies for Site Development,* 1991.

Institute of Transportation Engineers (ITE), *Traffic Engineering Handbook,* 4th Edition, 1991.

Institute of Transportation Engineers (ITE), *Design and Safety of Pedestrian Facilities,* 1998.

Institute of Transportation Engineers (ITE), *Canadian Guide to Neighbourhood Traffic Calming,* 1998.

Institute of Transportation Engineers (ITE), *Trip Generation Volumes 1, 2 & 3,* 6th Edition, 1997.

Transportation Research Board, National Research Council, *Highway Capacity Manual, Special Report 209,* 1994.

Louis J. Pignataro, *Traffic Engineering Theory and Practice,* 1973.

Institute of Transportation Studies, U.C. Berkeley, *Fundamentals of Traffic Engineering,* 1996.

Strong Concepts, *TEAPAC SIGNAL97-Intersection Capacity Analysis, SITE-Traffic Distribution, WARRANTS-Traffic Signal Warrants Analysis Software, NOSTOP-Bandwidth Progression & System Cycle Optimization Software, PRENETSIM-Animation Translation Software.*

U.S. Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices* (MUTCD), 2001Edition.

American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets,* 1994.

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

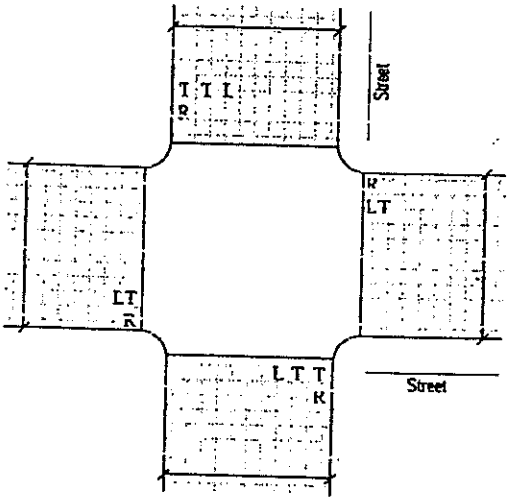
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	AM PEAK 2001
Comment	EXISTING VOLUMES

Site Information

Jurisdiction/Date	IMP. CO. 12/10/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration		LT	R		LT	R
No. of lanes		1	1		1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

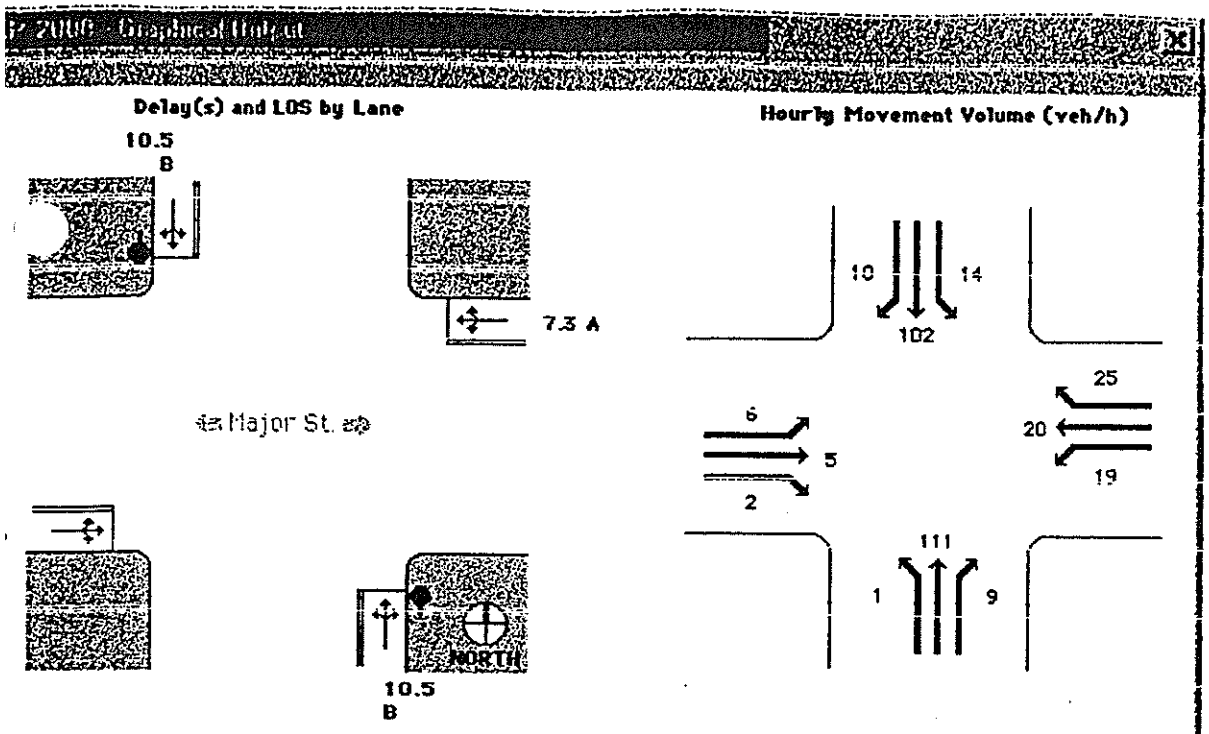
	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	11	27	57	12	27	55	44	843	9	33	582	14
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

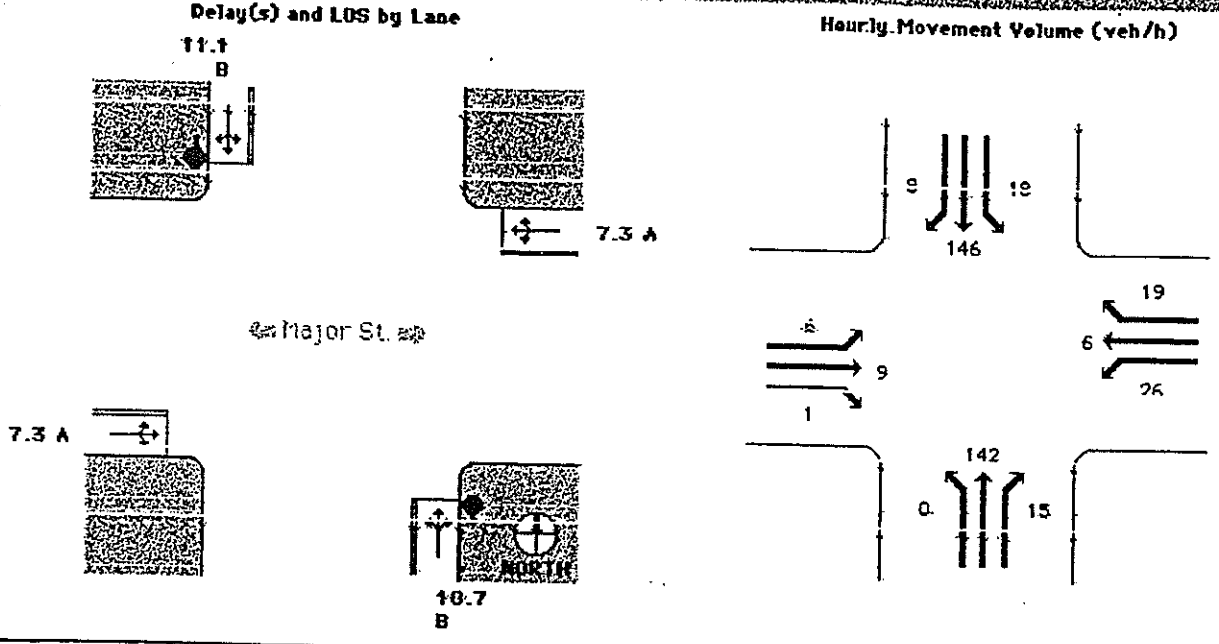


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/8/01
Period	AM PEAK 2010
Major St.	MCCABE ROAD
Minor St.	BOWKER RD

Approach	Delay	LOS
Minor St. (NB)	10.5 s	B
Minor St. (SB)	10.5 s	B
Major LT (EB)	7.3 s	A
Major LT (WB)	7.3 s	A

HCS+ 2000 - Graphical Output

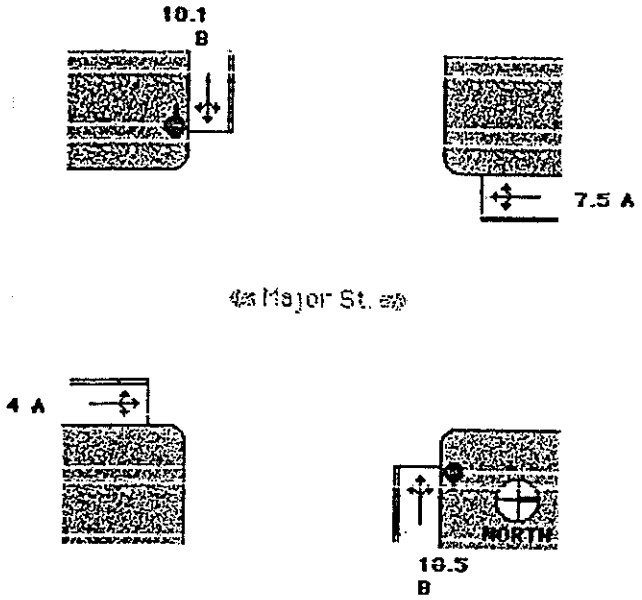


Chapter 17 - TWSC - Summary of Analysis

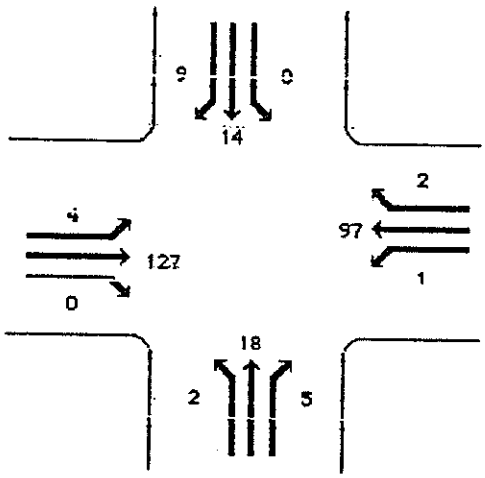
Analyst	RVH
Agency	DRA
Date	12/8/01
Period	PM PEAK 2010
Major St.	MCCABE ROAD
Minor St.	BOWKER RD

Approach	Delay		LOS
Minor St. (NB)	10.7	s	B
Minor St. (SB)	11.1	s	B
Major LT (EB)	7.3	s	A
Major LT (WB)	7.3	s	A

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)



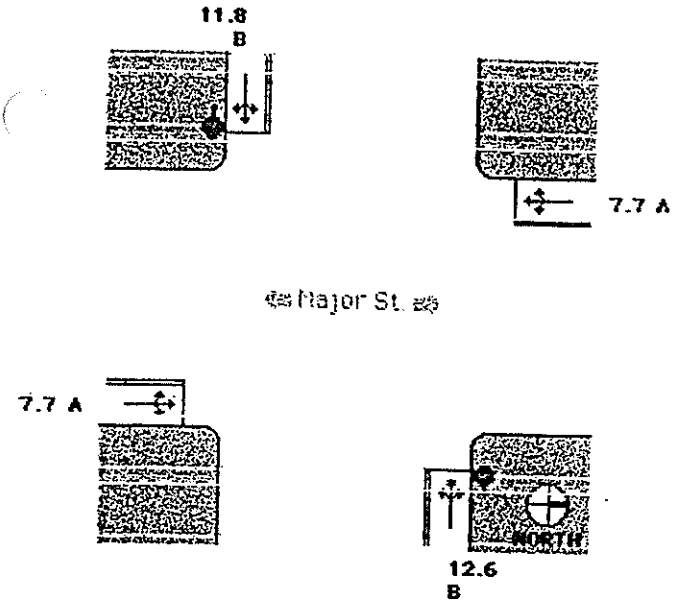
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/8/01
Period	AM PEAK 2010
Major St.	BOWKER ROAD
Minor St.	JASPER ROAD

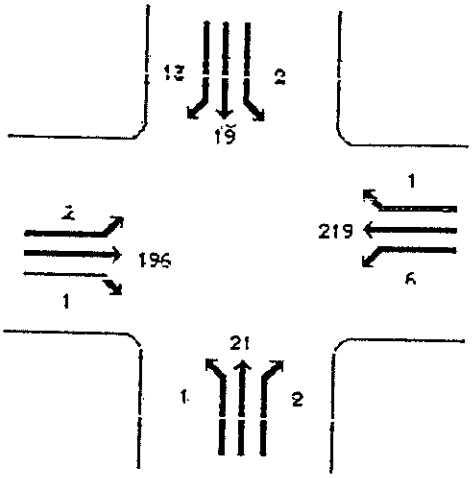
Approach	Delay	LOS
Minor St. (WB)	10.5 s	B
Minor St. (EB)	10.1 s	B
Major LT (NB)	7.4 s	A
Major LT (SB)	7.5 s	A

- HCM AT 2000 - Graphical Output

Delay(s) and LOS by Lane



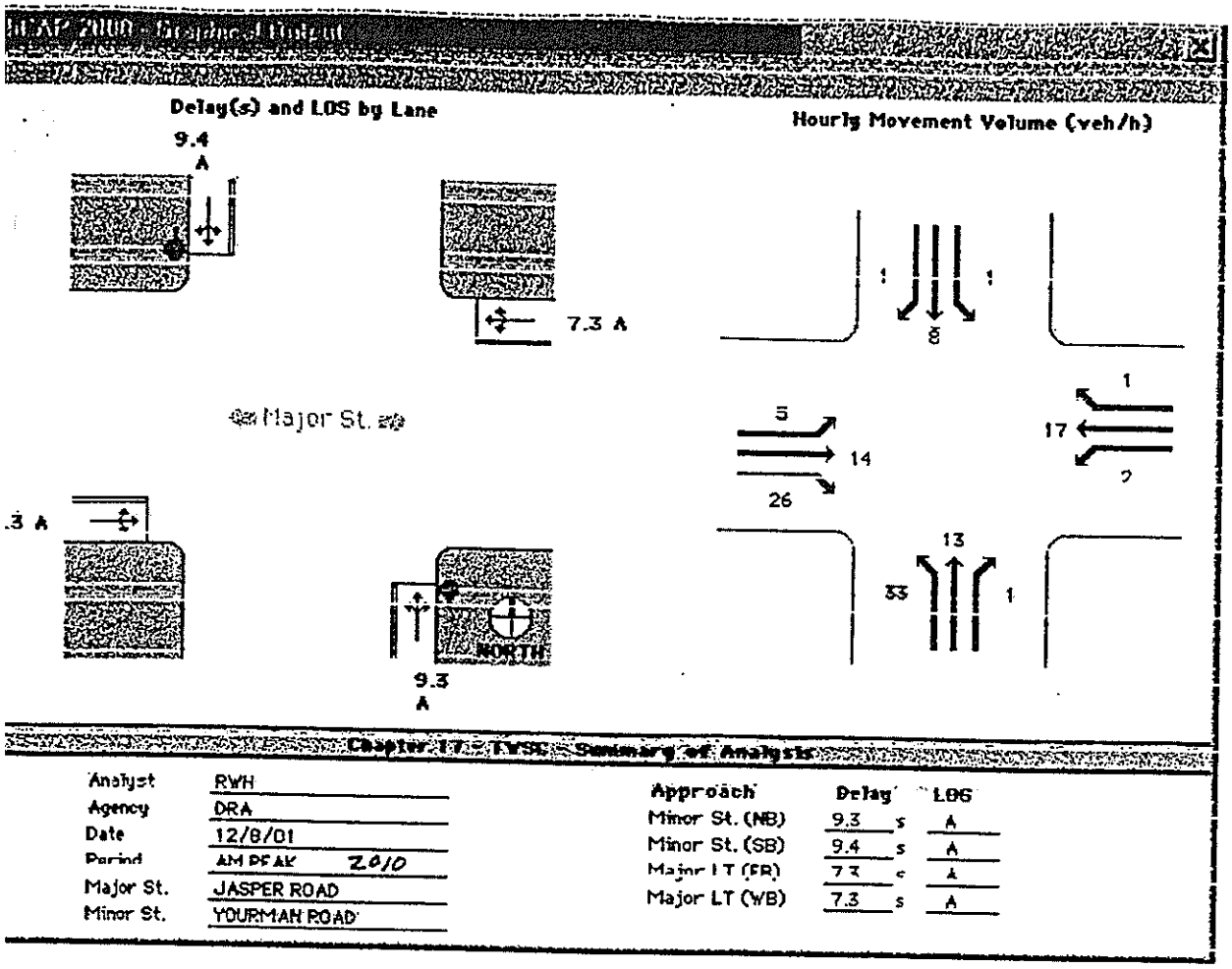
Hourly Movement Volume (veh/h)



Chapter 17 - HCM - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/8/01
Period	PM PEAK 2010
Major St.	BOWKER ROAD
Minor St.	JASPER ROAD

Approach	Delay	LOS
Minor St. (WB)	12.6 s	B
Minor St. (EB)	11.8 s	B
Major LT (NB)	7.7 s	A
Major LT (SB)	7.7 s	A

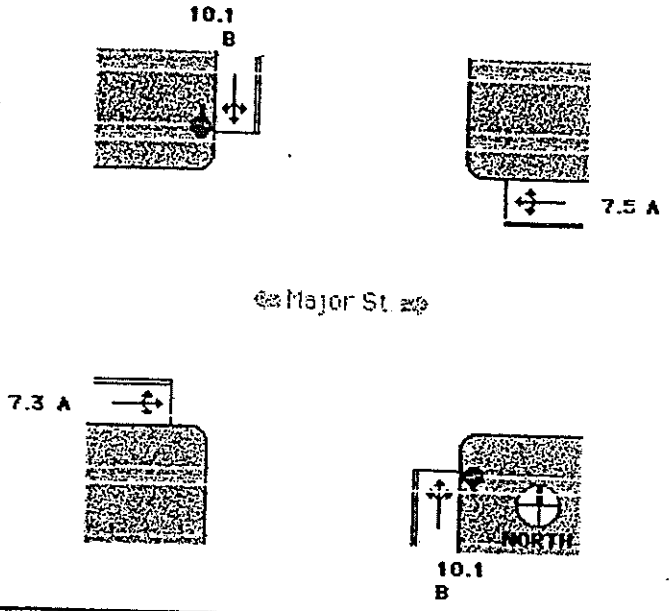


Chapter 17: TWSC - Summary of Analysis

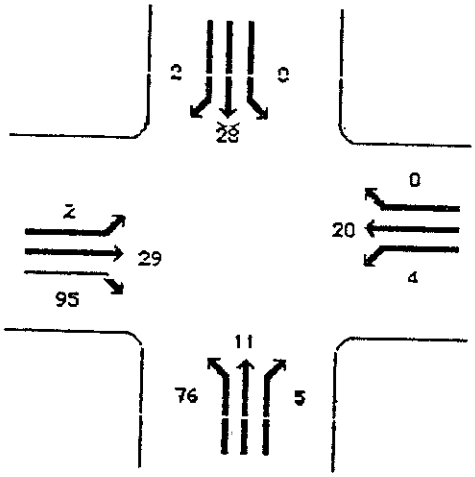
Analyst	RWH
Agency	DRA
Date	12/8/01
Period	AM PEAK 2010
Major St.	JASPER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	9.3	s	A
Minor St. (SB)	9.4	s	A
Major LT (EB)	7.3	s	A
Major LT (WB)	7.3	s	A

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)

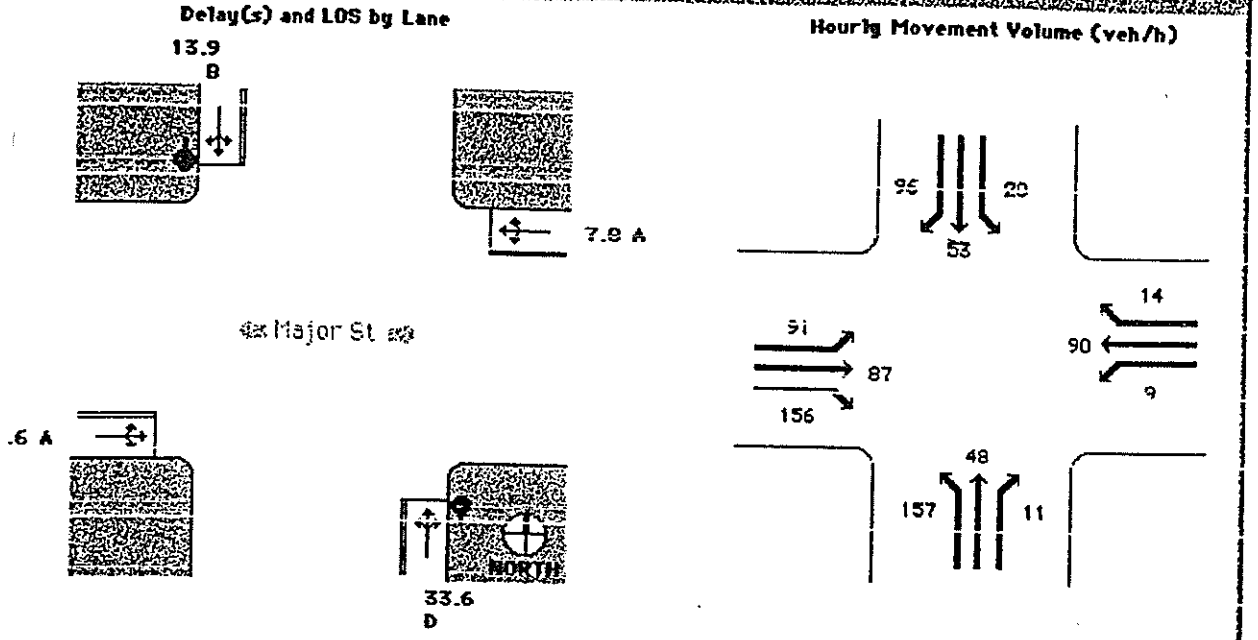


Chapter 17 - TWSC - Summary of Analysis

Analyst	RVH
Agency	DRA
Date	12/8/01
Period	PM PEAK 2010
Major St.	JASPER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	10.1	s	B
Minor St. (SB)	10.1	s	B
Major LT (EB)	7.3	s	A
Major LT (WB)	7.5	s	A

HCS+: 2000 - Graphics Output



Chapter 17 - TWSC - Summary of Analysis

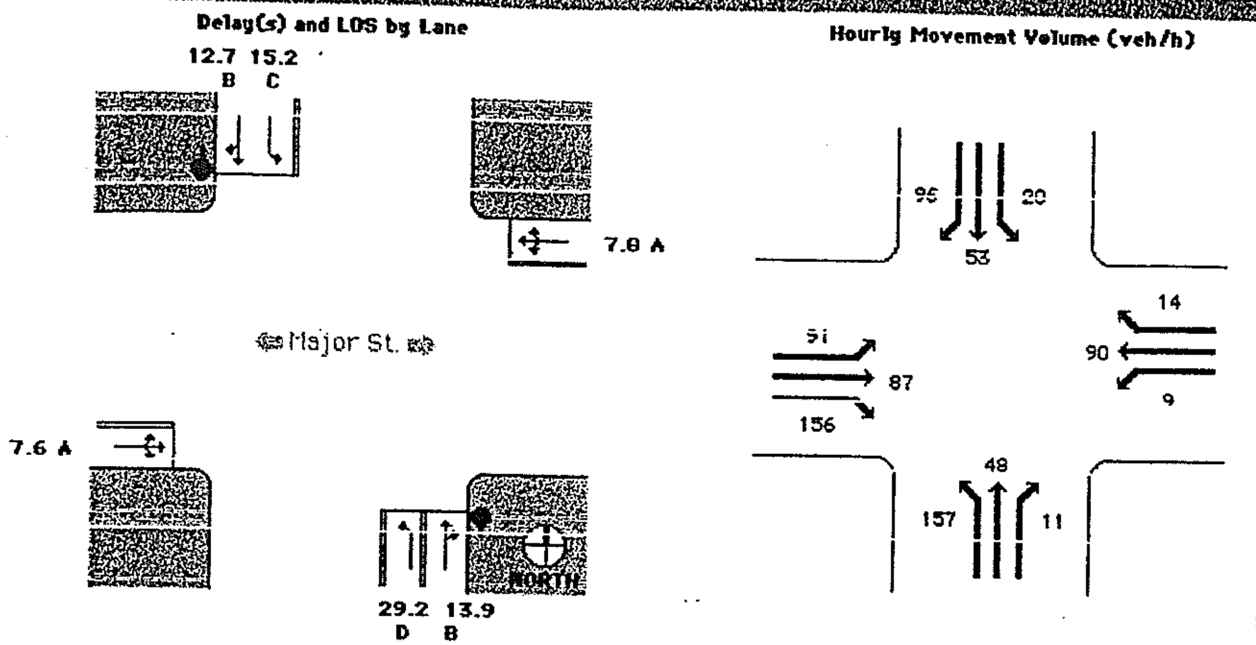
Analyst	RWH
Agency	DRA
Date	12/8/01
Period	PM PEAK
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

Approach	Delay		LOS
Minor St. (NB)	33.6	s	D
Minor St. (SB)	13.9	s	B
Major LT (EB)	7.6	s	A
Major LT (WB)	7.8	s	A

Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/8/01
Period	AM PEAK 2010
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

Approach	Delay		LOS
Minor St. (NB)	16.3	s	C
Minor St. (SB)	11.8	s	B
Major LT (EB)	7.7	s	A
Major LT (WB)	7.5	s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/8/01
Period	PM PEAK 2010
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

Approach	Delay	LOS
Minor St. (NB)	25.0 s	C
Minor St. (SB)	13.0 s	B
Major LT (EB)	7.6 s	A
Major LT (WB)	7.8 s	A

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	42		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NST		
Critical phase volume, CV (veh/h)	753		
Lost time/phase, t_L (s)	4		

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \sum CV$	795
Lost time/cycle, L (s) $L = \sum t_L$	8
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.583
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	6.7		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	53.3		

Control Delay and LOS

	EB	WB	NB		SB	
Lane group	LTR	LTR	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	10	10	38	1620	42	1254
Green ratio, g/C	.046	.046	0	.821	0	.821
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.139	.139		.627		.486
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	72	72		2583		2583
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	27.5	27.5		2		1.6
Incremental delay, d_2 (s/veh) (Equation 16-12)	4	4		1.2		.7
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	31.5	31.5		3.1		2.3
LOS by lane group	C	C		A		A
Delay by approach, d_A (s/veh) $\frac{\sum(d)(V)}{\sum V}$	31.5	31.5	3.1		2.3	
LOS by approach	C	C	A		A	
Intersection delay, d_I (s/veh) $d_I = \frac{\sum(d_A)(V_A)}{\sum V_A}$	3.6	Intersection LOS (Exhibit 16-2)			A	

Notes

1. RS = 1710(f_g)(1.0), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

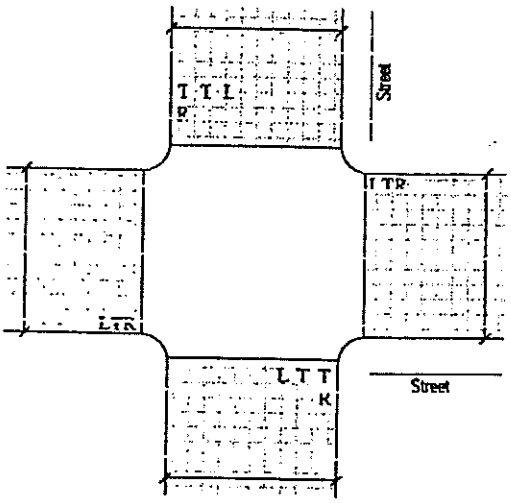
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	AM PEAK 2010
Comment	EXISTING

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	MC CABE ROAI HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration		LTR			LTR	
No. of lanes		1			1	

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	1	9	27	1	9	28	35	1490	13	39	1154	2
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	100	100	-	100	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	4			4			4			4		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING

East-West Phasing Plan

Selected plan (Exhibit A10-8) I	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	35		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NST		
Critical phase volume, CV (veh/h)	1019		
Lost time/phase, t_L (s)	4		

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \sum CV$	1054
Lost time/cycle, L (s) $L = \sum t_L$	8
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.773
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	5.7		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	54.3		

Control Delay and LOS

	EB	WB	NB		SB	
Lane group	LTR	LTR	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	5	1	46	1332	45	2212
Green ratio, g/C	.029	.029	0	.838	0	.838
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.1	.03		.505		.839
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	46	46		2636		2636
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	28.4	28.3		1.4		2.7
Incremental delay, d_2 (s/veh) (Equation 16-12)	4.3	1.2		.7		3.4
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	32.7	29.5		2.1		6.1
LOS by lane group	C	C		A		A
Delay by approach, d_A (s/veh) $\frac{\sum(d)(V)}{\sum V}$	32.7	29.5		2.1		6.1
LOS by approach	C	C		A		A
Intersection delay, d_I (s/veh) $d_I = \frac{\sum(d_A)(V_A)}{\sum V_A}$	5.1	Intersection LOS (Exhibit 16-2)				A

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

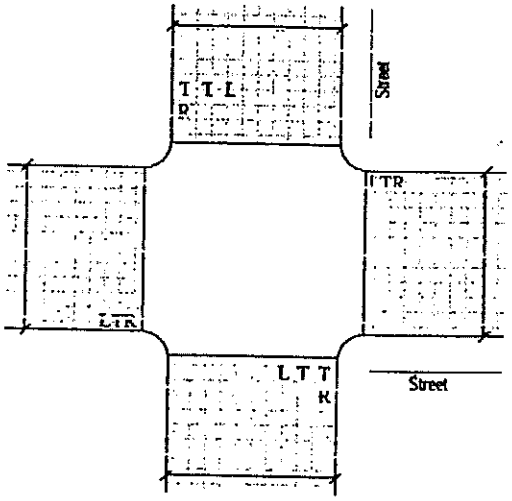
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	PM PEAK 2010
Comment	EXISTING

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	MC CABE ROAI HIWAY 111
Area Type	☐ CBD ☒ Other

Intersection Geometry



	EB			WB		
Lane configuration		LTR			LTR	
No. of lanes		1			1	

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	1	4	23	2	1	29	42	1225	1	41	2035	2
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	100	100	-	100	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	4			4			4			4		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description ADD SB LT

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	480		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 2a	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	SLT	NST	
Critical phase volume, CV (veh/h)	184	305	
Lost time/phase, t_L (s)	4	4	

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \sum CV$	969
Lost time/cycle, L (s) $L = \sum t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.77
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	27.8		
North-South Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	13.1	19.1	

Control Delay and LOS

	EB	WB		NB	SB	
Lane group	LTR	LT	R	LTR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	332	207	185	142	190	262
Green ratio, g/C	.396	.396	.396	.252	.152	.471
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	1573
v/c ratio, X $X = \frac{V/s}{g/C}$	.533	.428	.207	.358	.795	.354
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	623	623	623	397	239	741
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	13.9	13.2	12.4	18.4	24.5	10.1
Incremental delay, d_2 (s/veh) (Equation 16-12)	3.2	2.1	1.2	2.5	23.3	1.3
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	17.1	15.3	13.6	20.9	47.9	11.4
LOS by lane group	B	B	B	C	D	B
Delay by approach, d_A (s/veh) $\frac{\sum(d)(V)}{\sum V}$	17.1	14.6		20.9	26.8	
LOS by approach	B	B		C	C	
Intersection delay, d_I (s/veh) $d_I = \frac{\sum(d_A)(V_A)}{\sum V_A}$	19.4	Intersection LOS (Exhibit 16-2)			B	

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

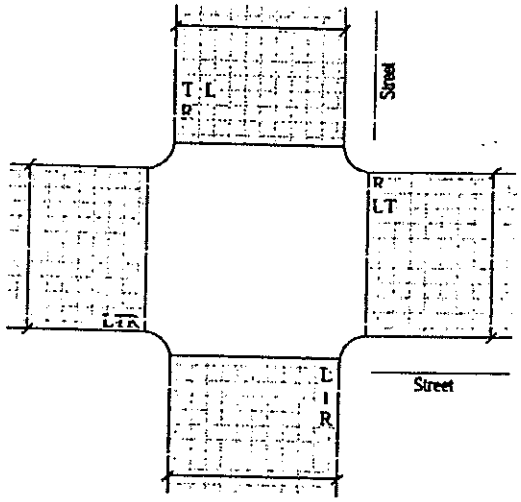
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	PM PEAK 2010
Comment	ADD SB LT

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	HEBER ROAD DOGWOOD ROA
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB	
Lane configuration		LTR		LT	R
No. of lanes		1		1	1

	NB			SB		
Lane configuration		LTR		L	TR	
No. of lanes		1		1	1	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	9	305	141	84	245	170	77	130	85	175	241	8
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	100	100	-	0	100	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	4			4			4			4		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description ADD SB LT

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	300		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NST		
Critical phase volume, CV (veh/h)	338		
Lost time/phase, t_L (s)	4		

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	638
Lost time/cycle, L (s) $L = \Sigma t_L$	8
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.468
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	28.4		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	31.6		

Control Delay and LOS

	EB	WB		NB	SB	
Lane group	LTR	LT	R	LTR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	226	204	170	211	139	132
Green ratio, g/C	.407	.407	.407	.46	0	.46
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	1573
v/c ratio, X $X = \frac{V/s}{g/C}$	.354	.319	.265	.292		.182
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	640	640	640	723		723
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	12.3	12.1	11.8	10.1		9.6
Incremental delay, d_2 (s/veh) (Equation 16-12)	1.5	1.3	1	1		.6
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	13.9	13.4	12.8	11.1		10.1
LOS by lane group	B	B	B	B		B
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	13.9	13.2		11.1	10.1	
LOS by approach	B	B		B	B	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	12.4	Intersection LOS (Exhibit 16-2)			B	

Notes

1. RS = 1740(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

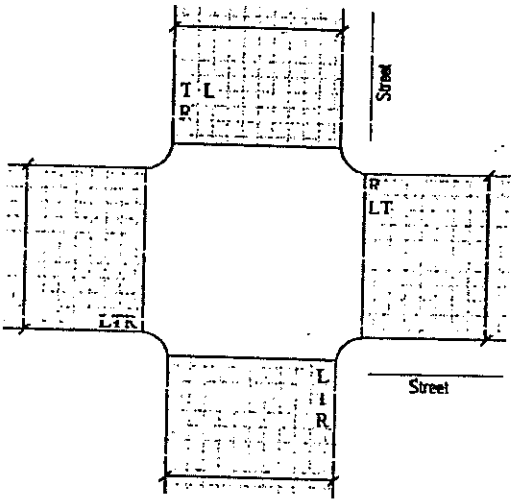
General Information

Analyst
Agency or Company DRA
Analysis Period/Year AM PEAK 2010
Comment ADD SB LT

Site Information

Jurisdiction/Date IMP. CO. 12/20/01
Intersection HEBER ROAD DOGWOOD ROA
Area Type ☐ CBD ☑ Other

Intersection Geometry



	EB			WB	
Lane configuration		LTR		LT	R
No. of lanes		1		1	1

	NB			SB		
Lane configuration		LTR		L	TR	
No. of lanes		1		1	1	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	2	208	77	31	188	156	91	194	42	128	121	1
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	·	100	100	·	0	100	·	100	0	·	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	4			4			4			4		

Peak-hour factor, PHF .92
Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING

East-West Phasing Plan

Selected plan (Exhibit A10-8) I	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	1307		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) I	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NST		
Critical phase volume, CV (veh/h)	1140		
Lost time/phase, t_L (s)	4		

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	2446
Lost time/cycle, L (s) $L = \Sigma t_L$	8
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	150
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	1.642
Intersection status (Exhibit A10-9)	OVER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	79.8		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	70.2		

Control Delay and LOS

	EB	WB	NB	SB
Lane group	LTR	LTR	LTR	LTR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	545	557	4	10
Green ratio, g/C	.506	.506	.441	.441
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573
v/c ratio, X $X = \frac{V/s}{g/C}$	.685	.7	.006	.014
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	795	795	694	694
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	28	28.4	23.5	23.6
Incremental delay, d_2 (s/veh) (Equation 16-12)	4.8	5.1	0	0
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	32.8	33.5	23.5	23.6
LOS by lane group	C	C	C	C
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	32.8	33.5	23.5	23.6
LOS by approach	C	C	C	C
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	30	Intersection LOS (Exhibit 16-2)		C

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

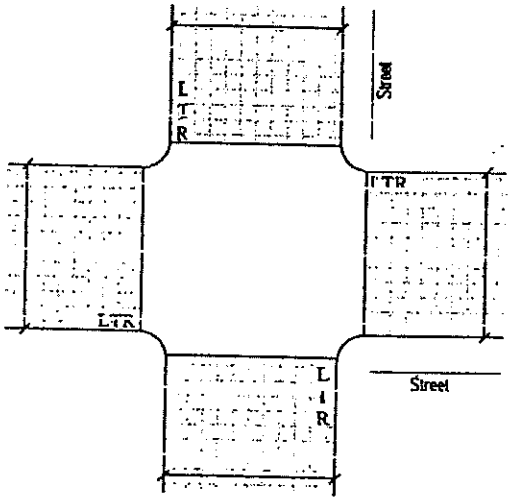
General Information

Analyst: RWH
Agency or Company: DRA
Analysis Period/Year: PM PEAK 2010
Comment: EXISTING

Site Information

Jurisdiction/Date: IMP. CO. 12/20/01
Intersection: HEBER ROAD YOURMAN ROA
Area Type: ☐ CBD ☒ Other

Intersection Geometry



	EB			WB		
Lane configuration		LTR			LTR	
No. of lanes		1			1	

	NB			SB		
Lane configuration		LTR			LTR	
No. of lanes		1			1	

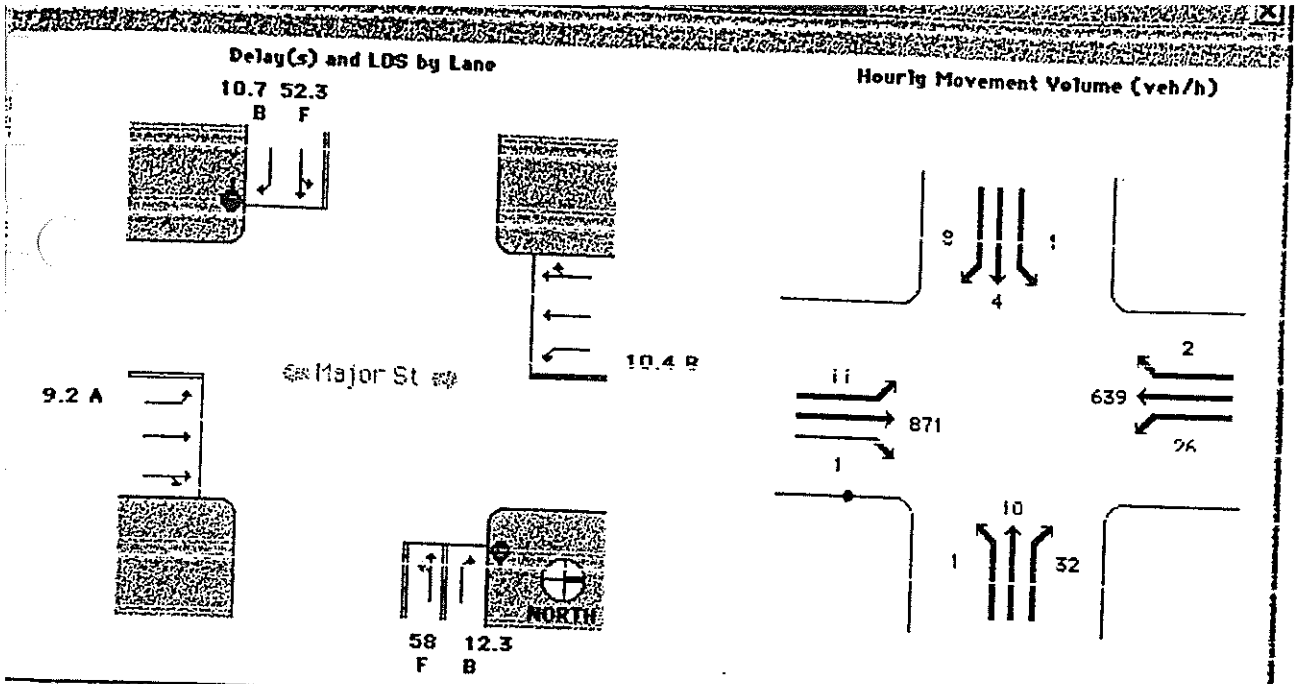
Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	759	497	9	8	512	107	13	4	7	107	2	764
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	100	100	-	100	100	-	100	100	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	3			4			4			4		

Peak-hour factor, PHF: .92
Cycle length: Minimum, C_{min} 60 s; Maximum, C_{max} 150 s; Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

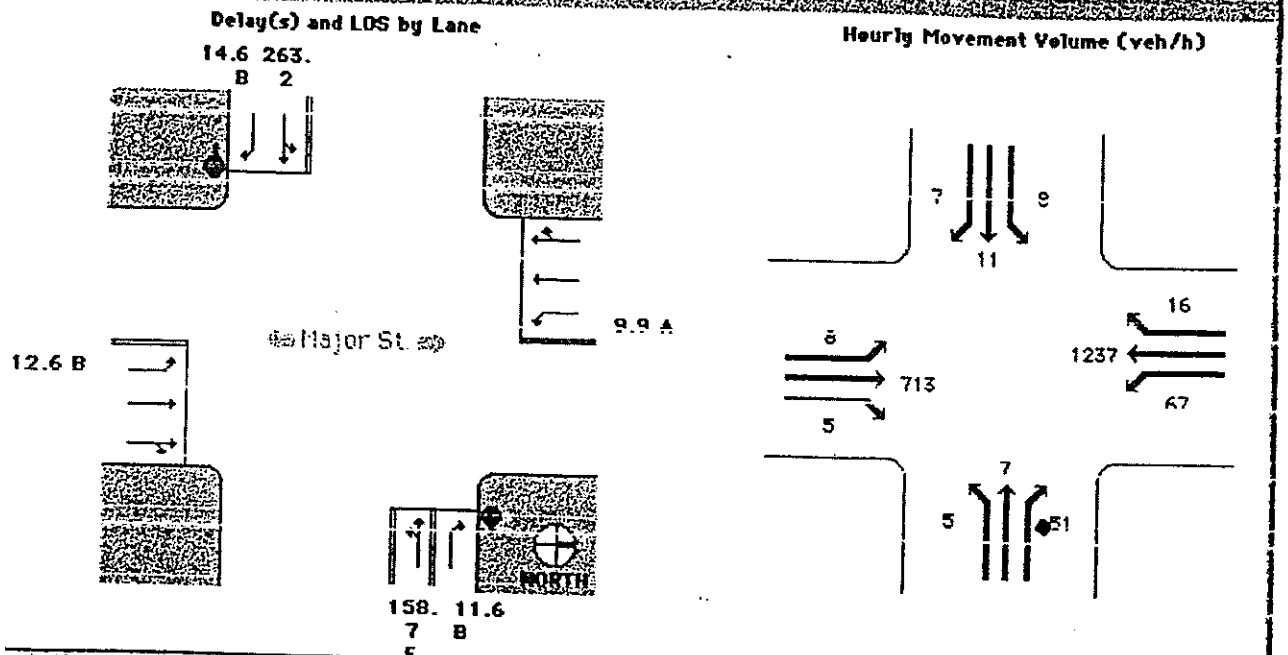


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	HWAY 111
Minor St.	JASPER ROAD

Approach	Delay		LOS
Minor St. (WB)	24.0	s	C
Minor St. (EB)	26.7	s	D
Major LT (NB)	9.2	s	A
Major LT (SB)	10.4	s	B

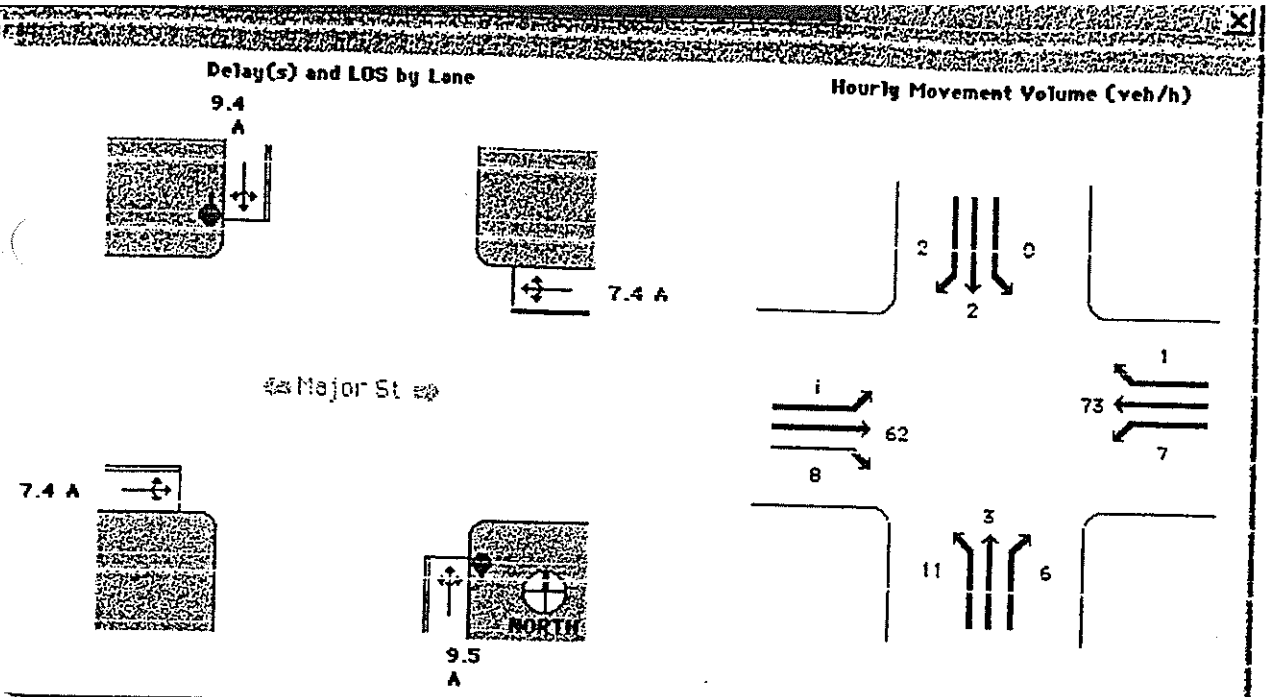
HiCAP 2000 - Graphical Output



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	HIWAY 111
Minor St.	JASPER ROAD

Approach	Delay		LOS
Minor St. (WB)	39.6	s	E
Minor St. (EB)	196.3	s	F
Major LT (NB)	12.6	s	B
Major LT (SB)	9.9	s	A



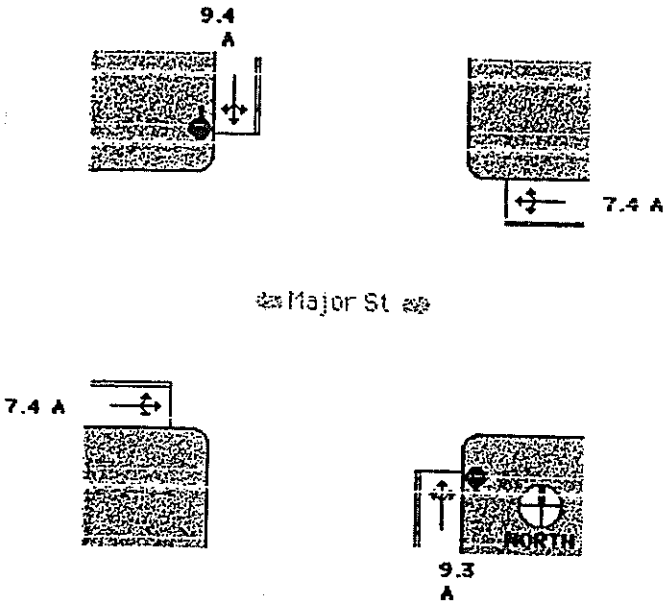
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

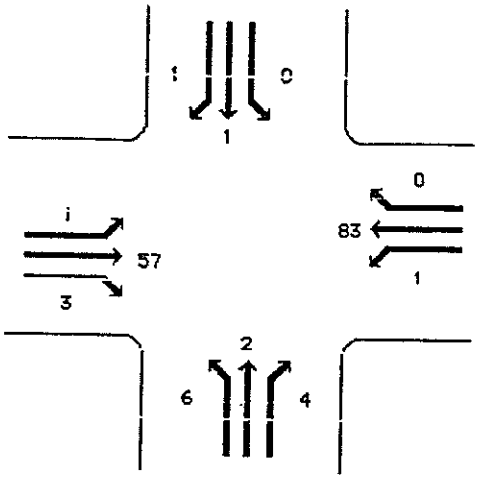
Approach	Delay		LOS
Minor St. (NB)	9.5	s	A
Minor St. (SB)	9.4	s	A
Major LT (EB)	7.4	s	A
Major LT (WB)	7.4	s	A

HiCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)



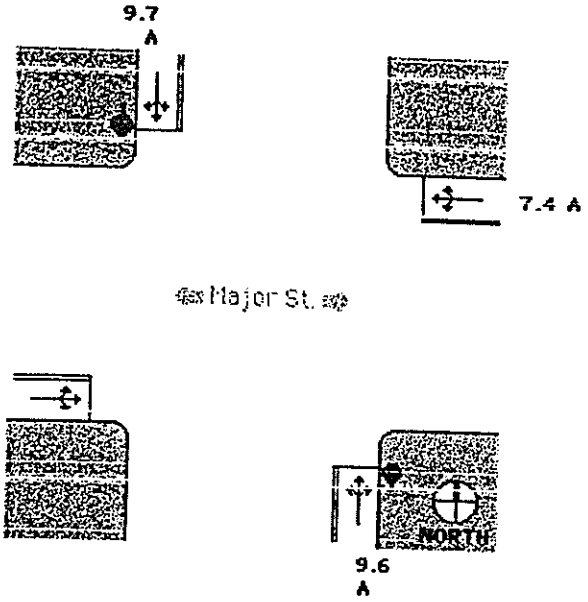
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

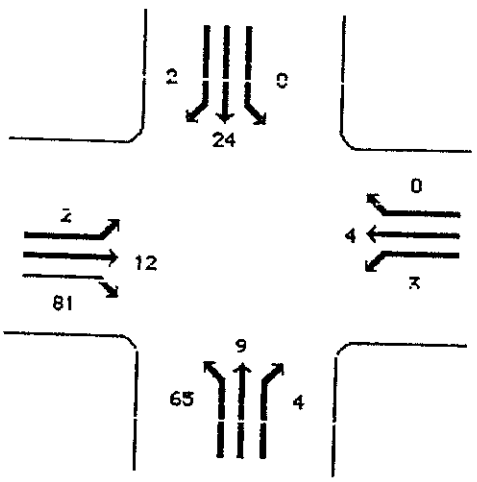
Approach	Delay		LOS
Minor St. (NB)	9.3	s	A
Minor St. (SB)	9.4	s	A
Major LT (EB)	7.4	s	A
Major LT (WB)	7.4	s	A

HCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)



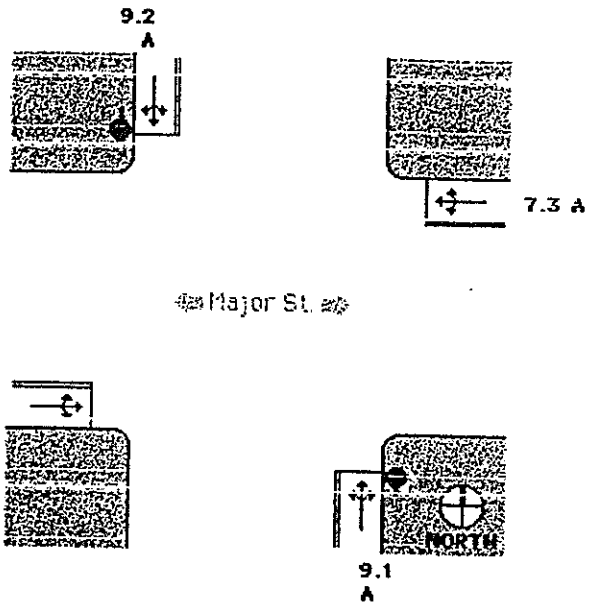
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	JASPER ROAD
Minor St.	YOURMAN ROAD

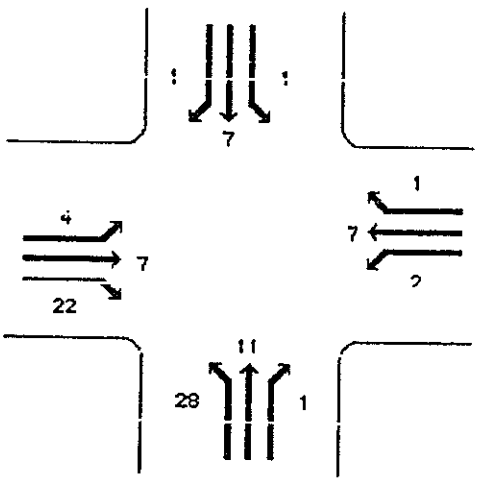
Approach	Delay		LOS
Minor St. (NB)	9.6	s	A
Minor St. (SB)	9.7	s	A
Major LT (EB)	7.2	s	A
Major LT (WB)	7.4	s	A

HCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)

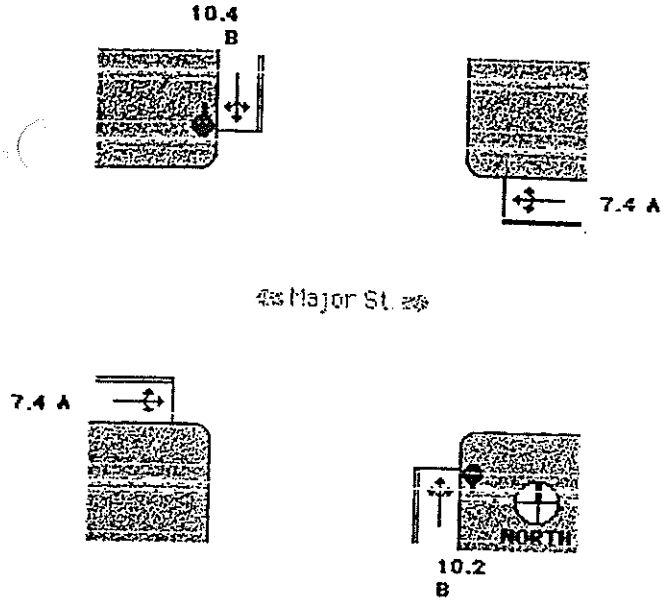


Chapter 17 - TWSC - Summary of Analysis

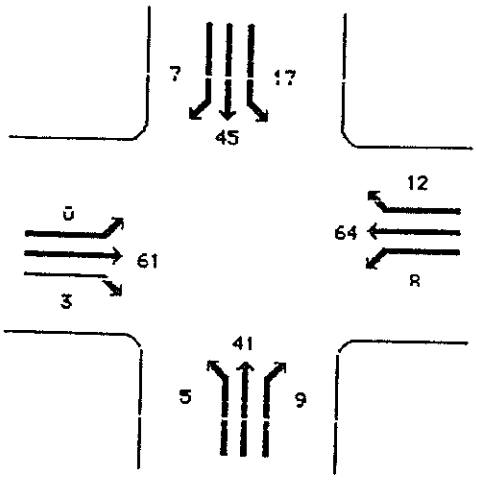
Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	JASPER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	9.1	s	A
Minor St. (SB)	9.2	s	A
Major LT (EB)	7.2	s	A
Major LT (WB)	7.3	s	A

Delay(s) and LOS by Lane



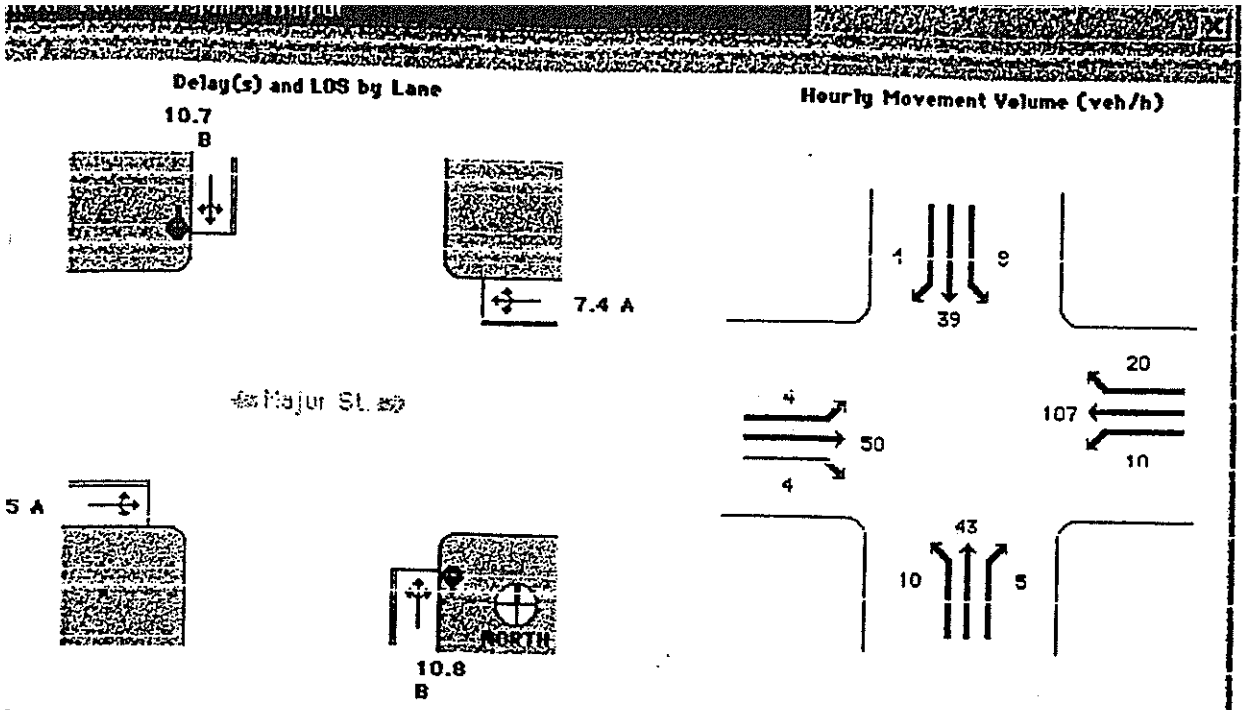
Hourly Movement Volume (veh/h)



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

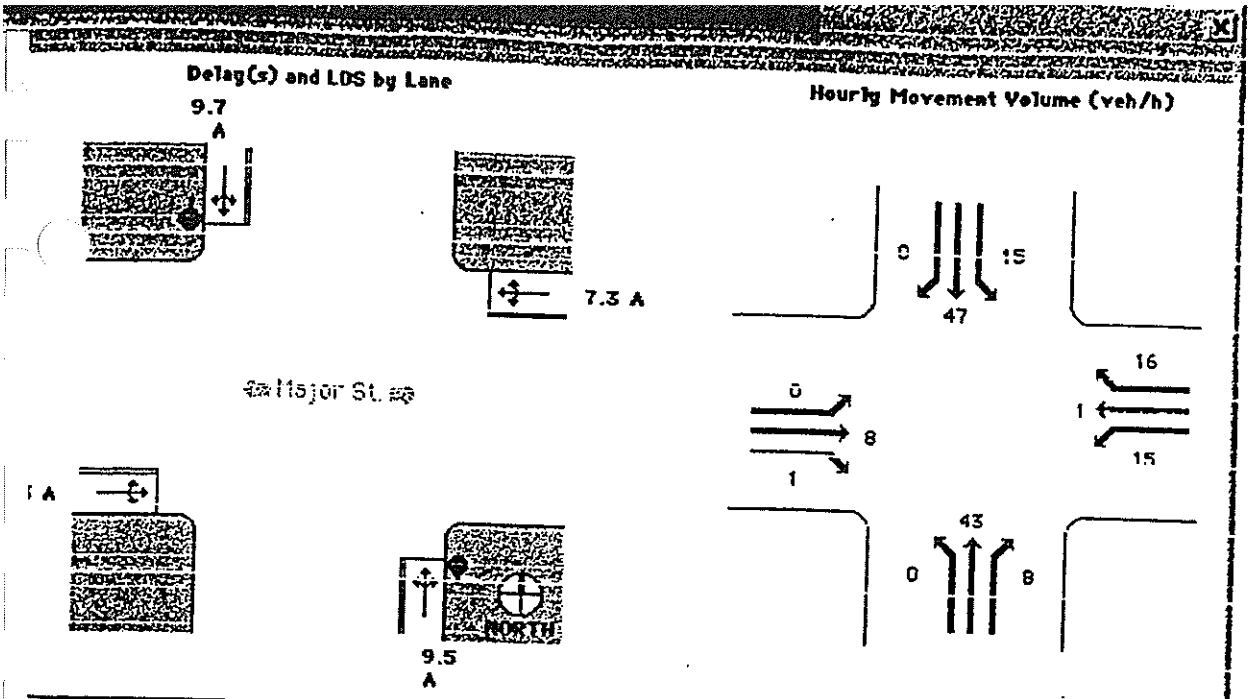
Approach	Delay		LOS
Minor St. (NB)	10.2	s	B
Minor St. (SB)	10.4	s	B
Major LT (EB)	7.4	s	A
Major LT (WB)	7.4	s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

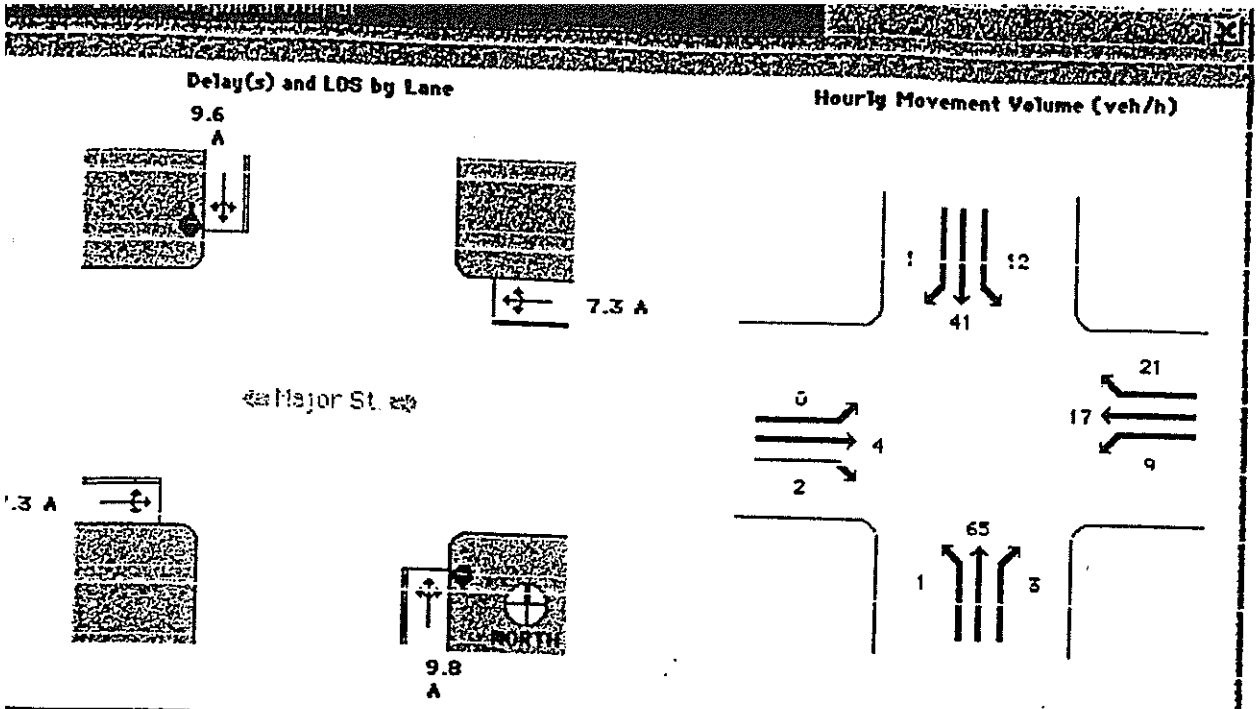
Approach	Delay	LOS
Minor St. (NB)	10.8 s	B
Minor St. (SB)	10.7 s	B
Major LT (EB)	7.5 s	A
Major LT (WB)	7.4 s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	MCCABE ROAD
Minor St.	BOWKER RD

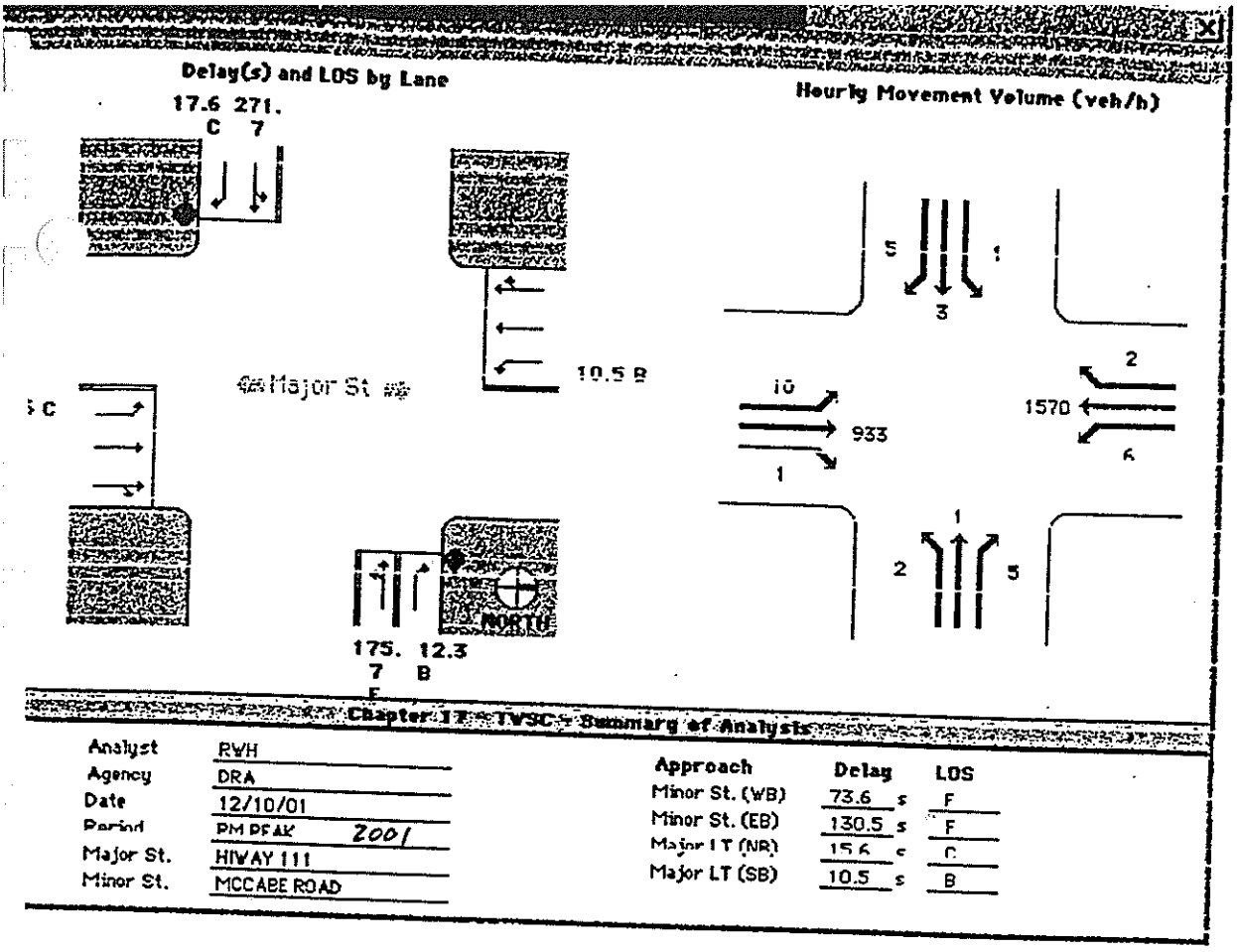
Approach	Delay		LOS
Minor St. (NB)	9.5	s	A
Minor St. (SB)	9.7	s	A
Major LT (EB)	7.3	s	A
Major LT (WB)	7.3	s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	MCCABE ROAD
Minor St.	BOWKER RD

Approach	Delay		LOS
Minor St. (NB)	9.8	s	A
Minor St. (SB)	9.6	s	A
Major LT (EB)	7.3	s	A
Major LT (WB)	7.3	s	A

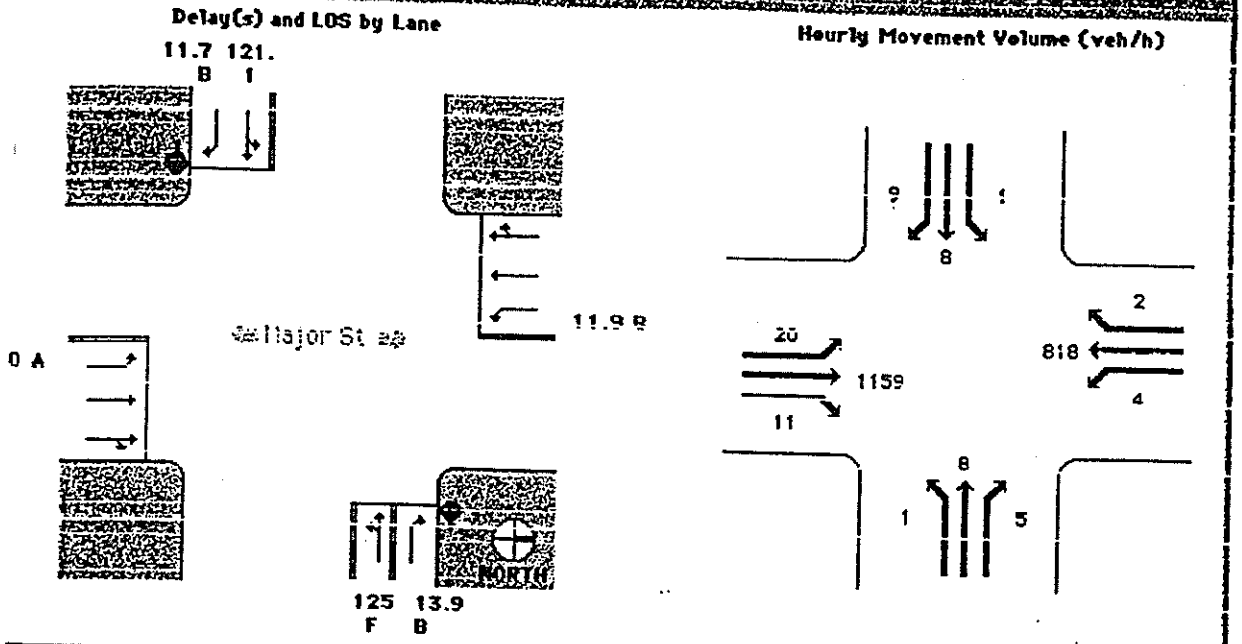


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	HIWAY 111
Minor St.	MCCABE ROAD

Approach	Delay		LOS
Minor St. (WB)	73.6	s	F
Minor St. (EB)	130.5	s	F
Major LT (NB)	15.6	s	C
Major LT (SB)	10.5	s	B

HCAP 2000 - Graphical Output

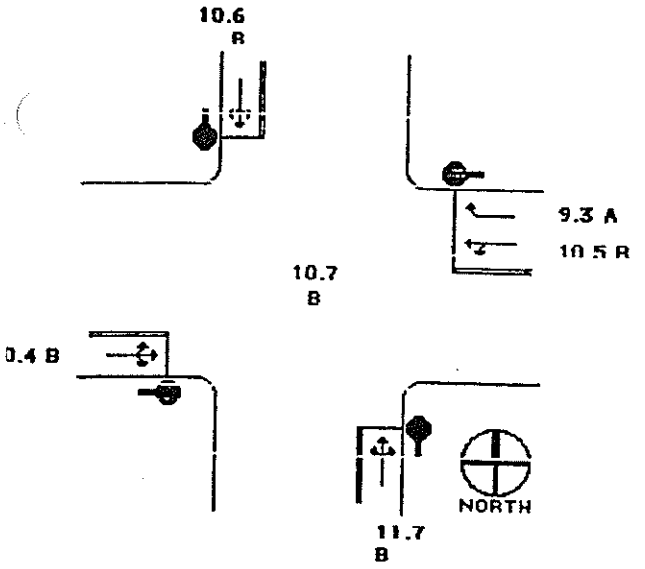


Chapter 17 - TWSC - Summary of Analysis

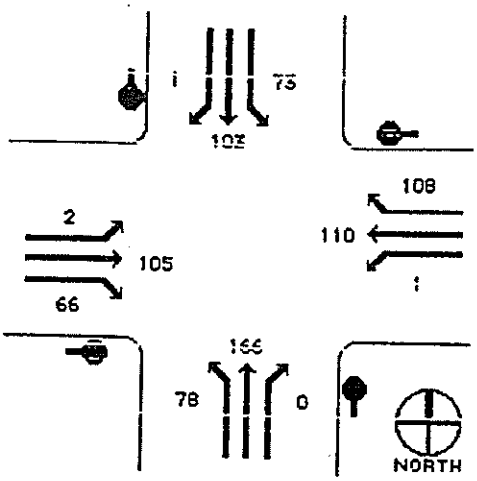
Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	HIWAY 111
Minor St.	MCCABE ROAD

Approach	Delay		LOS
Minor St. (WB)	85.3	s	F
Minor St. (EB)	66.4	s	F
Major LT (NB)	10.0	s	A
Major LT (SB)	11.9	s	B

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)

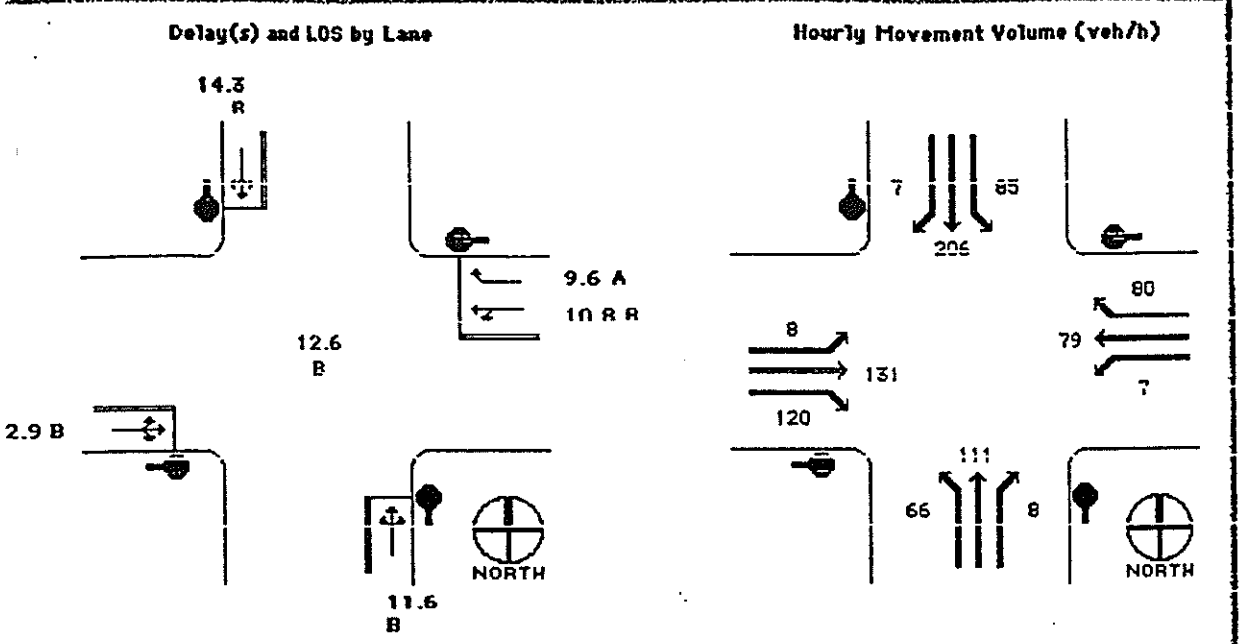


Chapter 17 — AWSC: Summary of Analysis

Analyst	RWH
Agency	DKA
Date	12/10/01
Period	AM PEAK 2001
EB/WB St.	HEBER ROAD
NB/SB St.	DOGWOOD ROAD

Approach	Delay	LOS
Northbound	11.7 s	B
Southbound	10.6 s	B
Eastbound	10.4 s	B
Westbound	9.9 s	A
Intersection	10.7 s	B

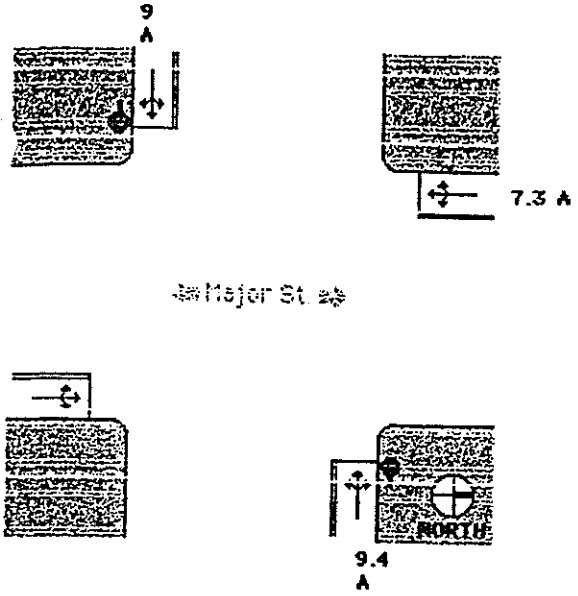
CAP 2000 - Graphic Output



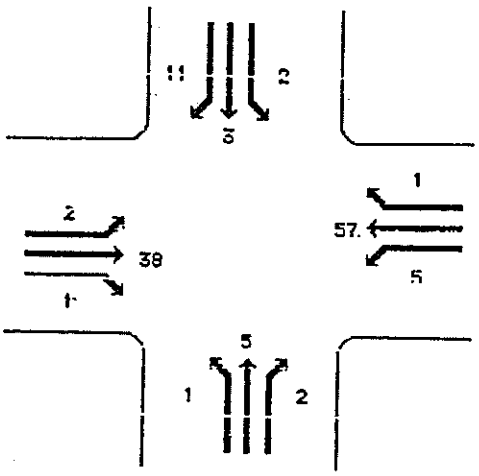
Chapter 17 - AWSC - Summary of Analysis

Analyst	RWH		Approach	Delay	LOS
Agency	UKA		Northbound	11.6 s	B
Date	12/10/01		Southbound	14.3 s	B
Period	PM PEAK 2001		Eastbound	12.9 s	B
EB/WB St.	HEBER ROAD		Westbound	10.2 s	B
NB/SB St.	DOGWOOD ROAD		Intersection	12.6 s	B

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)



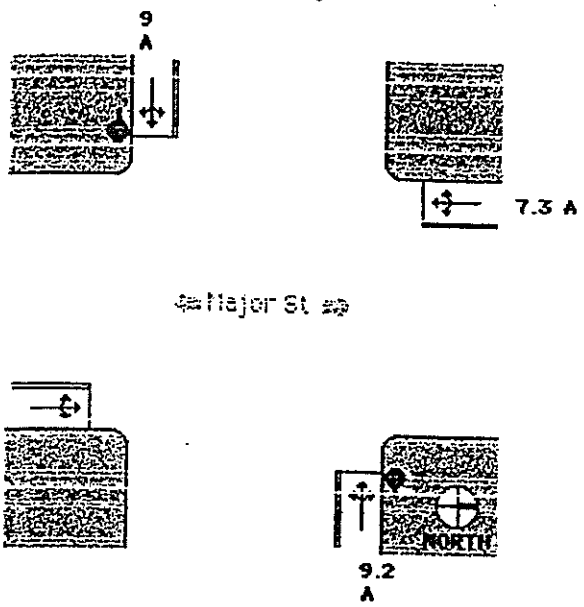
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2001
Major St.	BOWKER ROAD
Minor St.	JASPER ROAD

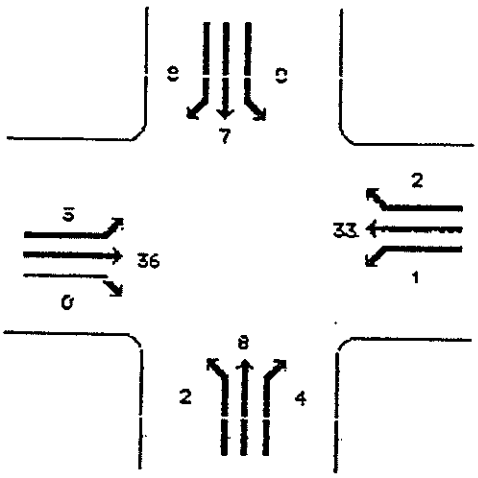
Approach	Delay	LOS
Minor St. (WB)	9.4 s	A
Minor St. (EB)	9.0 s	A
Major LT (NB)	7.4 s	A
Major LT (SB)	7.3 s	A

HCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



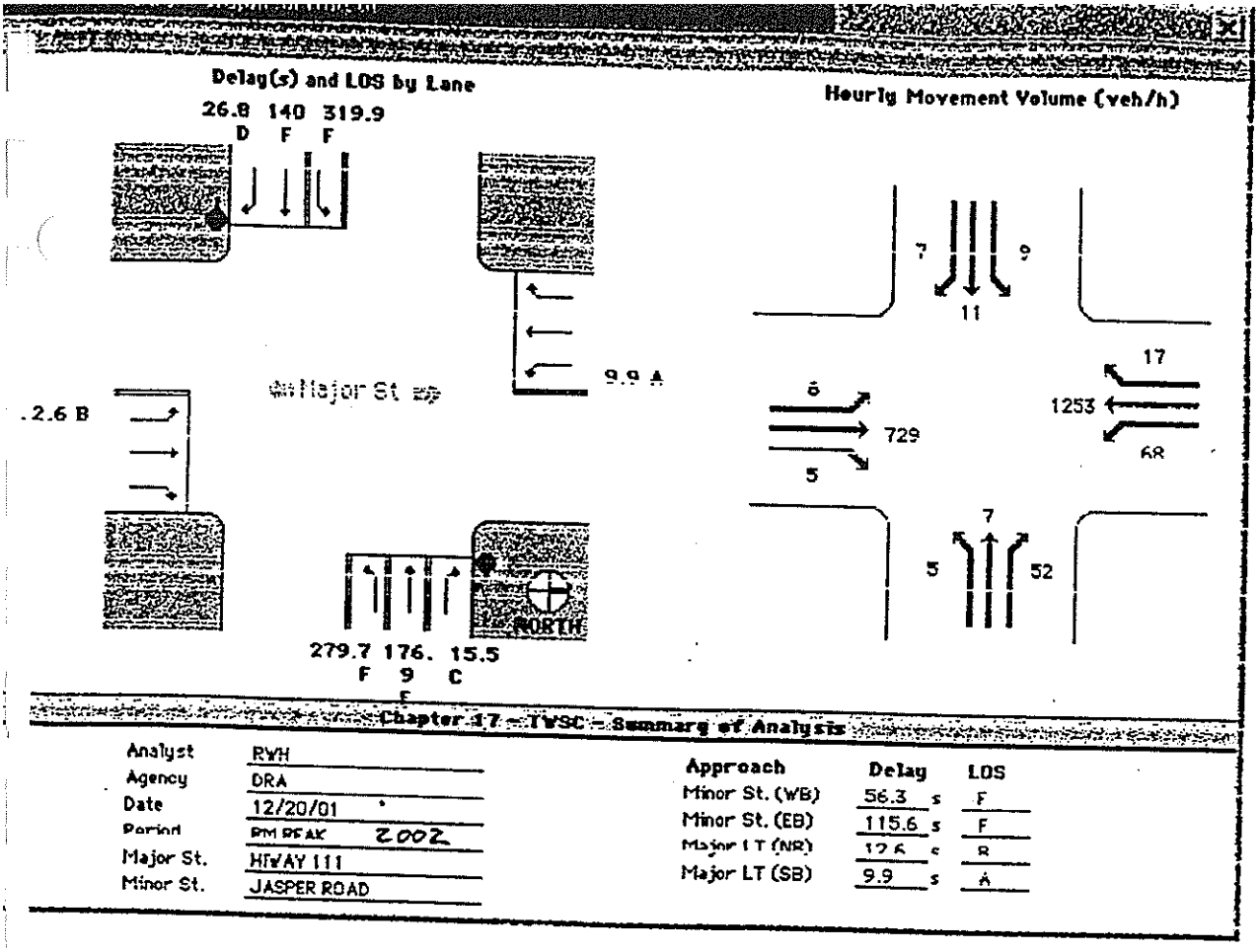
Hourly Movement Volume (veh/h)



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2001
Major St.	BOWKER ROAD
Minor St.	JASPER ROAD

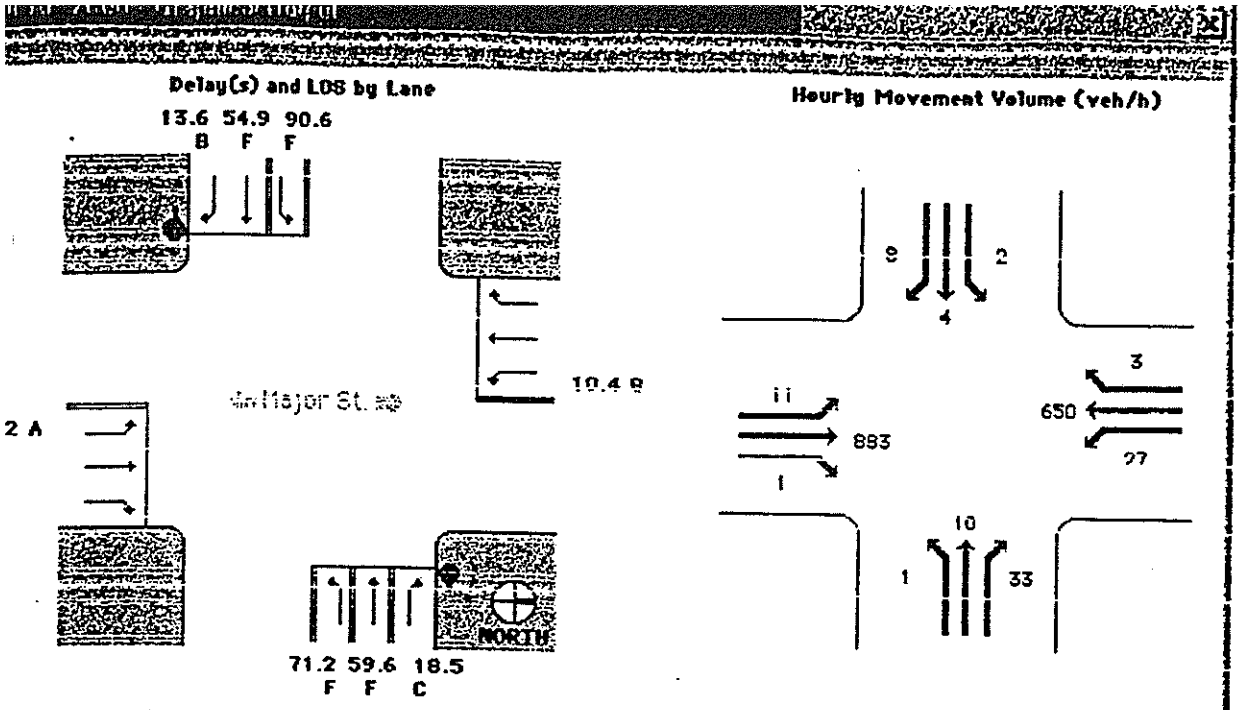
Approach	Delay	LOS
Minor St. (WB)	9.2 s	A
Minor St. (EB)	9.0 s	A
Major LT (NB)	7.3 s	A
Major LT (SB)	7.3 s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/20/01
Period	PM PEAK 2002
Major St.	HWAY 111
Minor St.	JASPER ROAD

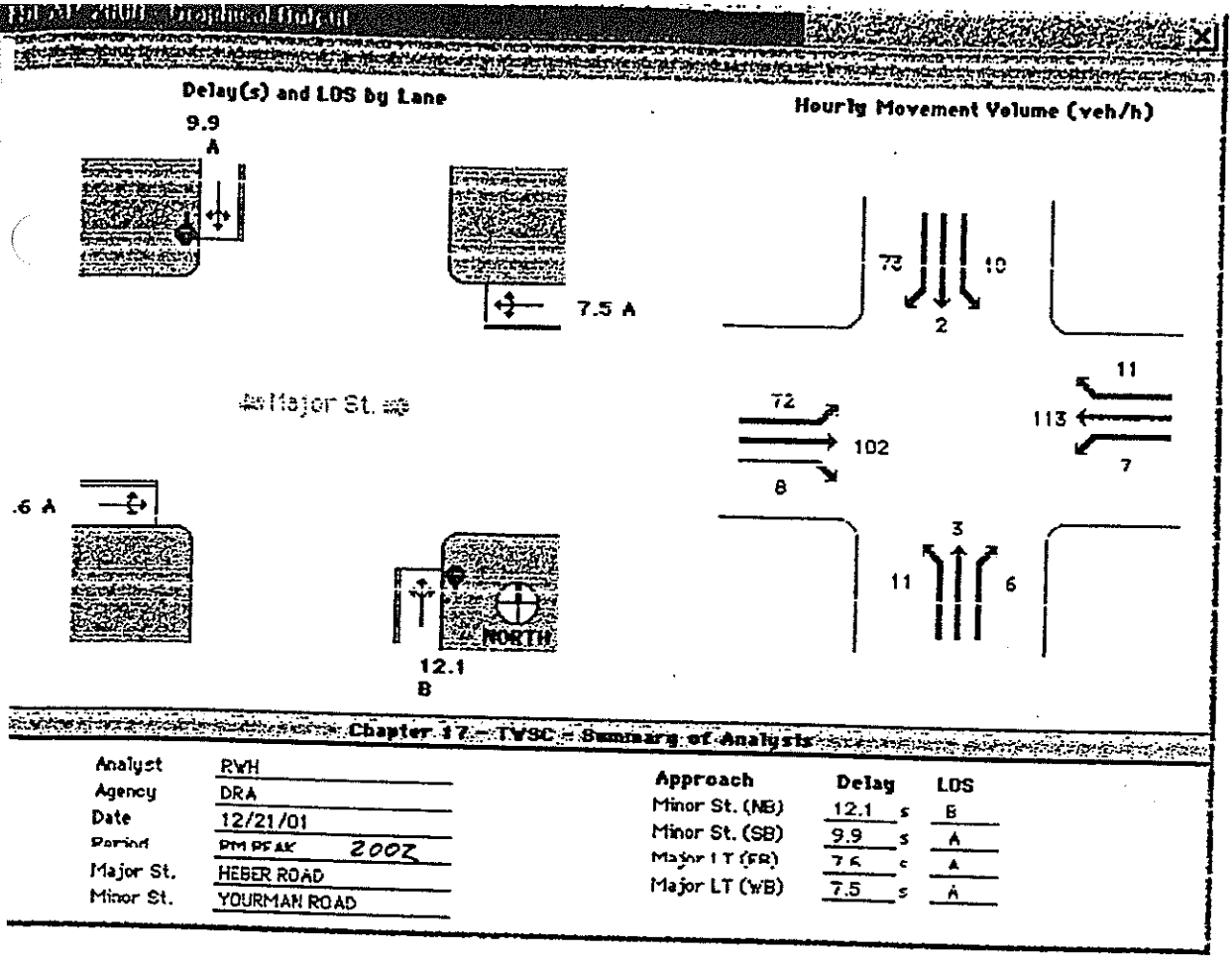
Approach	Delay		LOS
Minor St. (WB)	56.3	s	F
Minor St. (EB)	115.6	s	F
Major LT (NB)	12.6	s	B
Major LT (SB)	9.9	s	A



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/20/01
Period	AM PEAK 2002
Major St.	HWAY 111
Minor St.	JASPER ROAD

Approach	Delay		LOS
Minor St. (WB)	28.6	s	D
Minor St. (EB)	40.0	s	E
Major LT (NB)	9.2	s	A
Major LT (SB)	10.4	s	B



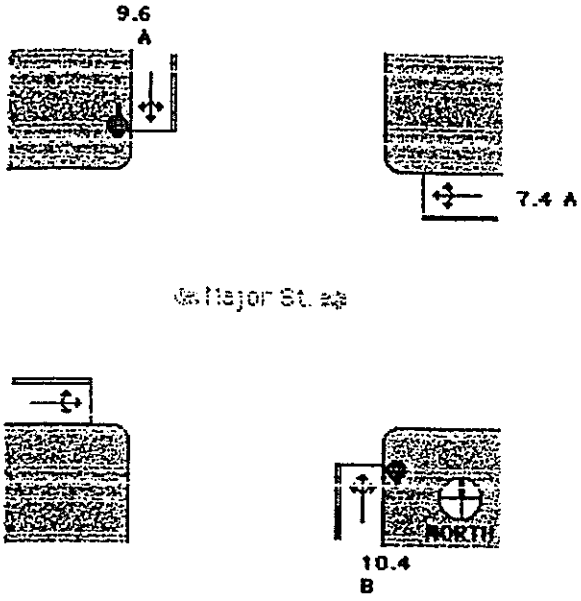
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/21/01
Period	PM PEAK 2002
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

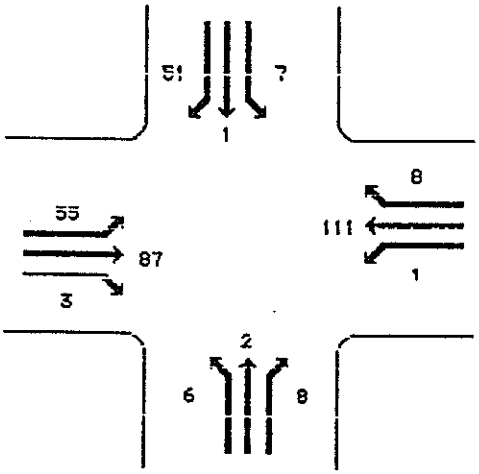
Approach	Delay		LOS
Minor St. (NB)	12.1	s	B
Minor St. (SB)	9.9	s	A
Major LT (EB)	7.6	s	A
Major LT (WB)	7.5	s	A

HCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)

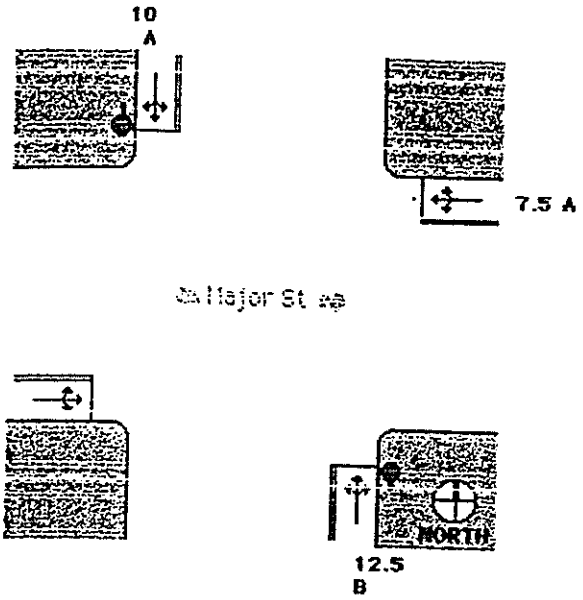


Chapter 17 - TWSC - Summary of Analysis

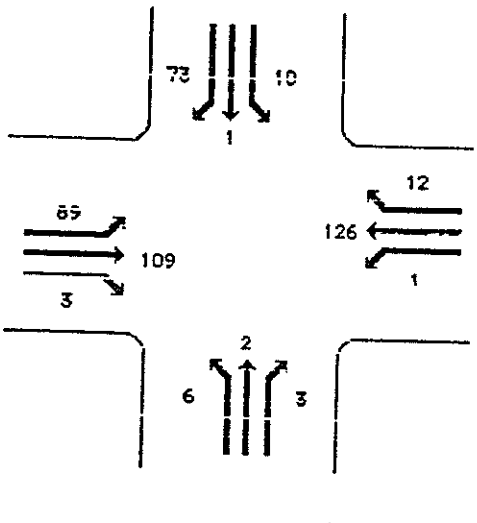
Analyst	RWH
Agency	DRA
Date	12/20/01
Period	AM PEAK 2002
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	10.4	s	B
Minor St. (SB)	9.6	s	A
Major LT (EB)	7.6	s	A
Major LT (WB)	7.4	s	A

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)

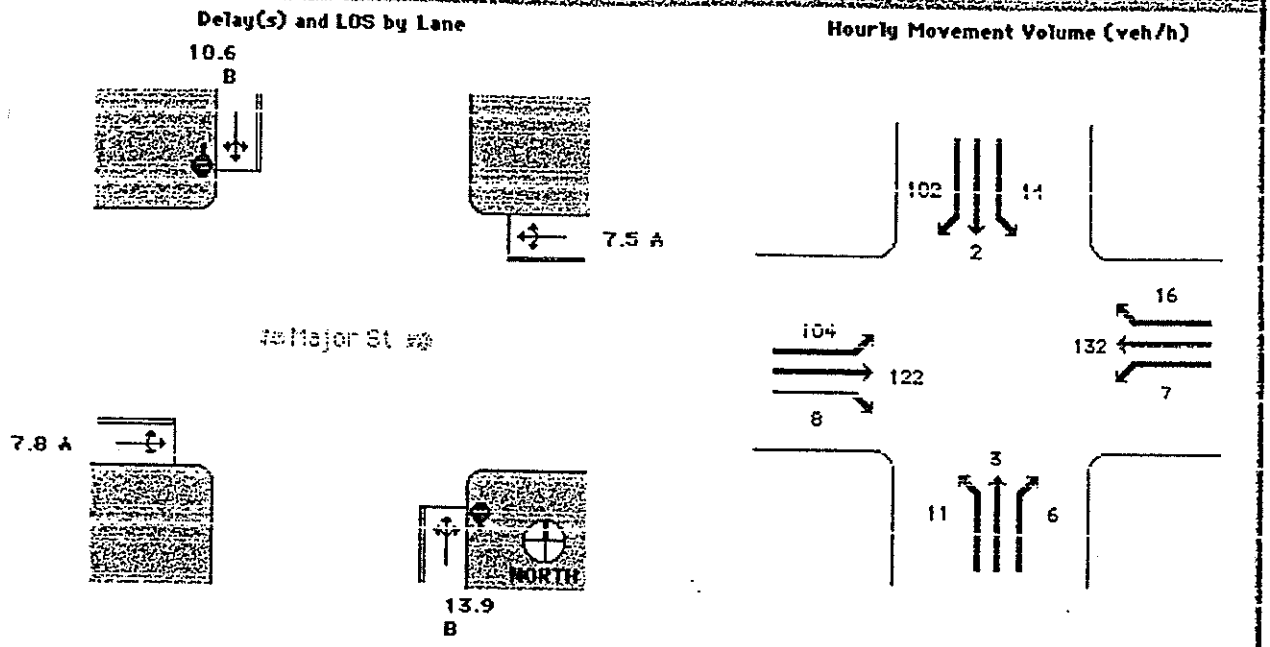


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/21/01
Period	AM PEAK 2004
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	12.5	s	B
Minor St. (SB)	10.0	s	A
Major LT (EB)	7.7	s	A
Major LT (WB)	7.5	s	A

HiCAP 2000 - Graphical Output

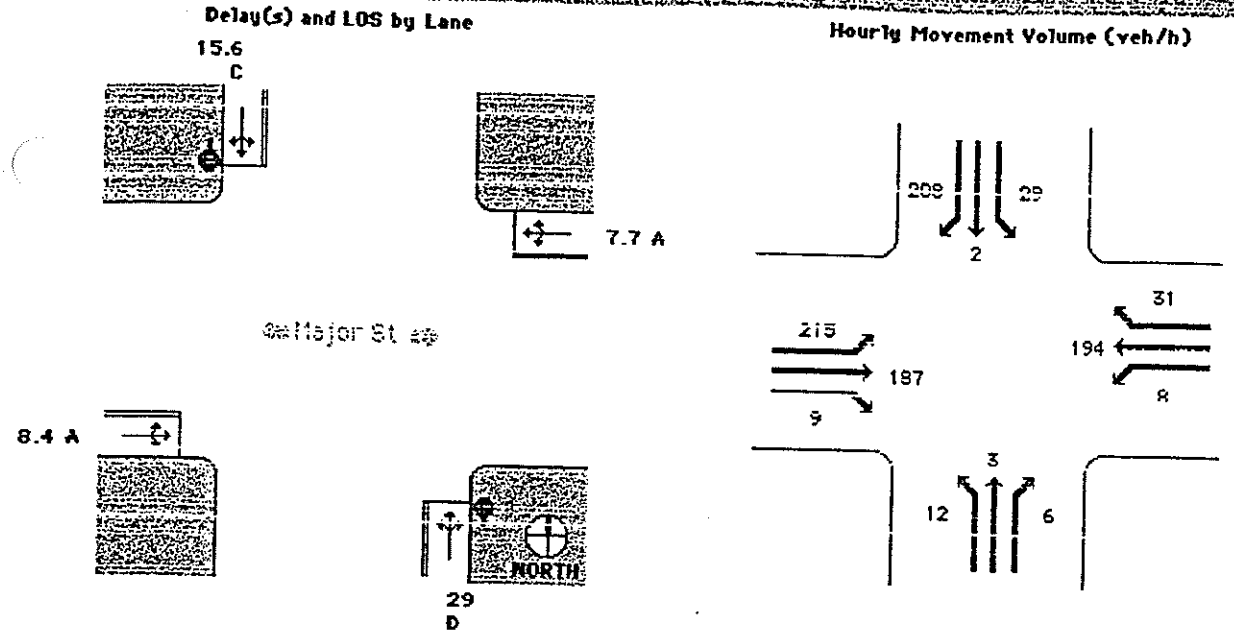


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/21/01
Period	PM PEAK 2004
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	13.9	s	B
Minor St. (SB)	10.6	s	B
Major LT (EB)	7.8	s	A
Major LT (WB)	7.5	s	A

HCAP 2000 - Graphical Output

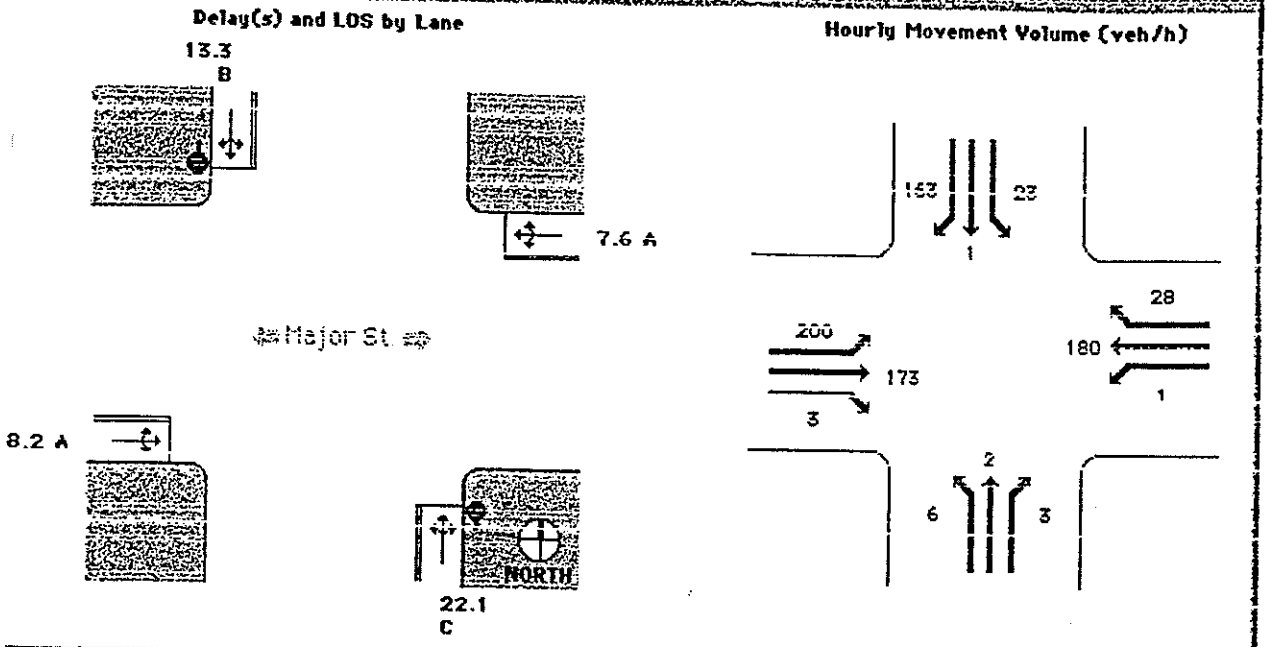


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/21/01
Period	PM PEAK 2006
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	29.0	s	D
Minor St. (SB)	15.6	s	C
Major LT (EB)	8.4	s	A
Major LT (WB)	7.7	s	A

HCS2P 2000 - Graphical Output

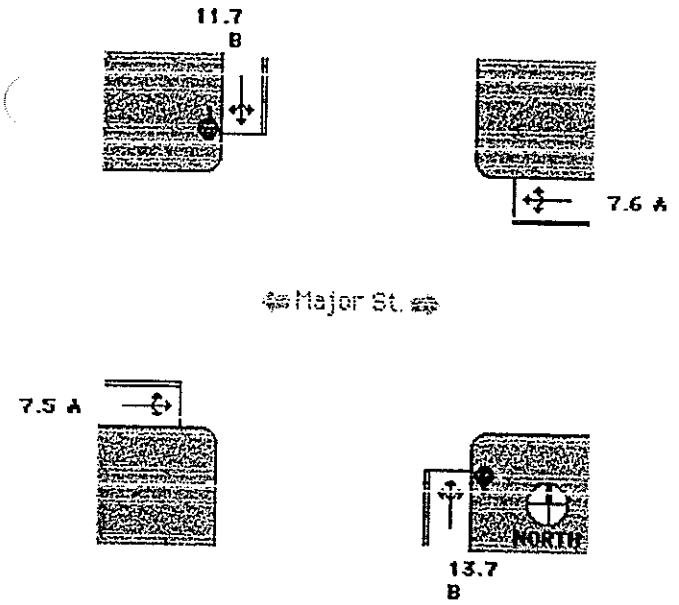


Chapter 17 - TWSC - Summary of Analysis

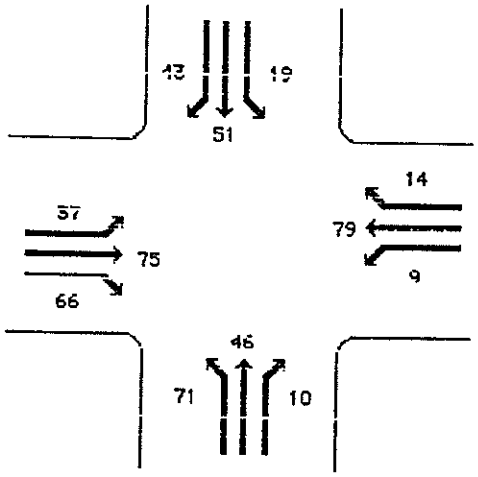
Analyst	RWH
Agency	DRA
Date	12/21/01
Period	AM PEAK 2006
Major St.	HEBER ROAD
Minor St.	YOURMAN ROAD

Approach	Delay		LOS
Minor St. (NB)	22.1	s	C
Minor St. (SB)	13.3	s	B
Major LT (EB)	8.2	s	A
Major LT (WB)	7.6	s	A

Delay(s) and LOS by Lane



Hourly Movement Volume (veh/h)



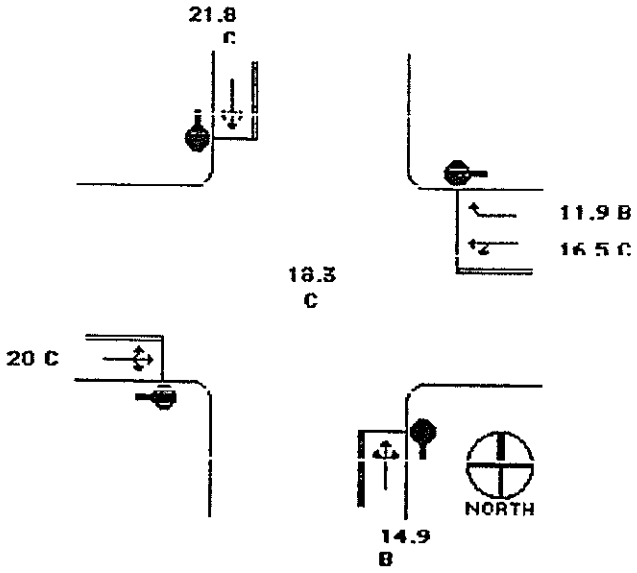
Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/23/01
Period	PM PEAK 2008
Major St.	HEBER ROAD
Minor St.	BOWKER ROAD

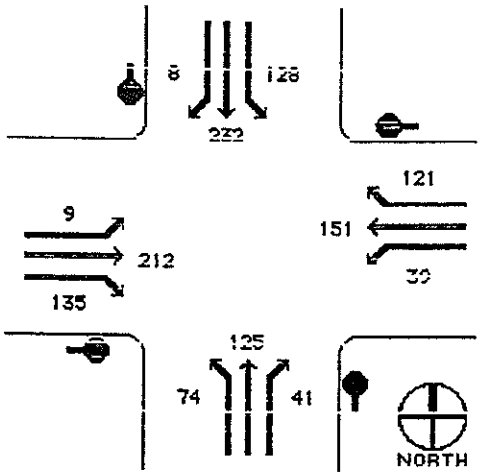
Approach	Delay		LOS
Minor St. (NB)	13.7	s	B
Minor St. (SB)	11.7	s	B
Major LT (EB)	7.5	s	A
Major LT (WB)	7.6	s	A

HCAP 2000 - Graphical Output

Delay(s) and LOS by Lane



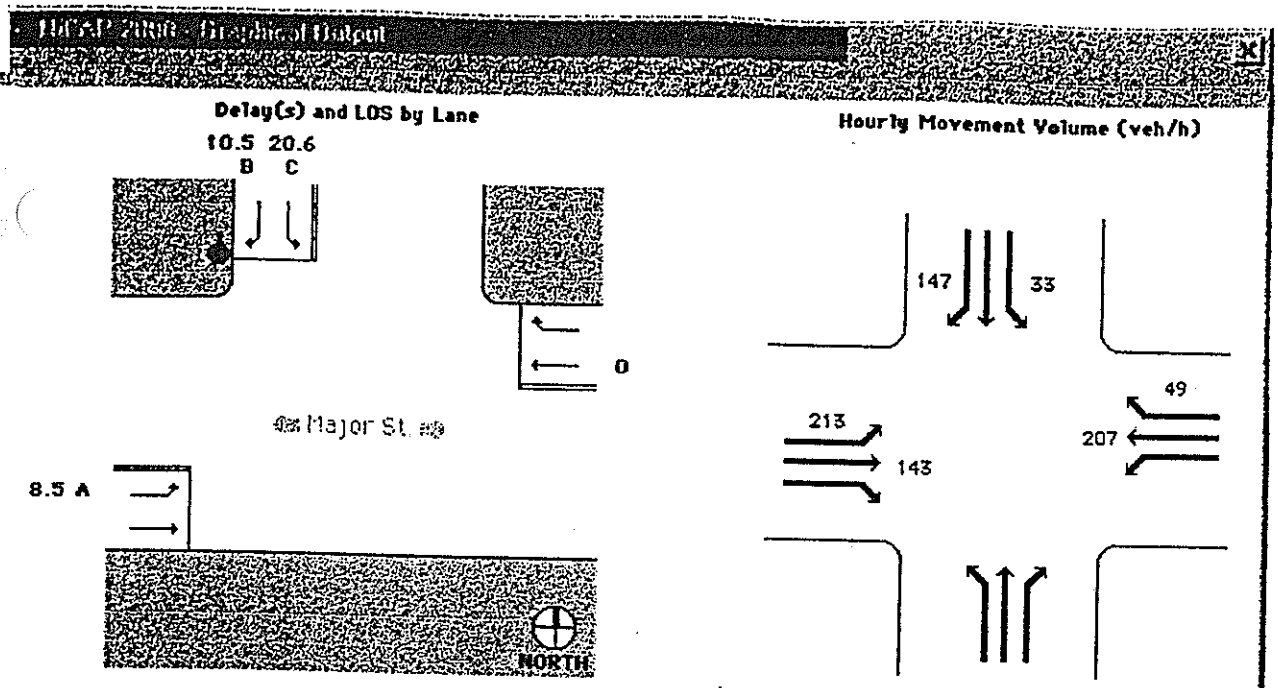
Hourly Movement Volume (veh/h)



Chapter 17 - AWSC Summary of Analysis

Analyst	RWH
Agency	DKA
Date	12/23/01
Period	PM PEAK 2008
EB/WB St.	HEBER ROAD
NB/SB St.	DOGWOOD ROAD

Approach	Delay	LOS
Northbound	14.9 s	B
Southbound	21.8 s	C
Eastbound	20.0 s	C
Westbound	14.7 s	B
Intersection	18.3 s	C

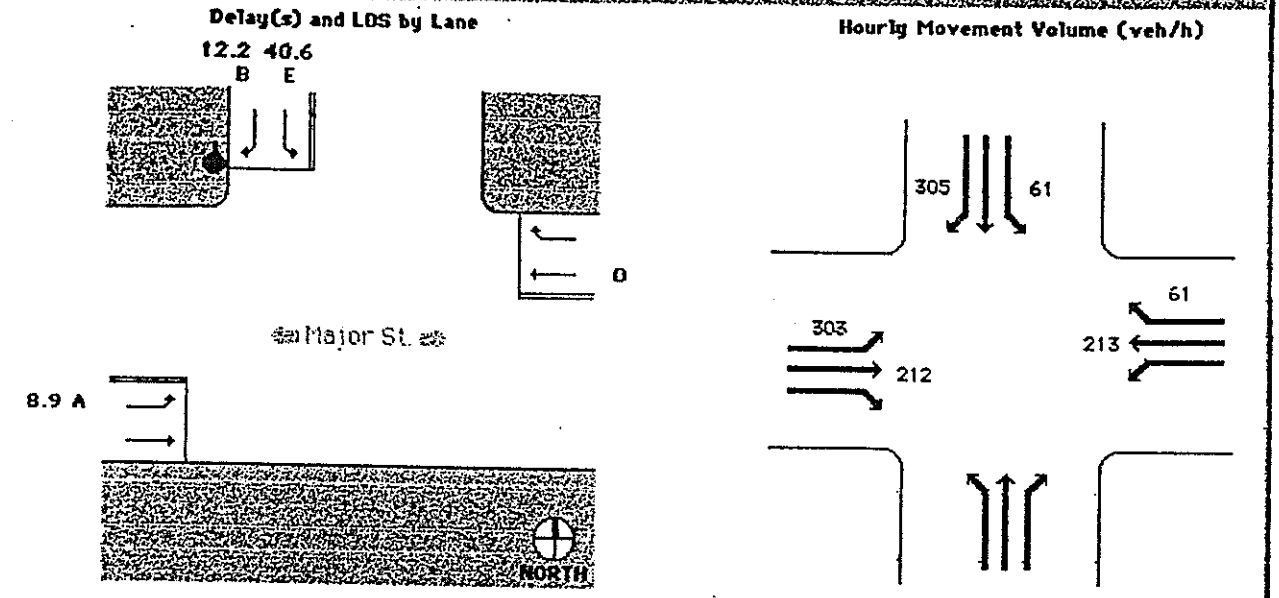


Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2010
Major St.	HEBER ROAD
Minor St.	EAST DRIVEWAY

Approach	Delay		LOS
Minor St. (NB)		s	
Minor St. (SB)	12.3	s	B
Major LT (EB)	8.5	s	A
Major LT (WB)		s	

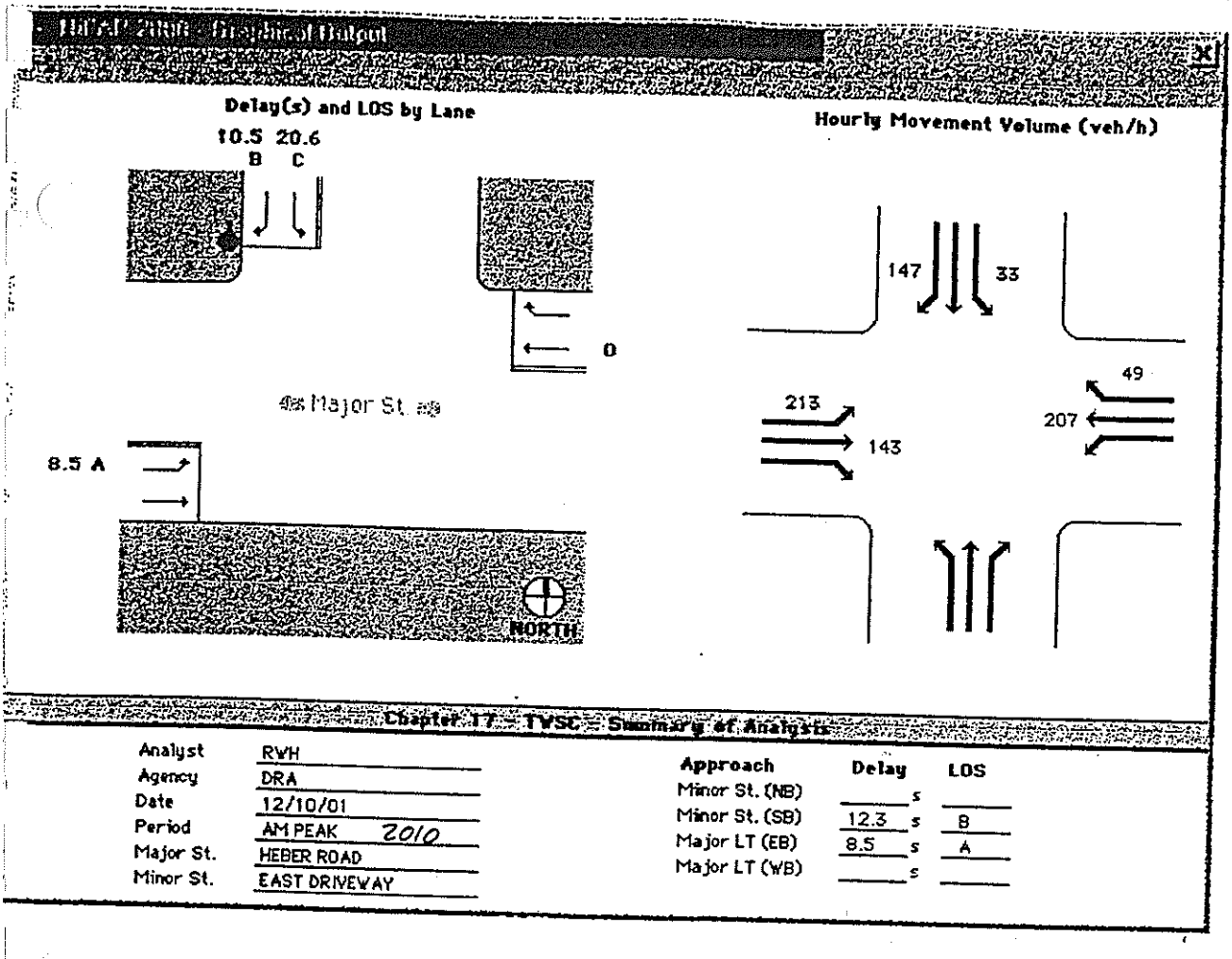
HCAP 2000 - Graphical Output



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2010
Major St.	HEBER ROAD
Minor St.	EAST DRIVEWAY

Approach	Delay	LOS
Minor St. (NB)	s	
Minor St. (SB)	17.0 s	C
Major LT (EB)	8.9 s	A
Major LT (WB)	s	

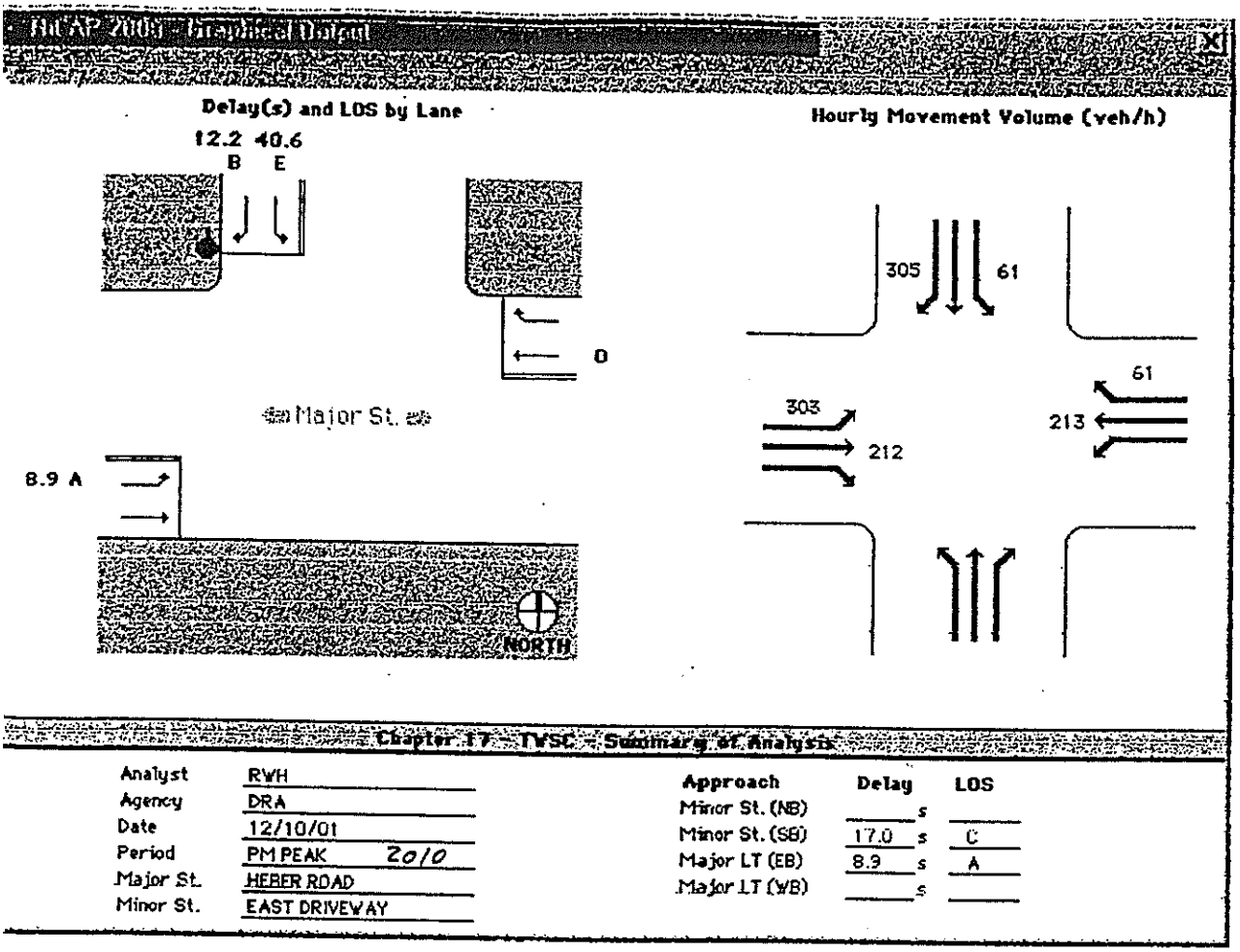


Chapter 17 – TWSC – Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	AM PEAK 2010
Major St.	HEBER ROAD
Minor St.	EAST DRIVEWAY

Approach	Delay	LOS
Minor St. (NB)	____ s	____
Minor St. (SB)	12.3 s	B
Major LT (EB)	8.5 s	A
Major LT (WB)	____ s	____

HCAP 2000 - Graphical Output



Chapter 17 - TWSC - Summary of Analysis

Analyst	RWH
Agency	DRA
Date	12/10/01
Period	PM PEAK 2010
Major St.	HEBER ROAD
Minor St.	EAST DRIVEWAY

Approach	Delay	LOS
Minor St. (NB)	s	
Minor St. (SB)	17.0 s	C
Major LT (EB)	8.9 s	A
Major LT (WB)	s	

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING VOLUMES

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	67		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3a	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	NLT	NST
Critical phase volume, CV (veh/h)	35	12	415
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	529
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.42
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	10.1		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.2	1.1	41.7

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	29	62	29	60	48	916	36	633
Green ratio, g/C	.101	.101	.101	.101	.07	.646	.053	.628
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.184	.388	.184	.374	.434	.451	.434	.32
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	160	160	160	160	110	2032	83	1977
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	24.7	25.2	24.7	25.2	26.8	5.3	27.6	5.2
Incremental delay, d_2 (s/veh) (Equation 16-12)	2.5	7	2.5	6.6	11.9	.7	15.7	.4
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	27.2	32.2	27.2	31.8	38.7	6	43.3	5.6
LOS by lane group	C	C	C	C	D	A	D	A
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	30.6		30.3		7.7		7.6	
LOS by approach	C		C		A		A	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	8.5		Intersection LOS (Exhibit 16-2)				A	

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

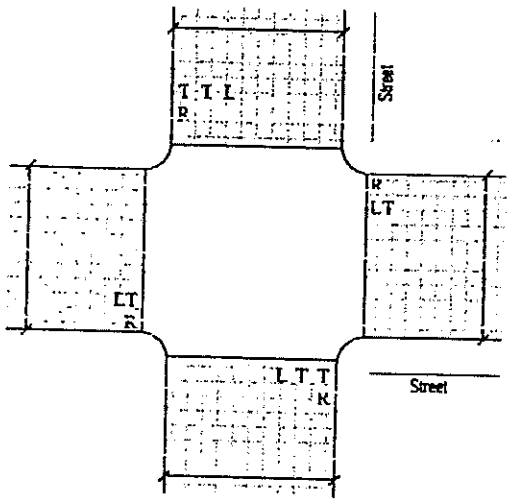
General Information

Analyst: RWH
Agency or Company: DRA
Analysis Period/Year: PM PEAK 2001
Comment: EXISTING VOLUMES

Site Information

Jurisdiction/Date: IMP. CO. 12/10/01
Intersection: HEBER ROAD HIWAY 111
Area Type: ☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration		LT	R		LT	R
No. of lanes		1	1		1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	16	12	75	11	14	36	61	696	6	45	1157	14
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF: .92

Cycle length: Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING VOLUMES

East-West Phasing Plan

Selected plan (Exhibit A10-8) I	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	88		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3a	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	NLT	NST
Critical phase volume, CV (veh/h)	47	17	587
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \sum CV$	739
Lost time/cycle, L (s) $L = \sum t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.587
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	9.7		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.1	1.1	42.1

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	13	82	15	39	66	757	49	1258
Green ratio, g/C	.095	.095	.095	.095	.069	.653	.051	.635
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.087	.543	.102	.26	.606	.368	.606	.629
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	150	150	150	150	109	2055	81	1998
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	24.8	25.9	24.8	25.2	27.1	4.7	27.9	6.7
Incremental delay, d_2 (s/veh) (Equation 16-12)	1.1	13.3	1.4	4.2	22.5	.5	29.5	1.5
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	25.9	39.2	26.1	29.3	49.6	5.3	57.4	8.2
LOS by lane group	C	D	C	C	D	A	E	A
Delay by approach, d_A (s/veh) $\frac{\sum(d)(V)}{\sum V}$	37.4		28.4		8.8		10	
LOS by approach	D		C		A		A	
Intersection delay, d_I (s/veh) $d_I = \frac{\sum(d_A)(V_A)}{\sum V_A}$	9.9		Intersection LOS (Exhibit 16-2)				A	

Notes

1. RS = 1710(PHF)(f_a), where f_a is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

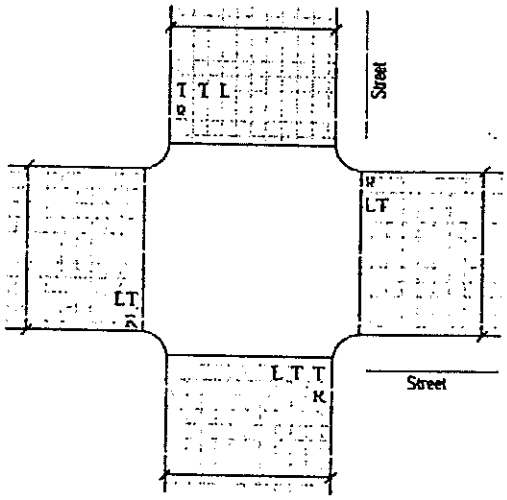
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	AM PEAK 2004
Comment	EXISTING GEOMETRY

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration		LT	R		LT	R
No. of lanes		1	1		1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	11	54	57	55	64	90	46	858	62	75	591	15
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING GEOMETRY

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	106		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	48	31	465
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	650
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate PS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.517
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	11.8		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.6	2.3	38.4

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	59	62	70	98	50	933	82	642
Green ratio, g/C	.13	.13	.13	.13	.06	.573	.097	.61
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.287	.302	.341	.477	.534	.518	.534	.335
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	205	205	205	205	94	1802	153	1920
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	23.6	23.6	23.7	24.2	27.4	7.8	25.8	5.7
Incremental delay, d_2 (s/veh) (Equation 16-12)	3.5	3.8	4.5	7.8	20.1	1.1	12.7	.5
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	27.1	27.4	28.2	32	47.5	8.9	38.5	6.2
LOS by lane group	C	C	C	C	D	A	D	A
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	27.2		30.4		10.8		9.8	
LOS by approach	C		C		B		A	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	11.7		Intersection LOS (Exhibit 16-2)				B	

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

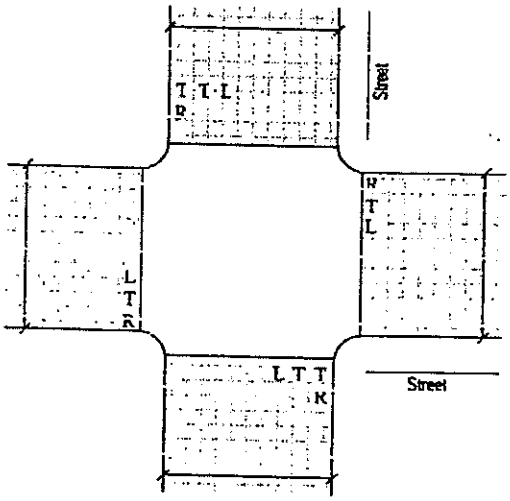
General Information

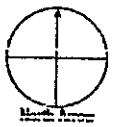
Analyst: RWH
Agency or Company: DRA
Analysis Period/Year: PM PEAK 2004
Comment: EXISTING GEOMETRY

Site Information

Jurisdiction/Date: IMP. CO. 12/19/01
Intersection: HEBER ROAD HIWAY 111
Area Type: ☐ CBD ☑ Other

Intersection Geometry





	EB			WB		
Lane configuration	L	T	R	L	T	R
No. of lanes	1	1	1	1	1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	17	64	78	71	64	83	63	699	68	94	1184	15
Proportion of LT or RT (P_{LT} or P_{RT})[2]	0	-	0	0	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF: .92
Cycle length: Minimum, C_{min} 60 s; Maximum, C_{max} 150 s; Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING GEOMETRY

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	98		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	66	33	568
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \sum CV$	765
Lost time/cycle, L (s) $L = \sum t_L$	12
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.608
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	10.1		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	8.2	2	39.7

Control Delay and LOS

	EB			WB			NB		SB	
Lane group	L	T	R	L	T	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	18	70	85	77	70	90	68	760	102	1287
Green ratio, g/C	0	.102	.102	0	.102	.102	.069	.594	.104	.628
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$		.433	.528		.433	.561	.627	.406	.627	.651
Lane group capacity, c (veh/h) $c = \frac{V}{X}$		161	161		161	161	109	1870	163	1977
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)		25.3	25.6		25.3	25.7	27.2	6.5	25.8	7
Incremental delay, d_2 (s/veh) (Equation 16-12)		8.3	11.9		8.3	13.4	24.3	.7	16.9	1.7
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)		33.6	37.4		33.6	39.1	51.4	7.2	42.7	8.7
LOS by lane group		C	D		C	D	D	A	D	A
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	35.7			36.7			10.8		11.2	
LOS by approach	D			D			B		B	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	12.6			Intersection LOS (Exhibit 16-2)					B	

Notes

1. $RS = 1710(f_{HV})(f_g)$, where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

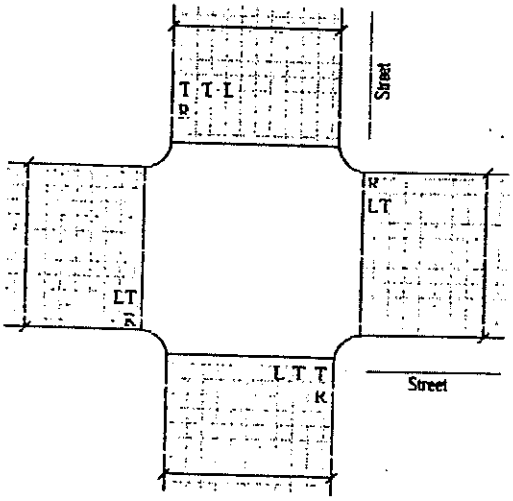
General Information

Analyst: RWH
Agency or Company: DRA
Analysis Period/Year: AM PEAK 2006
Comment: EXISTING GEOMETRY

Site Information

Jurisdiction/Date: IMP. CO. 12/19/01
Intersection: HEBER ROAD HIWAY 111
Area Type: ☐ CBD ☑ Other

Intersection Geometry



Lane configuration	EB			WB		
		LT	R		LT	R
No. of lanes		1	1		1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	12	129	62	110	110	134	48	893	129	127	615	16
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF: .92
Cycle length: Minimum, C_{min} 60 s; Maximum, C_{max} 150 s; Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING GEOMETRY

East-West Phasing Plan

Selected plan (Exhibit A10-8) I	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	203		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	51	83	522
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	859
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.683
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	15.4		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	6.8	4.6	33.2

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	140	67	120	146	52	971	138	668
Green ratio, g/C	.189	.189	.189	.189	.047	.486	.124	.564
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.471	.226	.403	.489	.705	.635	.705	.377
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	298	298	298	298	74	1530	196	1774
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	21.6	20.6	21.3	21.7	28.2	11.5	25.2	7.3
Incremental delay, d_2 (s/veh) (Equation 16-12)	5.3	1.8	4	5.6	43.7	2	19.2	.6
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	26.9	22.4	25.4	27.4	71.9	13.5	44.4	7.9
LOS by lane group	C	C	C	C	E	B	D	A
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	25.4		26.5		16.5		14.1	
LOS by approach	C		C		B		B	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	16.9		Intersection LOS (Exhibit 16-2)				B	

Notes

1. RS = 1710(f_{HV})(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

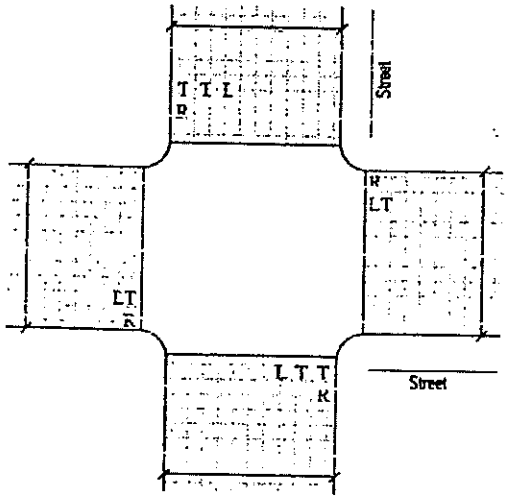
General Information

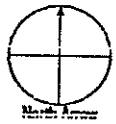
Analyst: RWH
Agency or Company: DRA
Analysis Period/Year: PM PEAK 2006
Comment: EXISTING GEOMETRY

Site Information

Jurisdiction/Date: IMP. CO. 12/19/01
Intersection: HEBER ROAD HIWAY 111
Area Type: ☐ CBD ☑ Other

Intersection Geometry





Lane configuration	EB			WB		
		LT	R		LT	R
No. of lanes		1	1		1	1

Lane configuration	NB			SB		
	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	17	120	81	135	118	133	66	728	135	147	1233	15
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF: .92
Cycle length: Minimum, C_{min} 60 s; Maximum, C_{max} 150 s; Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING GEOMETRY

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	261		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	69	85	540
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	956
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.76
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	17.1		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.5	4.3	31.1

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	130	88	129	145	72	792	160	1340
Green ratio, g/C	.219	.219	.219	.219	.058	.452	.129	.523
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.379	.256	.375	.42	.784	.557	.784	.814
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	344	344	344	344	91	1422	204	1646
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	20	19.4	20	20.2	27.9	12	25.3	11.9
Incremental delay, d_2 (s/veh) (Equation 16-12)	3.2	1.8	3.1	3.7	47.9	1.6	25.5	4.5
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	23.1	21.2	23.1	23.9	75.8	13.6	50.8	16.4
LOS by lane group	C	C	C	C	E	B	D	B
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	22.4		23.5		18.8		20.1	
LOS by approach	C		C		B		C	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	19.9		Intersection LOS (Exhibit 16-2)				B	

Notes

1. $RS = 1710(PHF)(f_g)$, where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

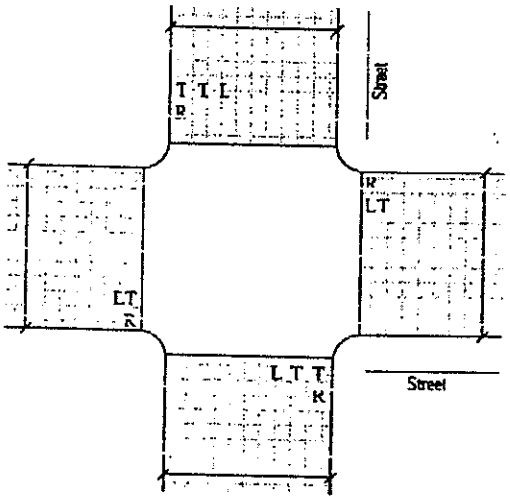
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	AM PEAK 2008
Comment	EXISTING GEOMETRY

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration		LT	R		LT	R
No. of lanes		1	1		1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	12	186	64	165	156	178	50	930	196	180	641	16
Proportion of LT or RT (P_{LT} or P_{RT})[2]	100	-	0	100	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description EXISTING GEOMETRY

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	406		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	53	137	580
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	1175
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.934
Intersection status (Exhibit A10-9)	NEAR CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	20.6		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	6.1	5.6	27.7

Control Delay and LOS

	EB		WB		NB		SB	
Lane group	LT	R	LT	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	202	70	170	193	54	1011	196	697
Green ratio, g/C	.276	.276	.276	.276	.036	.395	.129	.488
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$	.465	.16	.393	.445	.964	.814	.964	.454
Lane group capacity, c (veh/h) $c = \frac{V}{X}$	434	434	434	434	56	1243	203	1536
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)	18	16.4	17.6	17.9	28.9	16.2	26	10.1
Incremental delay, d_2 (s/veh) (Equation 16-12)	3.6	.8	2.7	3.3	110	5.9	54.6	1
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)	21.6	17.2	20.3	21.2	138.9	22.1	80.6	11.1
LOS by lane group	C	B	C	C	F	C	F	B
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	20.5		20.8		28.1		26.3	
LOS by approach	C		C		C		C	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	26.3		Intersection LOS (Exhibit 16-2)				C	

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

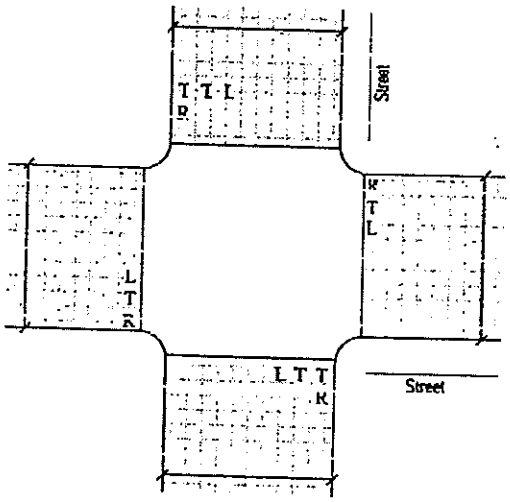
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	PM PEAK 2008
Comment	ADD EB & WB LT LANE

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



	EB			WB		
Lane configuration	L	T	R	L	T	R
No. of lanes	1	1	1	1	1	1

	NB			SB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	18	176	84	199	171	184	69	758	202	200	1283	16
Proportion of LT or RT (P_{LT} or P_{RT})[2]	0	-	0	0	-	0	0	-	100	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description ADD EB & WB LT LANE

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	216		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	73	138	513
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	940
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.747
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	15.1		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.7	7	30.2

Control Delay and LOS

	EB			WB			NB		SB	
Lane group	L	T	R	L	T	R	L	TR	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	20	191	91	216	186	200	75	824	217	1395
Green ratio, g/C	0	.184	.184	0	.184	.184	.062	.437	.179	.554
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	1573	1573	3146	1573	3146
v/c ratio, X $X = \frac{V/s}{g/C}$		.66	.315		.641	.69	.771	.8	.771	.8
Lane group capacity, c (veh/h) $c = \frac{V}{X}$		290	290		290	290	97	1374	282	1743
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)		22.7	21.2		22.6	22.9	27.7	12.9	23.5	10.7
Incremental delay, d_2 (s/veh) (Equation 16-12)		11.2	2.8		10.4	12.7	43.8	1.9	18.3	4
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)		34	24		33.1	35.5	71.5	14.8	41.7	14.7
LOS by lane group		C	C		C	D	E	B	D	B
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	30.8			34.4			19.6		18.3	
LOS by approach	C			C			B		B	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	20.7			Intersection LOS (Exhibit 16-2)			C			

Notes

1. RS = 1710(PHF)(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

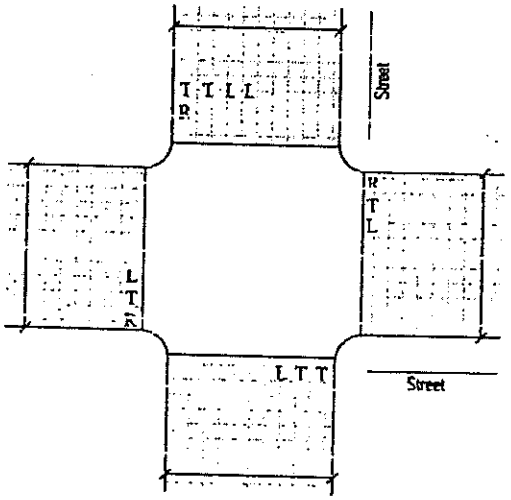
General Information

Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	AM PEAK 2010
Comment	E/W LT LANE, NB RT LANE, 2ND SB LT

Site Information

Jurisdiction/Date	IMP. CO. 12/8/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry



Lane configuration	EB			WB		
	L	T	R	L	T	R
No. of lanes	1	1	1	1	1	1

Lane configuration	NB			SB		
	L	T		L	TR	
No. of lanes	1	2		2	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	13	243	67	190	179	200	52	968	264	233	667	16
Proportion of LT or RT (P_{LT} or P_{RT})[2]	0	-	0	0	-	0	0	-	0	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description E/W LT LANE, NB RT LANE, 2ND SB LT

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	243		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	55	72	484
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	854
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.678
Intersection status (Exhibit A10-9)	UNDER CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	17.7		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7.1	4	31.2

Control Delay and LOS

	EB			WB			NB		SB	
Lane group	L	T	R	L	T	R	L	T	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	14	264	73	207	195	217	57	1052	253	725
Green ratio, g/C	0	.228	.228	0	.228	.228	.051	.454	.119	.521
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	1573	1573	1573	1573	1573	1573	3146	3146	3146
v/c ratio, X $X = \frac{V/s}{g/C}$		.737	.203		.543	.607	.7	.737	.678	.442
Lane group capacity, c (veh/h) $c = \frac{V}{X}$		358	358		358	358	81	1427	373	1639
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)		21.5	18.8		20.4	20.8	28	13.5	25.3	8.9
Incremental delay, d_2 (s/veh) (Equation 16-12)		12.7	1.3		5.8	7.4	40.2	3.4	9.5	.9
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)		34.2	20		26.2	28.2	68.2	16.9	34.9	9.8
LOS by lane group		C	B		C	C	E	B	C	A
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$		31.2			27.3			19.5		16.3
LOS by approach		C			C			B		B
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$		20.5			Intersection LOS (Exhibit 16-2)					C

Notes

1. RS = 1710(f_{HV})(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

CHAPER 16 - SIGNAL PLANNING INPUT WORKSHEET

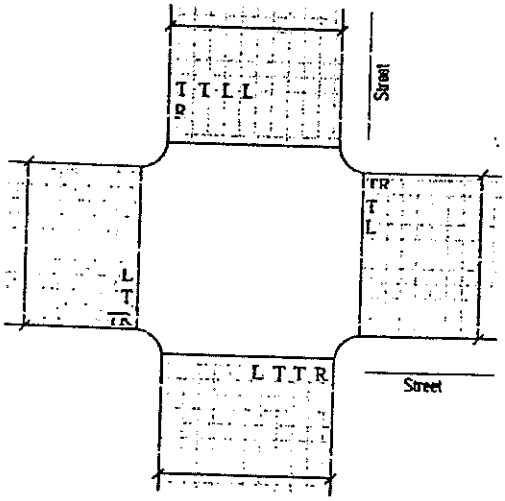
General Information

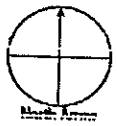
Analyst	RWH
Agency or Company	DRA
Analysis Period/Year	PM PEAK 2010
Comment	ADD SB LT, EB & WB T & LT, NB RT

Site Information

Jurisdiction/Date	IMP. CO. 12/19/01
Intersection	HEBER ROAD HIWAY 111
Area Type	☐ CBD ☑ Other

Intersection Geometry





	EB			WB		
Lane configuration	L	TR		L	TR	
No. of lanes	1	2		1	2	

	NB			SB		
Lane configuration	L	T	R	L	TR	
No. of lanes	1	2	1	2	2	

Volume and Signal Input

	EB			WB			NB			SB		
	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]	LT	TH	RT[1]
Volume, V (veh/h)	19	393	88	470	397	392	71	790	461	401	1336	16
Proportion of LT or RT (P_{LT} or P_{RT})[2]	0	-	100	0	-	100	0	-	0	0	-	100
Parking (Yes/No)	N			N			N			N		
Left-turn treatment (permitted, protected, not opposed) (if known)	1			1			2			2		

Peak-hour factor, PHF .92

Cycle length Minimum, C_{min} 60 s Maximum, C_{max} 150 s Lost time/phase 4 s

Notes

1. RT volumes, as shown, exclude RTOR.
2. P_{LT} = 1.000 for exclusive left-turn lanes, and P_{RT} = 1.000 for exclusive right-turn lanes. Otherwise, they are equal to the proportions of turning volumes in the lane group.

CHAPTER 16 - SIGNAL PLANNING CONTROL DELAY AND LOS WORKSHEET

General Information

Description ADD SB LT, EB & WB T & LT, NB RT

East-West Phasing Plan

Selected plan (Exhibit A10-8) 1	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	EWT		
Critical phase volume, CV (veh/h)	429		
Lost time/phase, t_L (s)	4		

North-South Phasing Plan

Selected plan (Exhibit A10-8) 3b	Phase No. 1	Phase No. 2	Phase No. 3
Movement codes	NSL	SLT	NST
Critical phase volume, CV (veh/h)	75	143	542
Lost time/phase, t_L (s)	4	0	4

Intersection Status Computation

Critical sum, CS (veh/h) $CS = \Sigma CV$	1189
Lost time/cycle, L (s) $L = \Sigma t_L$	12
Reference sum flow rate, RS (veh/h)[1]	1573
Cycle length, C (s) $C = \frac{L}{1 - \left[\frac{\min(CS, RS)}{RS}\right]}$ $C_{min} \le C \le C_{max}$	60
Critical v/c ratio, X_{cm} $X_{cm} = \frac{CS}{RS\left(1 - \frac{L}{C}\right)}$	.945
Intersection status (Exhibit A10-9)	NEAR CAPACITY

Green Time Calculation

East-West Phasing	Phase No. 1	Phase No. 2	Phase No. 3
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	21.3		
North-South Phasing	**Phase No. 1**	**Phase No. 2**	**Phase No. 3**
Green time, g (s) $g = \left[(C - L)\left(\frac{CV}{CS}\right) + t_L\right]$	7	5.8	25.9

Control Delay and LOS

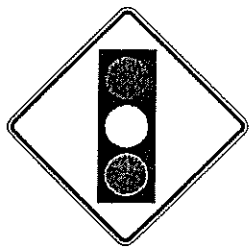
	EB		WB		NB			SB	
Lane group	L	TR	L	TR	L	T	R	L	TR
Lane group adjusted volume from lane volume worksheet, V (veh/h)	21	427	511	434	77	859	501	436	1452
Green ratio, g/C	0	.289	0	.289	.05	.365	.365	.147	.461
Lane group saturation flow rate, s (veh/h) s = RS * number of lanes in lane group	1573	3146	1573	3146	1573	3146	1573	3146	3146
v/c ratio, X $X = \frac{V/s}{g/C}$		.471		.478	.976	.748	.873	.945	1.001
Lane group capacity, c (veh/h) $c = \frac{V}{X}$		908		908	79	1148	574	461	1451
Progression adjustment factor, PF (Exhibit 16-12)	1	1	1	1	1	1	1	1	1
Uniform delay, d_1 (s/veh) (Equation 16-11)		17.6		17.6	28.5	16.6	17.8	25.4	16.2
Incremental delay, d_2 (s/veh) (Equation 16-12)		1.7		1.8	94.7	4.5	16.7	30.2	23.8
Initial queue delay, d_3 (s/veh) (Appendix F, Ch. 16)	0	0	0	0	0	0	0	0	0
Delay, $d = d_1(PF) + d_2 + d_3$ (s/veh)		19.3		19.4	123.1	21.1	34.5	55.6	40
LOS by lane group		B		B	F	C	C	E	D
Delay by approach, d_A (s/veh) $\frac{\Sigma(d)(V)}{\Sigma V}$	19.3		19.4		31.3			43.6	
LOS by approach	B		B		C			D	
Intersection delay, d_I (s/veh) $d_I = \frac{\Sigma(d_A)(V_A)}{\Sigma V_A}$	31.4		Intersection LOS (Exhibit 16-2)					C	

Notes

1. RS = 1710(f_{HV})(f_g), where f_g is area adjustment factor (0.90 for CBD and 1.0 for all others).

APPENDIX C

LEVEL OF SERVICE CRITERIA



LEVEL OF SERVICE CRITERIA
LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS

Level of Service for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level of service criteria is stated in terms of the average stopped delay per vehicle for a 15 minute analysis period. The criteria are given in the table below.

Level of Service	Stopped Delay per Vehicle (sec)
A	≤ 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	> 60.0

Delay is dependent on a number of variables, including the quality of progression, cycle length, the green ratio, and the volume to capacity ratio for the lane group or approach in question.

Level of Service A, describes operations with very low delay. Average delays are less than 5.0 seconds per vehicle and most vehicles do not stop at all. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Short cycle lengths may also contribute to low delay.

Level of Service B, describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This condition occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level of Service C, describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level of Service D, describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level of Service E, describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. The high delay values generally indicate poor progression, long cycle lengths and high volume to capacity ratios. Individual cycle failures are frequent occurrences.

Level of Service F, describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation and high volume to capacity ratios. There are many individual cycle failures in this level. Poor progression and long cycle lengths may also be major contributing causes of the delays.

Source: *Highway Capacity Manual, Special Report No. 209,* published by the Transportation Research Board, National Research Council, Washington, D.C., 1985, pages 9-4 and 9-5.

LEVEL OF SERVICE CRITERIA
LEVEL OF SERVICE FOR UNSIGNALIZED INTERSECTIONS

It is not possible to directly compare an unsignalized intersection level of service with a signalized intersection level of service. Level of service criteria for unsignalized intersections is related to general delay ranges. The criteria are given in the table on the following below.

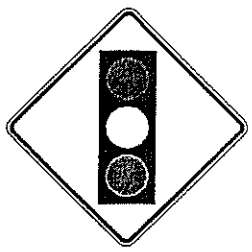
Level of Capacity Service	Average Total Delay(Sec/Veh)	Qualitative Description
A	≤5	Little or no delays
B	>5 and ≤10	Short traffic delays
C	>10 and ≤20	Average traffic delays
D	>20 and ≤30	Long traffic delays
E	>30 and ≤45	Very long traffic delays
F	>45	*

* When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection.

Source: *Highway Capacity Manual, Special Report No. 209,* published by the Transportation Research Board, National Research Council, Washington, D.C., 1994, Table 10-3, page 10-12.

APPENDIX D

CORRESPONDENCE



Kevin A. Dahl, P.E., R.L.S.
Christopher D. Robins, P.E.
Juan N. Lomelí, R.L.S.
Douglas J. Nicholls, P.E.

DAHL, ROBINS & ASSOCIATES, INC.

CIVIL ENGINEERING ■ SURVEYING ■ TRAFFIC

1560 South 5th Avenue
Yuma, Arizona 85364
Phone:(928) 819-0825
Fax:(928) 819-0826
E-mail:dra@dahlrobins.com

April 15, 2002

Development Design Engineering, LLC
1122 State Street, Suite D
El Centro, CA 92243

Attention: Mr. Tom Dubose, Manager

Reference: Imperial Center Traffic Impact Study

Dear Mr. Dubose:

We have reviewed the comments to the Imperial Center Traffic Impact Study provided by Bill Figge of the California Department of Transportation. The following is our response to his comments:

- **A 2020 Traffic Impact Study should be completed and include any future development planned in the area so that traffic impacts to the state system and surrounding facilities can be determined. The report currently shows projections through build out at 2010, and does not include any planned development in the area that may also impact SR-111 and State Route (SR-86). The analysis should also include future AM and PM peak period traffic and its impact to highway facilities.**

Traffic volumes have been inflated to estimate 2020 conditions. Level Of Service analyses are attached for this time period (Tables 8 & 9). In talking with Imperial County officials, there is currently no planned development near this location. As a result, no attempt was made to assume what future uses might be in place near the Imperial Center in 2020. Any future traffic studies in this area will need to take into account the Imperial Center traffic and make the appropriate adjustments.

- **The Traffic Study indicates that there are several phases (Phase I - Phase V) to this project. Each phase of the project needs to be outlined in detail, with impacts to SR-111 and SR-86 for each phase.**

The estimated phasing and timing of the development was described in Section II.B.4 of the report. Beginning in 2002, it is anticipated that a new phase will be completed every two years. The first phase will consist of the truck stop and gas station/convenience mart, along with ancillary uses. The second phase, in 2004, will include a hotel. The third phase, estimated in 2006, would comprise half of the outlots on the property. Phase IV, in 2008, would be the other half of the outlots. Potential uses on the outlots would include banks, a video store, restaurants and strip center type uses. The final phase in 2010, would include the outlet mall and theater. The traffic generated by each phase is noted in Table 2. Table 5 shows the impacts on the surrounding roads. Blank columns indicate no significant changes between the previous phase.

- **Heber Road and SR-111 - As noted on page 30 and 31 of the report, any additional widening of Heber Road, southbound left turn lanes and northbound right turn lane will be required by build out. Mitigation and fair share must be included for these items.**
- **McCabe and SR-111 - As noted on page 30 of the report, any additional improvements such as restriping or reconfiguration of the intersection to accommodate a left turn lane and combine through/right turn lane will require mitigation and a fair share contribution.**

These are acknowledged.

- **The circulation plans for truck delivery access should be included in the traffic study.**

For the purposes of this study, it was assumed that most of the delivery truck traffic would use the easternmost access off of Heber Road. Some delivery traffic was also assigned to the driveway to the west of that. Additional delivery traffic would be expected to use Correll Road and the easternmost driveway from the project site.

- **The Transportation Concept Report shows that SR-111 may be widened in the future. The developer should realize that this might require additional Right of Way in the vicinity of the developers proposed project.**

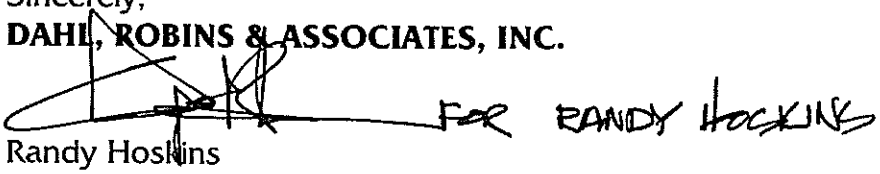
This is acknowledged.

The comment letter also asked for additional detail regarding the transportation facilities that might serve the development, including Yourman Road, right-of-way lines and pedestrian traffic areas. DDE would need to provide details on these items.

There were also two additional comments regarding accident data. This data has been requested from CalTrans on multiple occasions and still has not been received. Once we

have obtained that data, we will process our response to those comments.

Sincerely,
DAHL, ROBINS & ASSOCIATES, INC.



Randy Hoskins

TABLE 8
UNSIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	2020	
		AM	PM
Yourman Rd & Jasper Rd	NBLT	A	B
	SBLT	A	B
	EB	A	A
	WB	A	A
Heber Rd & Bowker Rd	NBLT	C	D
	SBLT	B	B
	EB	A	A
	WB	A	A
McCabe Rd & Bowker Rd	NB	B	B
	SB	B	B
	EBLT	A	A
	WBLT	A	A
Jasper Rd & Bowker Rd	NBLT	B	B
	SBLT	B	B
	EB	A	A
	WB	A	A
Heber Rd & West Dr.	SB	B	D
	EBLT	A	A
Heber Rd & East Dr.	SB	B	C
	EBLT	A	A

Kevin A. Dahl, P.E., R.L.S.
Christopher D. Robins, P.E.
Juan N. Lomelí, R.L.S.
Douglas J. Nicholls, P.E.

DAHL, ROBINS & ASSOCIATES, INC.

CIVIL ENGINEERING ■ SURVEYING ■ TRAFFIC

1560 South 5th Avenue
Yuma, Arizona 85364
Phone:(928) 819-0825
Fax:(928) 819-0826
E-mail:dra@dahlrobins.com

July 1, 2002

Development Design Engineering, LLC
1122 State Street, Suite D
El Centro, CA 92243

Attention: Mr. Tom Dubose, Manager

Reference: Imperial Center Traffic Impact Study

Dear Mr. Dubose:

We have reviewed the comments on the Imperial Center Traffic Impact Study provided by Bill Figge of the California Department of Transportation dated May 29, 2002. The following are our replies to his comments:

- **The Traffic Study indicates that there are several phases (Phase I - Phase V) to this project. Each phase of the project needs to be outlined in detail, with impacts to State Route 111 (SR-111) and State Route 86 (SR-86) for each project. The response by Dahl Robins does not adequately answer this question. Section II.B.4 of the latest Preliminary Traffic Impact Study on pages 6 and 7 only outlines years that buildings will come online, it does not address "Impacts" to SR-111 and SR-86 by phase as requested. Impacts are changes in Traffic Volumes, mitigated changes to the state highway system etc. as a result of planned project.**

The estimated phasing and timing of the development was described in Section II.B.4 of the report. The traffic generated by each phase is noted in Table 2, with Figures 6-10 showing resulting peak hour traffic volumes. Tables 5-7 show the impacts on the Level Of Service of surrounding roads for each phase of the project. Tables 8 & 9 show ultimate service levels in the year 2020. Any needed improvements for mitigating the intersections are outlined in Section VII.A, and it is noted at which phase the improvements will need to be completed.

- **A review of collision history at all impacted locations with SR-111 should be completed and mitigation provided to any increase in collision history as a**

HP OfficeJet T Series
Personal Printer/Fax/Copier/Scanner

Fax History Report for
Dahl, Robins & Assoc
520-819-0826
May 20 2002 10:07am

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
May 20	9:58am	Sent	17603526408	0:55	2	OK

Result:
OK - black and white fax
OK color - color fax

occurring at this intersection is the rear end collision. In order to decrease the frequency of these types of accidents, it is recommended some form of advance flasher be installed notifying motorists when the light is expected to turn red for their approach. Since this intersection is already experiencing 5 of these types of crashes per year, this would be a good mitigation measure to implement immediately, independent of any development at this site.

At the Jasper Road and SR-111 intersection, there are currently about 4 accidents per year. Based on the increased volume, that number could be expected to increase to 7 per year by 2020. The number of accidents correctable by signal installation would be five. This was the only intersection that would warrant a signal based on accidents (in 2010). Since it also meets volume warrants, a signal was previously recommended for this location. The angle accidents are the primary type of crashes occurring, so no other mitigation is expected to be needed.

At the McCabe Road and SR-111 intersection, there are currently about 2 accidents per year. Based on the increased volume, that number could be expected to increase to 3 per year by 2020. The number of accidents correctable by signal installation would be three. The proposal to install a signal at this location when volume warrants are met should adequately mitigate the majority of the accidents occurring here.

At the Heber Road and Dogwood Road intersection, there is currently an average of 1 accident per year. Based on the increased volume, that number could be expected to increase to 2 per year by 2020. None of the accidents are correctable by signal installation. This minimal increase in the number of accidents does not suggest mitigation would be necessary.

Sincerely,
DAHL, ROBINS & ASSOCIATES, INC.

FOR RANDY HOSKINS

Randy Hoskins

Kevin A. Dahl, P.E., R.L.S.
Christopher D. Robins, P.E.
Juan N. Lomelí, R.L.S.
Douglas J. Nicholls, P.E.

DAHL, ROBINS & ASSOCIATES, INC.

CIVIL ENGINEERING ■ SURVEYING ■ TRAFFIC

1560 South 5th Avenue
Yuma, Arizona 85364
Phone:(928) 819-0825
Fax:(928) 819-0826
E-mail:dra@dahlrobins.com

May 20, 2002

Development Design Engineering, LLC
1122 State Street, Suite D
El Centro, CA 92243

Attention: Mr. Tom Dubose, Manager

Reference: Imperial Center Traffic Impact Study

Dear Mr. Dubose:

We have received the accident data from the California Department of Transportation to provide a response to Bill Figge's comments on the Imperial Center Traffic Impact Study. The following are our replies to his comments:

- **A review of collision history at all impacted locations with SR-111 should be included and mitigation provided to any increase in collision history as a result of increased volumes from this project. Impacted locations would include Jasper Road and SR-111, McCabe Road and SR-111, Heber Road and SR-111 and Dogwood Road and Heber/SR-86.**

- **All proposed signals on SR-111 or to be coordinated with SR-111 should be analyzed to meet not only volume warrants, but also collision history warrants, and mitigated as necessary.**

The existing accident rate for each intersection was determined using the 1998-2001 data provided by CalTrans. By making the gross assumption this rate would stay constant as traffic volumes increased, the numbers of accidents were projected in to the future years.

At the Heber Road and SR-111 intersection, there are currently about 7 accidents per year. Based on the increased volume, that number could be expected to increase to 15 per year by 2020. The number of accidents correctable by signal installation would be four (realizing signals are already in place at this location). The primary type of accident

HP OfficeJet T Series
Personal Printer/Fax/Copier/Scanner

Fax History Report for
Dahl, Robins & Assoc
520-819-0826
Apr 15 2002 12:53pm

Last Fax

Date	Time	Type	Identification	Duration	Pages	Result
Apr 15	12:41pm	Sent	17603526408	1:24	5	OK

Result:
OK - black and white fax
OK color - color fax

TABLE 9
SIGNALIZED INTERSECTION LEVEL OF SERVICE IMPACT

Intersection	Mvmt	Jasper & Hwy 111	Heber & Yourman	McCabe & Hwy 111	Heber & Hwy 111	Heber & Dogwood
2020	SB	C/C	C/C	C/C	D/B	C/B
	WB	D/F	E/C	C/C	C/C	C/B
	NB	A/B	B/C	A/A	C/D	B/C
	EB	A/D	B/C	A/C	B/C	C/D
	INT	A/C	C/C	A/B	C/C	C/C

result of increased volumes from this project. Impacted locations would include Jasper Road and SR-111, McCabe Road and SR-111, Heber Road and SR-111, and Dogwood Road and Heber/SR-86.

As outlined in section V.B of the report, the existing accident rate for each intersection was determined using the 1998-2001 data provided by CalTrans. By making the gross assumption this rate would stay constant as traffic volumes increased, the numbers of accidents were projected in to the future years.

At the Heber Road and SR-111 intersection, there are currently about 7 accidents per year. Based on the increased volume, that number could be expected to increase to 15 per year by 2020. The number of accidents correctable by signal installation would be four (realizing signals are already in place at this location). The primary type of accident occurring at this intersection is the rear end collision. In order to decrease the frequency of these types of accidents, it is recommended some form of advance flasher be installed notifying motorists when the light is expected to turn red for their approach. Since this intersection is already experiencing 5 of these types of crashes per year, this would be a good mitigation measure to implement immediately, independent of any development at this site.

At the Jasper Road and SR-111 intersection, there are currently about 4 accidents per year. Based on the increased volume, that number could be expected to increase to 7 per year by 2020. The number of accidents correctable by signal installation would be five. This was the only intersection that would warrant a signal based on accidents (in 2010). Since it also meets volume warrants, a signal was previously recommended for this location. The angle accidents are the primary type of crashes occurring, so no other mitigation is expected to be needed.

At the McCabe Road and SR-111 intersection, there are currently about 2 accidents per year. Based on the increased volume, that number could be expected to increase to 3 per year by 2020. The number of accidents correctable by signal installation would be three. The proposal to install a signal at this location when volume warrants are met should adequately mitigate the majority of the accidents occurring here.

At the Heber Road and Dogwood Road intersection, there is currently an average of 1 accident per year. Based on the increased volume, that number could be expected to increase to 2 per year by 2020. None of the accidents are correctable by signal installation. This minimal increase in the number of accidents does not suggest mitigation would be necessary.

Sincerely,
DAHL, ROBINS & ASSOCIATES, INC.

Randy Hoskins

01104corr.wpd