Exhibit 3.10

PETERKORT TOWN CENTER RETAIL DEVELOPMENT

TRAFFIC IMPACT ANALYSIS

FOR

J. PETERKORT AND COMPANY

October 1993

Project Number 293222.01

prepared by:

Mackenzie Engineering Incorporated (MEI)
0690 S.W. Bancroft Street
P.O. Box 69039
Portland, Oregon 97201-0039

Phone (503) 224-9560
Fax (503) 228-1285

11/1/93
EXP. 12/31/94

TABLE OF CONTENTS

VII. ARTERIAL ANALYSIS

- BARNES ROAD EXTENSION ANALYSIS
- CEDAR HILLS BLVD. ANALYSIS
- EXISTING BARNES ROAD ANALYSIS

VIII. VEHICULAR QUEUING ANALYSIS

- INTERSECTION STORAGE REQUIREMENTS
- ACCESS AND CHANNELIZATION EFFECTS

IX. CONCLUSIONS AND RECOMMENDATIONS

- TOWN CENTER RETAIL DEVELOPMENT
- ACCESS MANAGEMENT PLAN - MASTER PLAN TRAFFIC

X. APPENDIX (Under Separate Cover)

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

INTRODUCTION:
This transportation system analysis has been prepared in support of the development application for the proposed 16.5 acre Peterkort Town Center retail development. This document provides a considerable amount of additional information, focusing on traffic impacts of phased development of the balance of Peterkort properties located north of Sunset Highway (US 26) stretching from St. Vincents Hospital to the Shilo Inn office building. **Figure 1** presents a Vicinity Map illustrating the location of the Peterkort property. Due to retail site design limitations, an Access Management Plan will be submitted with a Development Review application for the Town Center project. Though this study addresses a wide range of sub-site future developments for "master planning" purposes, it should be understood that only the Town Center retail development is being applied for at this time.

RETAIL DEVELOPMENT DESCRIPTION:
The proposed Town Center retail complex includes a maximum of 170,000 square feet of building area including anchors, in-line retail shops, and pads. No fast food restaurants are now proposed though this analysis was prepared assuming two high turnover restaurant pads with drive-thrus. Thus, this analysis represents "Worst-Case" conditions. It has been assumed that the Town Center retail complex would be mostly developed and occupied by 1995. Development projections estimate completion and occupancy of the final 8,000 square feet of in-line retail space by 1998 to complete development on this site. **Figure 2A** and **Figure 2B** present the proposed site plan alternatives.

ANALYSIS SCOPE:
This analysis also addresses phased development assumptions for the balance of Peterkort properties and some surrounding properties' development potential. These projects are described in detail in Section IV of this report, but generally include anticipated development of office-commercial space in the vicinity of the LRT station and north of the Town Center retail complex, LRT station construction, development of retail use and a medical office west of Cedar Hills Blvd., expansion of St. Vincent's Hospital, and residential development north of Johnson Creek.

To obtain a reasonable understanding of roadway improvement requirements, commensurate with anticipated developments, this analysis has reviewed estimated traffic conditions in 1995, 1998, 2005, and 2010 design years. Also, full buildout conditions have been reviewed at critical intersections to determine the effects of complete buildout of the office-commercial land (2010 design year assumes 62% completion of office-commercial development). Analysis of buildout conditions is necessary to ensure that access spacings, channelization, and signalization will operate adequately under maximum traffic generating conditions.

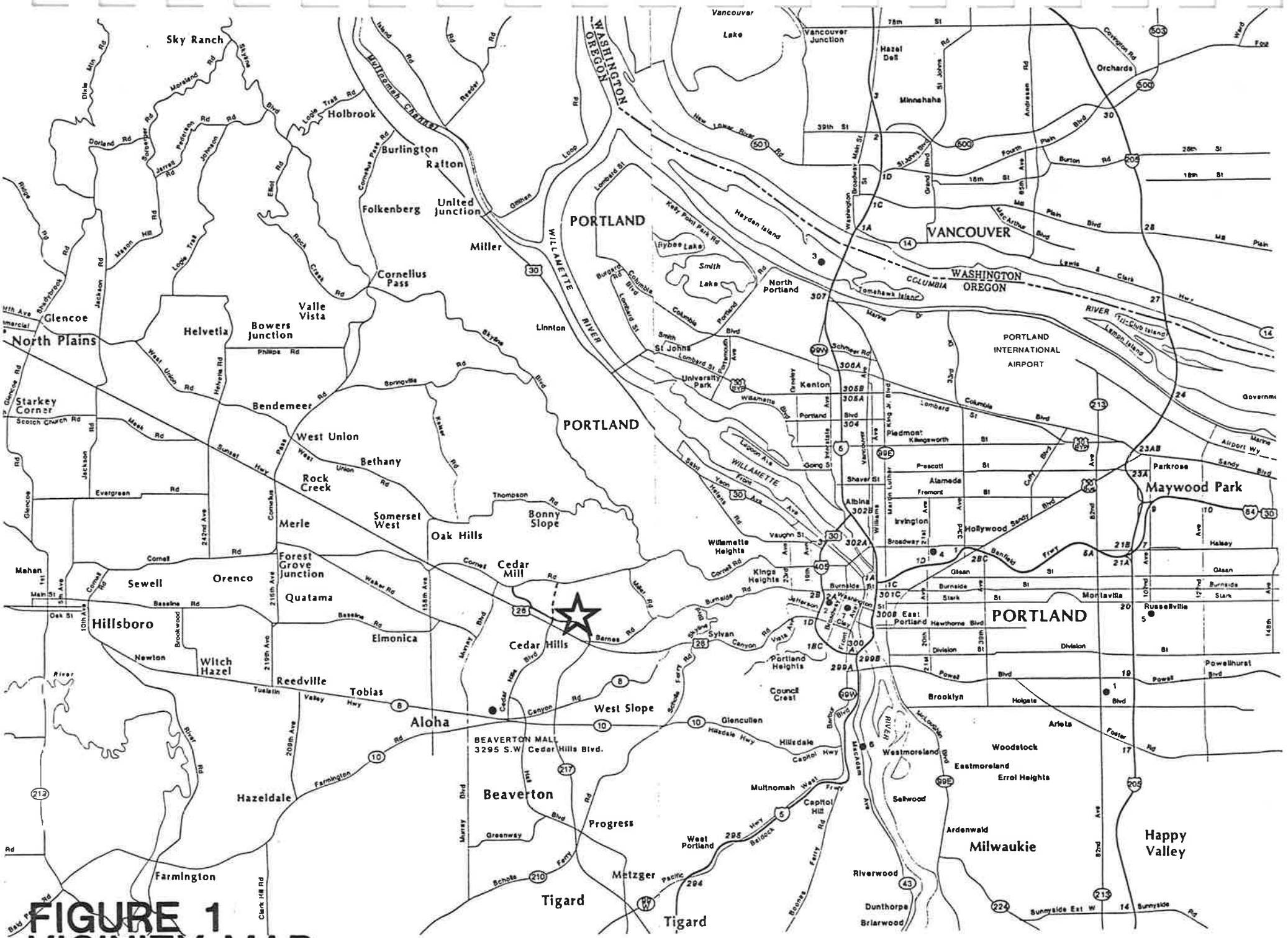


FIGURE 1
VICINITY MAP

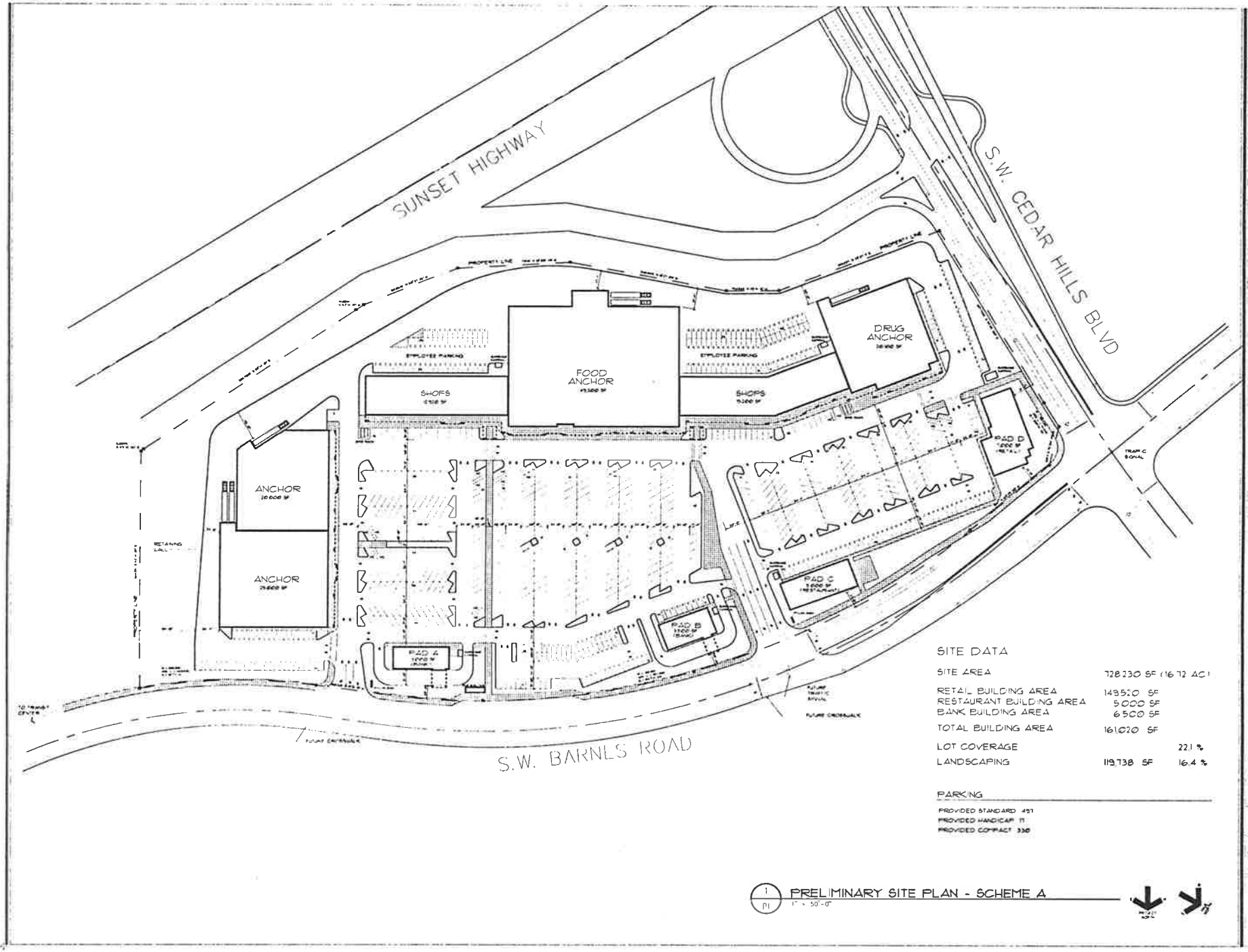
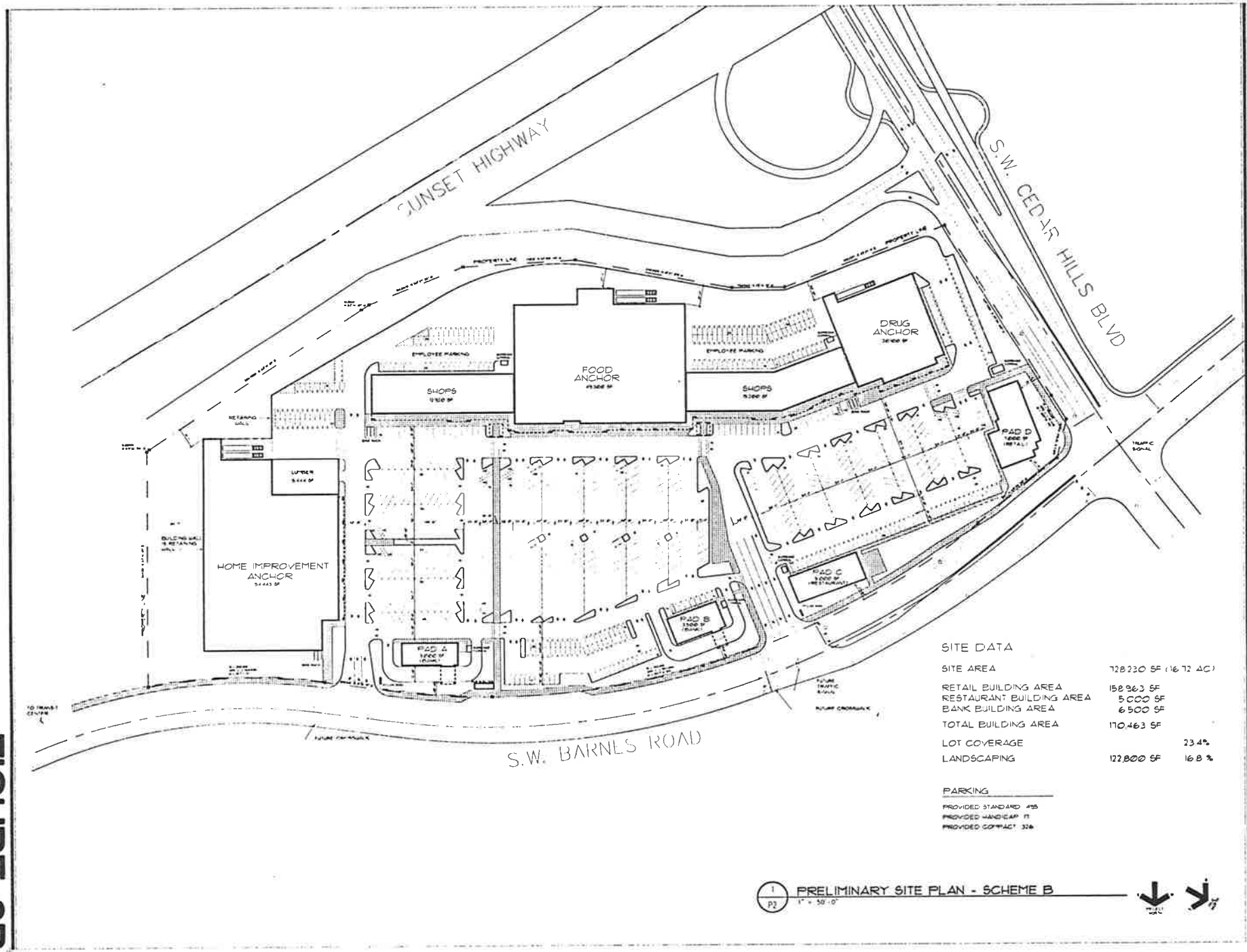

SUNSET HIGHWAY
S.W. CEDAR HILLS BLVD
S.W. BARNES ROAD
FOOD ANCHOR
DRUG ANCHOR
SHOPS
SHOPS
ANCHOR
ANCHOR
PAD A
PAD B
PAD C
PAD D
EMPLOYEE PARKING
EMPLOYEE PARKING
RETAINING WALL
FUTURE CROSSWALK
FUTURE CROSSWALK
SITE DATA
SITE AREA 728,330 SF (16.72 AC)
RETAIL BUILDING AREA 149,520 SF
RESTAURANT BUILDING AREA 5,000 SF
BANK BUILDING AREA 6,500 SF
TOTAL BUILDING AREA 161,020 SF
LOT COVERAGE 22.1 %
LANDSCAPING 119,738 SF 16.4 %
PARKING
PROVIDED STANDARD 457
PROVIDED HANDICAP 11
PROVIDED COMPACT 330
1 P1 PRELIMINARY SITE PLAN - SCHEME A
1" = 50'-0"
JKS Architects PC
1610 S.W. Taylor Street • Suite 200 • Portland, Oregon 97205
503.227.5464 / FAX 503.227.3590
PETERKORT TOWNE SQUARE
SW BARNES RD. AND SW 112TH AVENUE
PORTLAND, OREGON
A1
A

FIGURE 2A



SITE DATA

SITE AREA	728,230 SF (16.72 AC)	
RETAIL BUILDING AREA	158,963 SF	
RESTAURANT BUILDING AREA	5,000 SF	
BANK BUILDING AREA	6,500 SF	
TOTAL BUILDING AREA	170,463 SF	
LOT COVERAGE		23.4%
LANDSCAPING	122,800 SF	16.8 %

PARKING

PROVIDED STANDARD 495
PROVIDED HANDICAP 17
PROVIDED COMPACT 326

1/P2 PRELIMINARY SITE PLAN - SCHEME B
1" = 50'-0"

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PETERKORT TOWNE SQUARE
SW. BARNES RD. AND SW. 112TH AVENUE
PORTLAND, OREGON

A1
B

FIGURE 2B

ANALYSIS METHODOLOGY:
This analysis is based upon utilization of existing traffic count data taken by MEI staff at intersections significantly impacted by Peterkort site development. MEI also undertook license plate surveys to determine the directional distribution of existing traffic in order that traffic volumes could be accurately reassigned to alternate routes in response to the rechannelization of roadways constructed by Washington County and ODOT. Traffic growth has been evaluated by the addition of traffic generated by Peterkort property development plus growth rates on background traffic for roadway segments based upon traffic modelling and land development projections supplied by Washington County. This method of determining future design year traffic has been reviewed with County, Tri-Met, and ODOT traffic engineering staffs. All parties have agreed that the method described is more accurate than utilization of computerized traffic modelling.

Analysis of intersection capacity/level of service and arterial coordination were accomplished using NCAP and PASSER2 software respectively. Analyses address both the AM and PM peak hours during each design year.

ANALYSIS FINDINGS:
It was determined that the site can be adequately served by the construction of two signalized accesses. The primary access will be located approximately 550' from the Cedar Hills Blvd. intersection. It is expected that future development of office-commercial space north of the Barnes Road Extension will also access these traffic signals. The arterial progression analysis, however, indicates that the main intersection (westerly) will not be able to serve left turn egress from the north site. Though adequate intersection capacity could be maintained, creation of a separate sidestreet signal phase would impede operation of signal coordination.

The **main access** will require one ingress lane and three egress lanes, comprised of dual left turn lanes (future thru-left) and a separate right turn lane. Onsite circulation requires a minimum of 175' for vehicle storage to queue at the signal approach. Pedestrian crosswalks would be provided across the north, east, and south approaches of the intersection, but not across the west approach due to conflict with the dual left turn lanes. Traffic volumes require construction of an eastbound to site inbound right turn lane. With future development of the north office, westbound right turns into the office site and signalized eastbound left turns into the site can be provided. Right turn egress from the office site, which is the predominant directional movement during the critical PM peak hour, would be served as an "overlap" signal phase simultaneous with left turns into the office site.

The **east access** requires two egress lanes and one ingress lane providing a minimum of 165' for vehicle storage to queue at the signal approach. Future signal operation will include a "common green" phasing to simultaneously serve traffic exiting from the north commercial-office complex.

The **Barnes Road Extension** will generally require a three lane configuration across the site's frontage upon opening of the facility, transitioning to two lanes east of the site and flaring to four lanes in the area between the main access and Cedar Hills Blvd. This would consist of dual left turn lanes westbound to southbound, one westbound through lane, and one eastbound through lane. It is recommended, however, that the site frontage be constructed to the "ultimate" roadway width which will result in two eastbound lanes across the site's frontage, including a separate right turn lane into the site's main access. Bike lanes will be provided on Barnes Road across the site. **Figure 2A** illustrates the proposed lanes across the frontage.

The **Cedar Hills Blvd. Frontage** will require dual northbound left turn lanes and separate thru and right turn lanes to accommodate site traffic and the opening of the Cedar Hills Blvd. extension to Cornell Road. This will require some pavement widening along the site frontage. The road widening for the fourth northbound lane is not needed until extension of Cedar Hills Blvd. to Cornell Road.

Removal of the island being constructed by ODOT at the US 26 offramp to Cedar Hills Blvd will also be required. Under the ODOT plan, northbound through traffic at the westbound ramp intersection is served by a single lane and the offramp traffic travelling northbound turns without stopping. Upon creation of two-way traffic on the Barnes Extension, this will create an unacceptable amount of weaving movements within the relatively short distance south of the Barnes Road intersection. To alleviate this condition, it is recommended that the second northbound through lane be created and the offramp right turn traffic become signal controlled.

Future traffic conditions may require widening on the Cedar Hills Blvd. site frontage to provide a fifth northbound lane, depending upon possible construction of a Barnes Road onramp to US 26 at the Highway 217 interchange upon completion of the freeway weave ramps in 1998. An extensive discussion of roadway widening and system improvements is addressed in the main study, including timing assumptions relating to the level of development within the study area. Future 2010 lane channelization is illustrated in **Figure 11** and **Figure 12** later in this report.

II. INTRODUCTION

The Peterkort Town Center retail development proposed for the southeast quadrant of the Cedar Hills Blvd. and Barnes Road intersection will cover approximately 16.5 acres. This project is the first development on the Peterkort property which stretches from St. Vincent's Hospital to the Shilo Inn office building north of US 26. This study's primary purpose is to address the traffic impacts of the proposed Town Center retail development. However, to adequately address the coordination of traffic signals within the area of impact, the analysis extends along Barnes Road from Leahy Road to Cornell Road and on Cedar Hills Blvd. from Barnes Road to Park Way.

The secondary purpose of this study and the reason for its extensive detail and review of development potential and timing is to provide the Peterkorts and Washington County with insight on master plan traffic needs, access requirements and locations, and roadway lane requirements in response to background traffic growth and phased development of Peterkort and surrounding property. The fundamental assumptions, scope, and analysis methodology were reviewed during the early stages with County, ODOT, and Tri-Met staff to obtain concurrence.

This document provides the most comprehensive transportation planning and operational analysis document available to date specific to the traffic requirements relating to Barnes Road, Cedar Hills Blvd., Barnes Extension, and future development accesses along these roadways. Data used for this study was drawn from new traffic counts and directional surveys as well as from County EMME2 modelling and traffic analyses prepared by Washington County, METRO, ODOT, and various consulting firms.

The analysis is formatted to address development and roadway system status and projections for 1995, 1998, 2005, and 2010 design years. The information generated will provide recommendations for infrastructure improvements to mitigate the proposed Town Center development as well as to provide insight on future roadway needs as they relate to expanding development of other Peterkort and adjacent properties in the study area.

III. EXISTING AND FUTURE CONDITIONS

The study area encompasses a region which is undergoing substantial changes to the transportation system. With construction projects underway for Washington County, Oregon Department of Transportation, and Tri-Met, analysis of traffic conditions and development scenarios is relatively complex. For this reason, the analysis has been formatted to review "snapshot" design years, beginning upon opening of the new Town Center development in 1995. The second "design year" is 1998 reflecting operation of the light rail terminal (LRT), full buildout of the Town Center retail facility, construction of some office-commercial space, and the beginning of residential development along the Cedar Hills Blvd. extension.

The third analysis year is 2005, selected as approximately half way between 1998 and the 2010 design year used by Washington County. This analysis period assumes continued expansion of office-commercial and residential development in the area. The fourth and final "design year" is 2010 at which time it is anticipated that the Peterkort residential properties would be built out and office-commercial development would be at approximately 62% of estimated density. This analysis also reviews buildout of the office-commercial land to determine adequate roadway and intersection capacity and operation.

Section IV of this report presents a summary of specific development assumptions for each of the design years, coupled with the status of roadway infrastructure projects being completed by ODOT, County, Tri-Met, or site development frontage improvements.

EXISTING TRAFFIC CONDITIONS:
MEI staff collected AM and PM traffic counts during July 1993 from 6:30 AM to 8:30 AM and 4:00 PM to 6:00 PM at the following intersections:

Cornell/Saltzman	Barnes/Hospital East
Barnes/Saltzman	Barnes/Catlin Gable
Barnes/Cedar Hills	Barnes/Leahy
Barnes/217	Cedar Hills/US 26 Eastbound
Barnes/94th	Cedar Hills/Butner
Barnes/Hospital West	Cedar Hills/Park Way

Figure 3A1 presents the summary of existing AM peak hour traffic counts. Traffic volumes were then reassigned to the 1995 roadway configuration in preparation for factoring in background traffic growth and site development traffic. The reassigned traffic for the AM peak hour is shown on **Figure 3A2**.

Figure 3P1 presents the PM peak hour existing traffic count summary. Reassignment of traffic to the road network in place in 1995 has been illustrated on **Figure 3P2**.
Trip reassignments were based upon field data collected by MEI staff utilizing license plate surveys completed during August 1993. Traffic was "tracked" from an initial location or intersection movement to determine its distribution to downstream locations. These surveys were taken during the PM peak hours at the following locations:

- From Barnes Rd. westbound onramp to US 26:
  - 5.7% to Cedar Hills Southbound
  - 10.2% to Barnes Rd. Westbound
  - 84.1% to US 26 Westbound

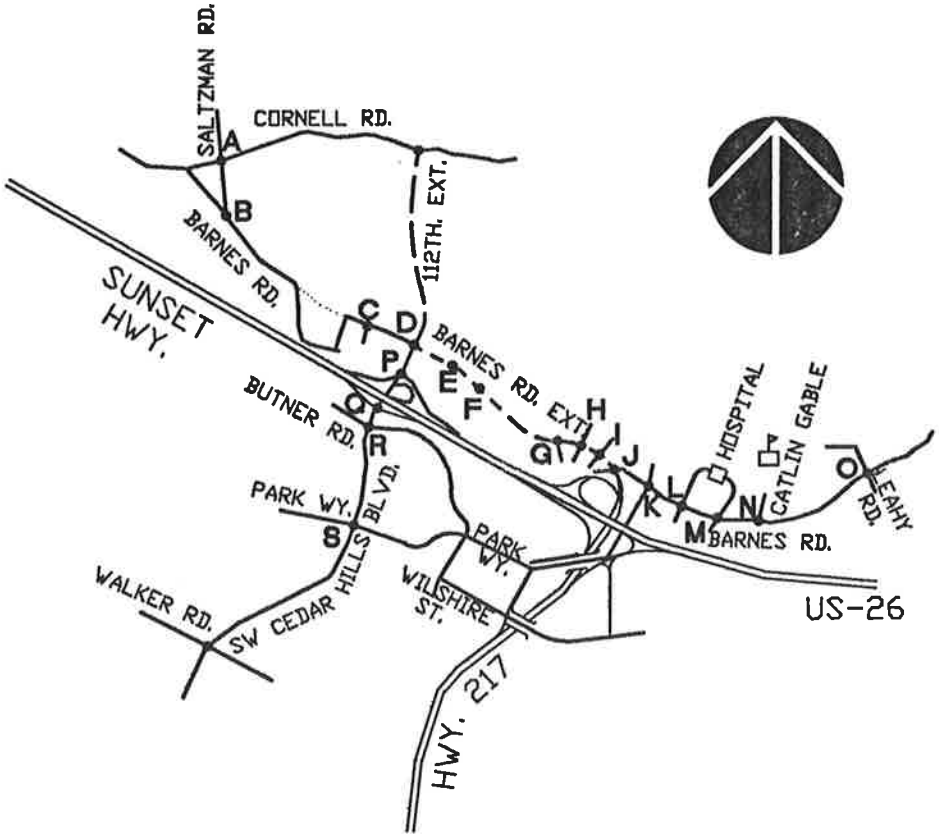
- From Cedar Hills Blvd. southbound onramp to US 26 eastbound:
  - 60.4% to US 26 Eastbound
  - 38.2% to Hwy 217 Southbound
  - 1.4% to Barnes Rd Eastbound

- From Hwy 217 northbound onramp to US 26 westbound:
  - 57.1% to US 26 Westbound
  - 7.2% to Cedar Hills Southbound
  - 35.7% to Barnes Rd. Westbound

These distribution surveys were utilized to assess the rerouting of traffic volumes upon completion of the Barnes Road Extension, both during the interim "detour" use and after the ramp from Hwy 217 northbound to US 26 westbound is rebuilt.

EXISTING ACCIDENT HISTORY:
Traffic accident data was collected for the roadways and intersections contained within the study area. Various intersections have experienced a number of accidents from 1990 to 1992. Listings of accidents for 1990, 1991, and 1992 are included in the Appendix. Accidents occurring at currently signalized intersections appear to be predominantly capacity related. These are reflected in rear end, following too close, and running signal related accidents. Many of the accidents in the Barnes Road corridor near Cornell Road and Saltzman were caused by movements into and out of adjacent driveways. The improvements being made at the Cedar Hills Blvd. westbound interchange should increase the safety at one of the intersections experiencing the highest frequency of accidents. Future 5-lane widening of Cornell Road and Barnes Road at Leahy Road will improve capacity and should reduce accident frequency.

EXISTING ROADWAY CONDITIONS:
At the time of this report's publishing, the Barnes Road Extension has been constructed to provide two westbound lanes from Hwy 217 northbound to Cedar Hills Blvd. **Figure 4A** illustrates the intersection lane configurations which are in effect upon at the present time. This does not yet reflect the detouring of Hwy 217 northbound traffic through the Barnes Extension, though the lanes are illustrated with dashed arrows. ODOT expected to begin use of the Barnes Extension detour route in October 1993. It will be in effect while construction occurs on the light rail bridge structures which will require rebuilding of the Hwy 217 northbound to US 26 westbound ramp. ODOT expects to complete the ramp rebuild, terminating detour use of Barnes Extension, by October/November 1994. This will coincide



MAP-2B

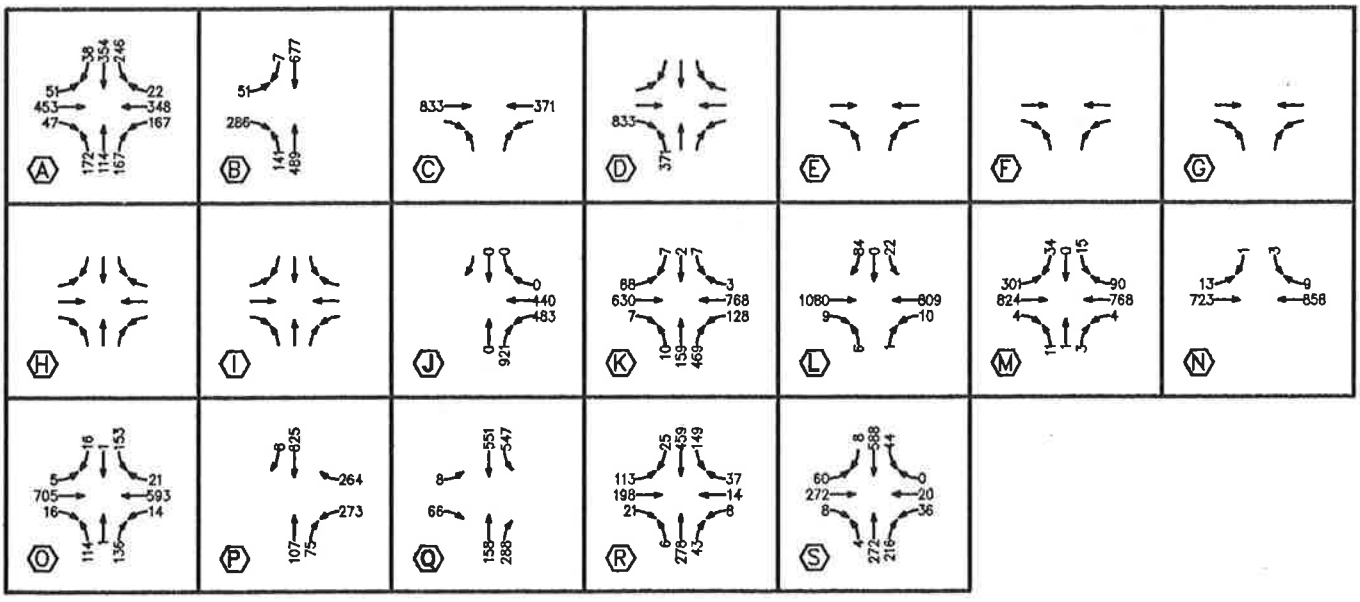


FIGURE 3A1

EXISTING TRAFFIC AM PEAK HOUR

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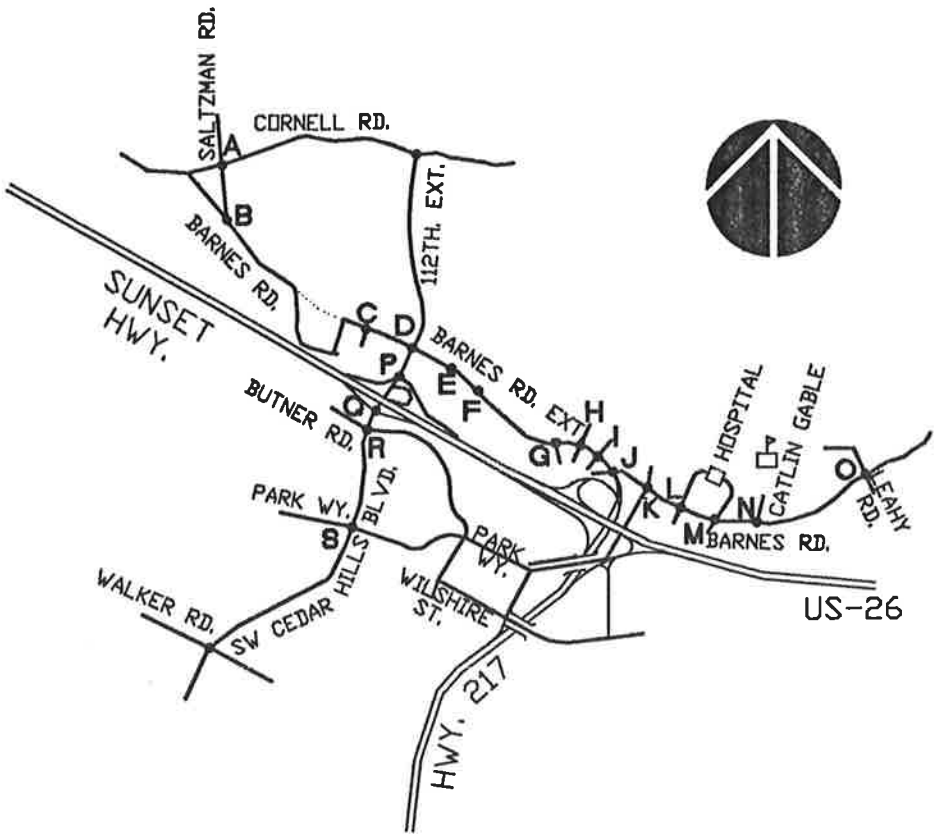
Civil • Structural • Transportation
0690 S. W. Bancroft Street • P.O. Box 69039
Portland, Oregon 97201-0039
Phone: (503)224-9560 • FAX: (503)228-1285



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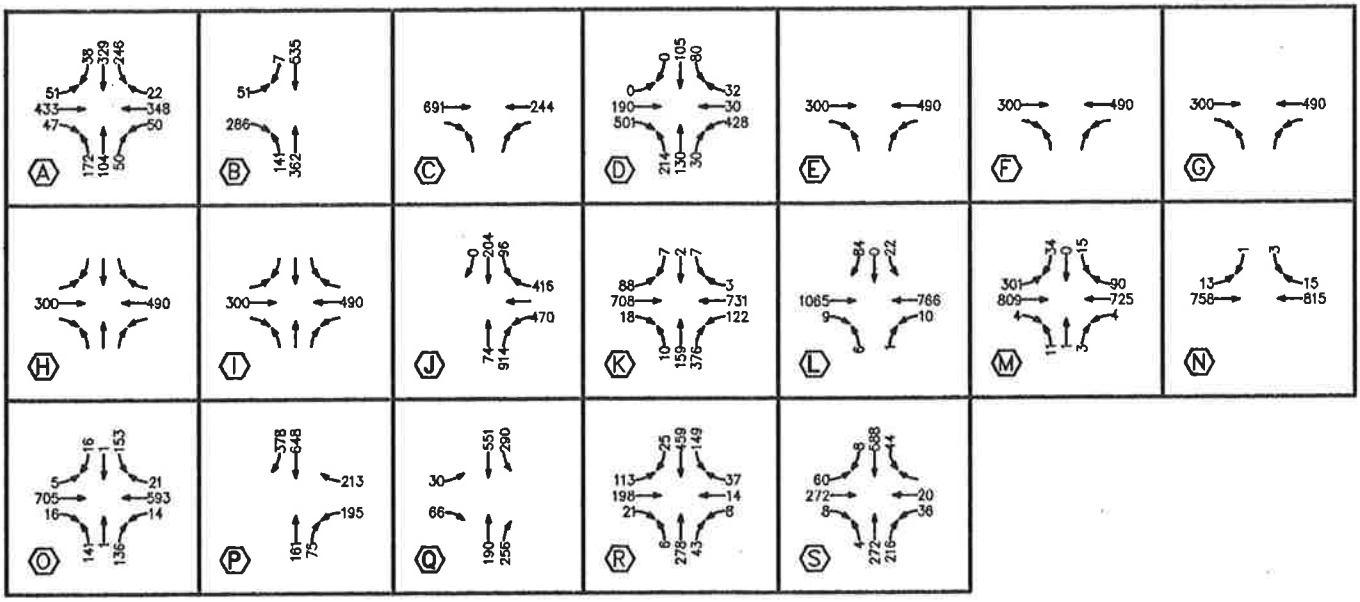

FIGURE 3A2

EXISTING TRAFFIC - AM PEAK HOUR REASSIGNED TO 1995 ROADS

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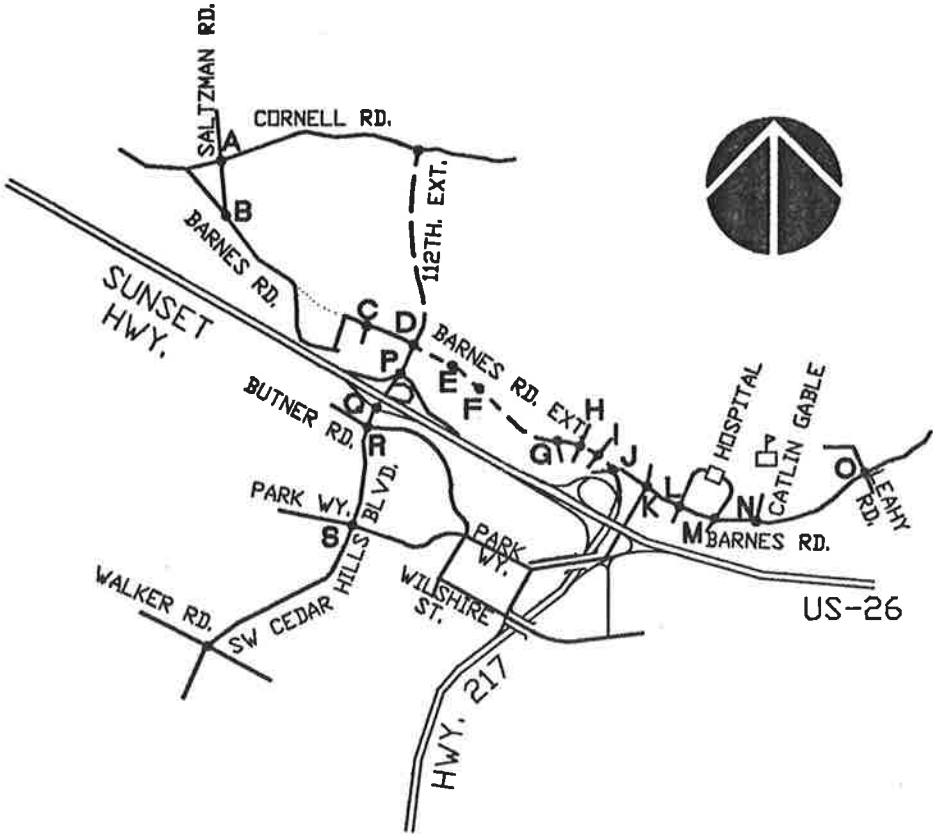
Portland, Oregon 97201-0039
Phone: (503)224-9560 • FAX: (503)228-1285



MAP-2B

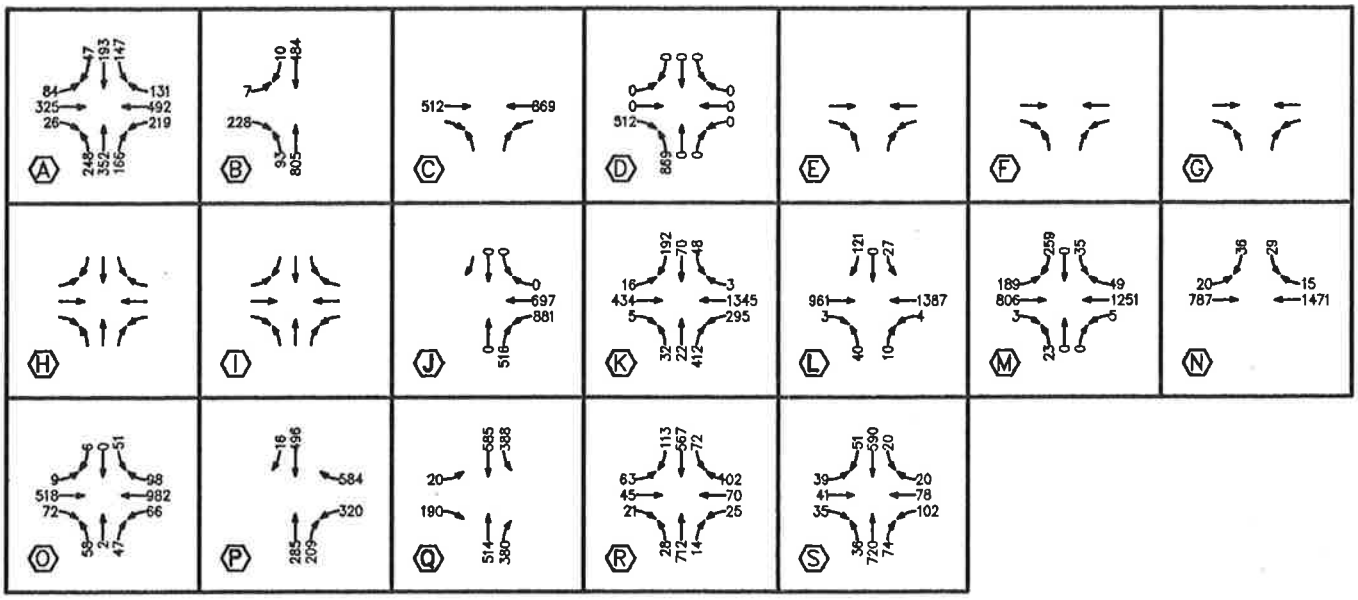


FIGURE 3P1

EXISTING TRAFFIC
PM PEAK HOUR

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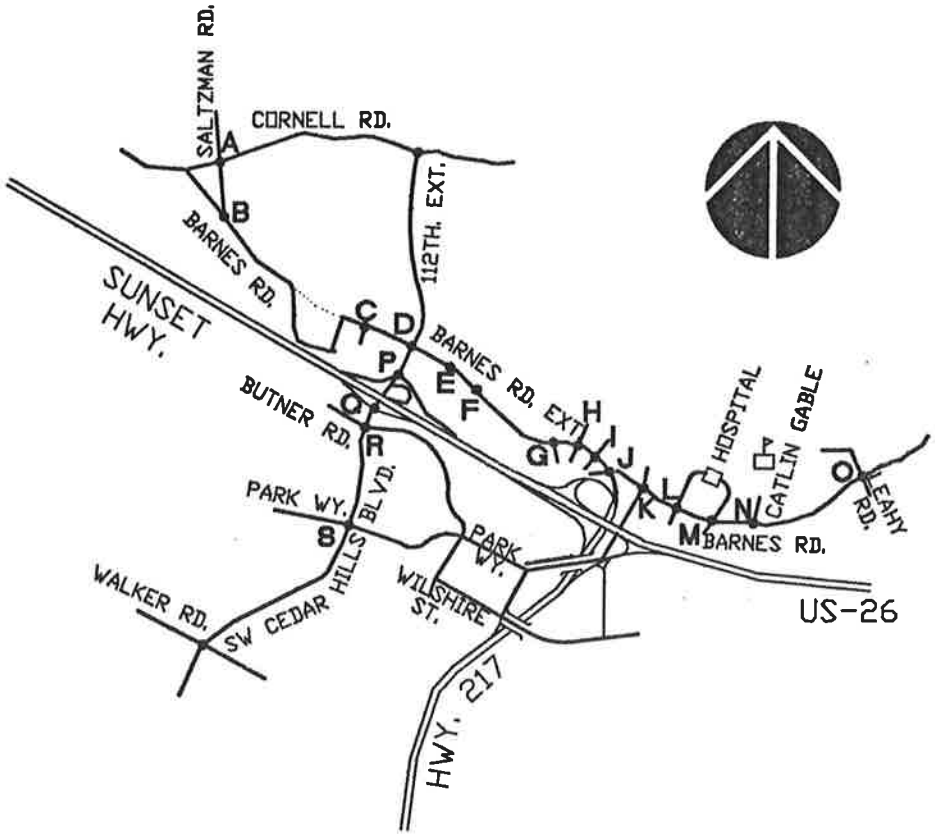

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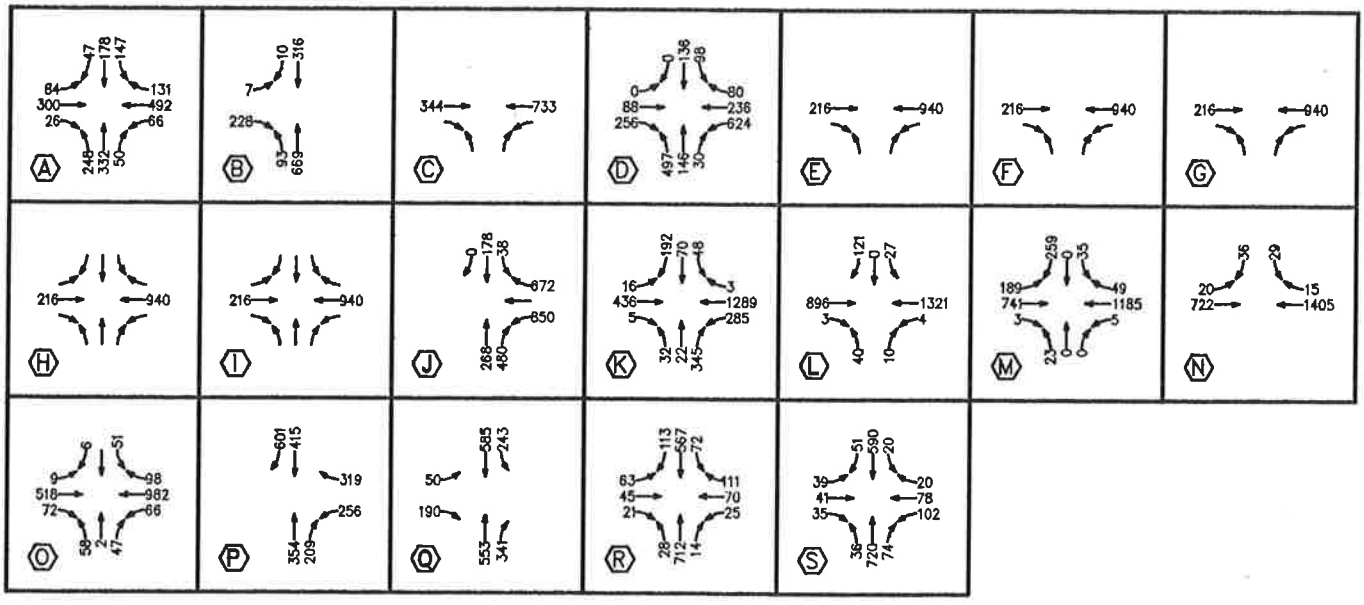

FIGURE 3P2

EXISTING TRAFFIC - PM PEAK HOUR REASSIGNED TO 1995 ROADS

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Portland, Oregon 97201-0039
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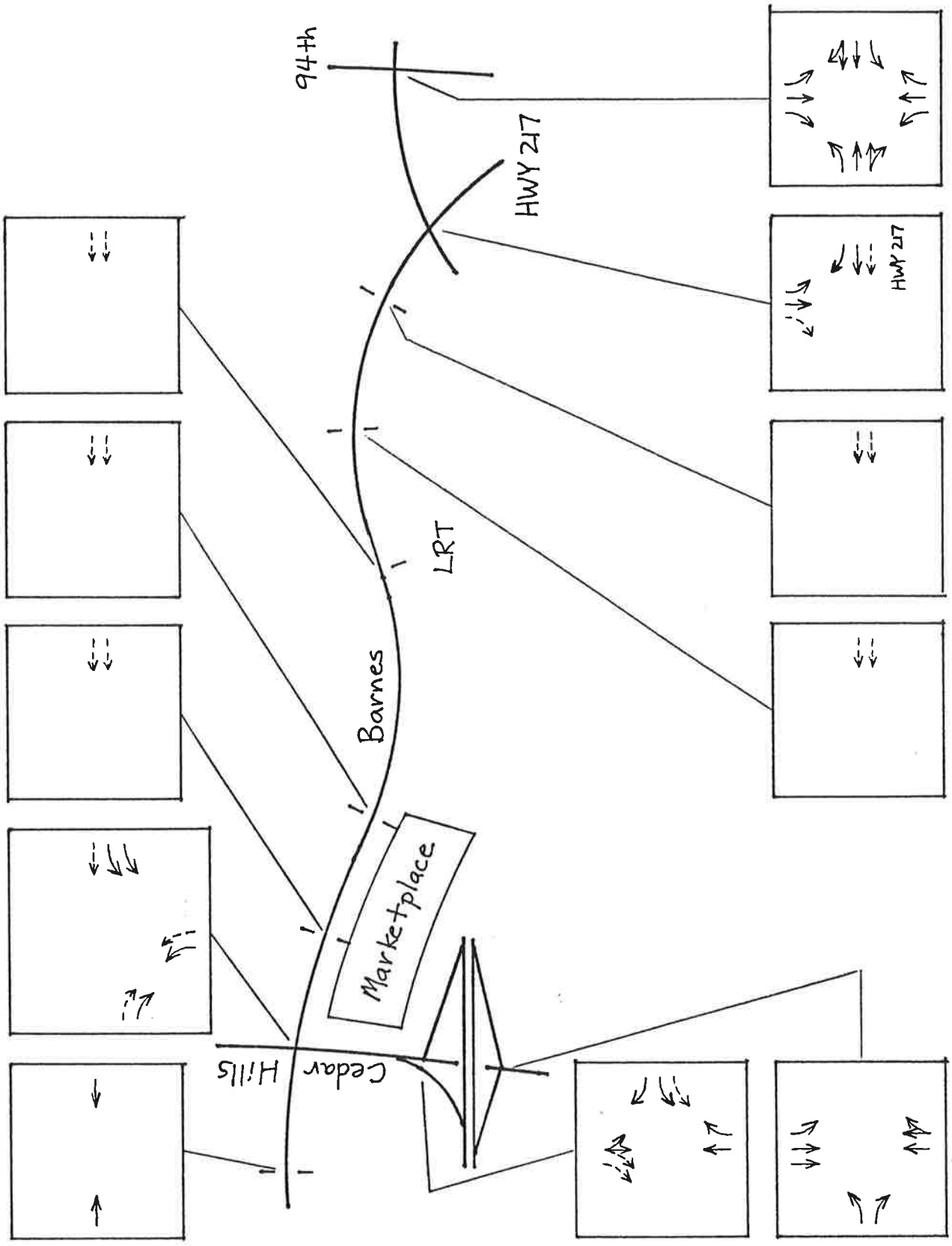

INTERSECTION CONFIGURATIONS 1993

FIGURE 4A

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with development of the Town Center retail complex and the beginning of two-way traffic flow on the Barnes Extension.

FUTURE ROADWAY CONDITIONS:
Determination of future roadway lane requirements is a goal of this analysis. County and ODOT planning and analysis completed to date indicate the expectation that the Barnes Extension would operate for a period of time as a 3-lane roadway with development of a 5-lane section when necessary. This study endeavors to determine when the 3 and 5-lane improvements will be necessary as a function of expanding background traffic and site generated traffic.

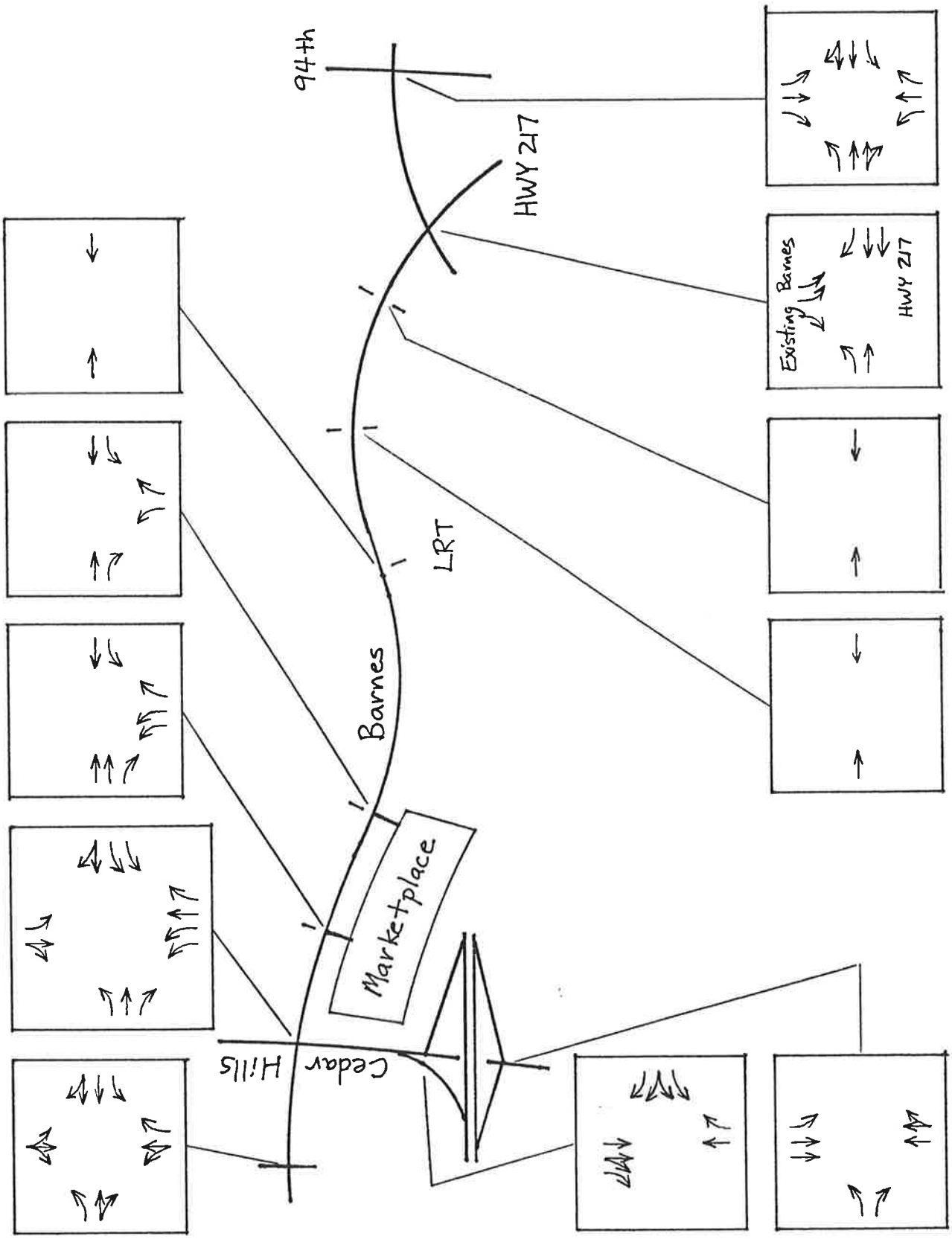
ODOT's construction involvement in the area relates to construction of highway improvements relating to the LRT project and the Cedar Hills Blvd. north interchange construction (which is nearing completion). In addition to the detouring of Hwy 217 traffic discussed above, they may also have a short-term detour in effect while they extend the tunnel for Barnes Road traffic travelling southbound to Hwy 217.

Figure 4B illustrates road and lane configurations for 1995 conditions, including development of the Town Center Retail complex. At the direction of County Staff, this analysis assumes extension of Cedar Hills Blvd. to Cornell Road by 1995.

Figure 4C depicts the required intersection lane configurations for 1998 conditions. This assumes development of two new accesses to serve the office-commercial site adjacent to the LRT station, and construction of the access for the LRT station. Also assumed by 1998 is development of north approaches to the intersections serving the Town Center Retail complex. These accesses will be required to serve anticipated office-commercial development north of the Barnes Road Extension.

Figure 4D illustrates the road and lane configurations for the 2005 design year. This graphic reflects anticipated access needs to serve the office-commercial site located between St. Vincent's Hospital and the Barnes Road Extension.

Figure 4E presents the lane configurations required for 2010 design year traffic projections. Access is assumed to development of office-commercial space north of the Barnes Extension. Attention is directed to the detail illustrating lane requirements at the Barnes Rd. - Cedar Hills Blvd. intersection. To maintain a D/E level of service, triple left turn lanes westbound to southbound will be required in addition to construction of a fifth northbound lane. The need to serve westbound Barnes Road traffic generating from east of Hwy 217 is the critical element necessitating the triple left turn lanes and northbound right turn lane. Barnes Road traffic originating east of Hwy 217 travelling to US 26 westbound is in excess of 600 vehicles in the PM peak hour. **Figure 4F** illustrates the lane requirements with construction of an onramp to US 26 westbound at Hwy 217.



INTERSECTION CONFIGURATIONS 1995

FIGURE 4B

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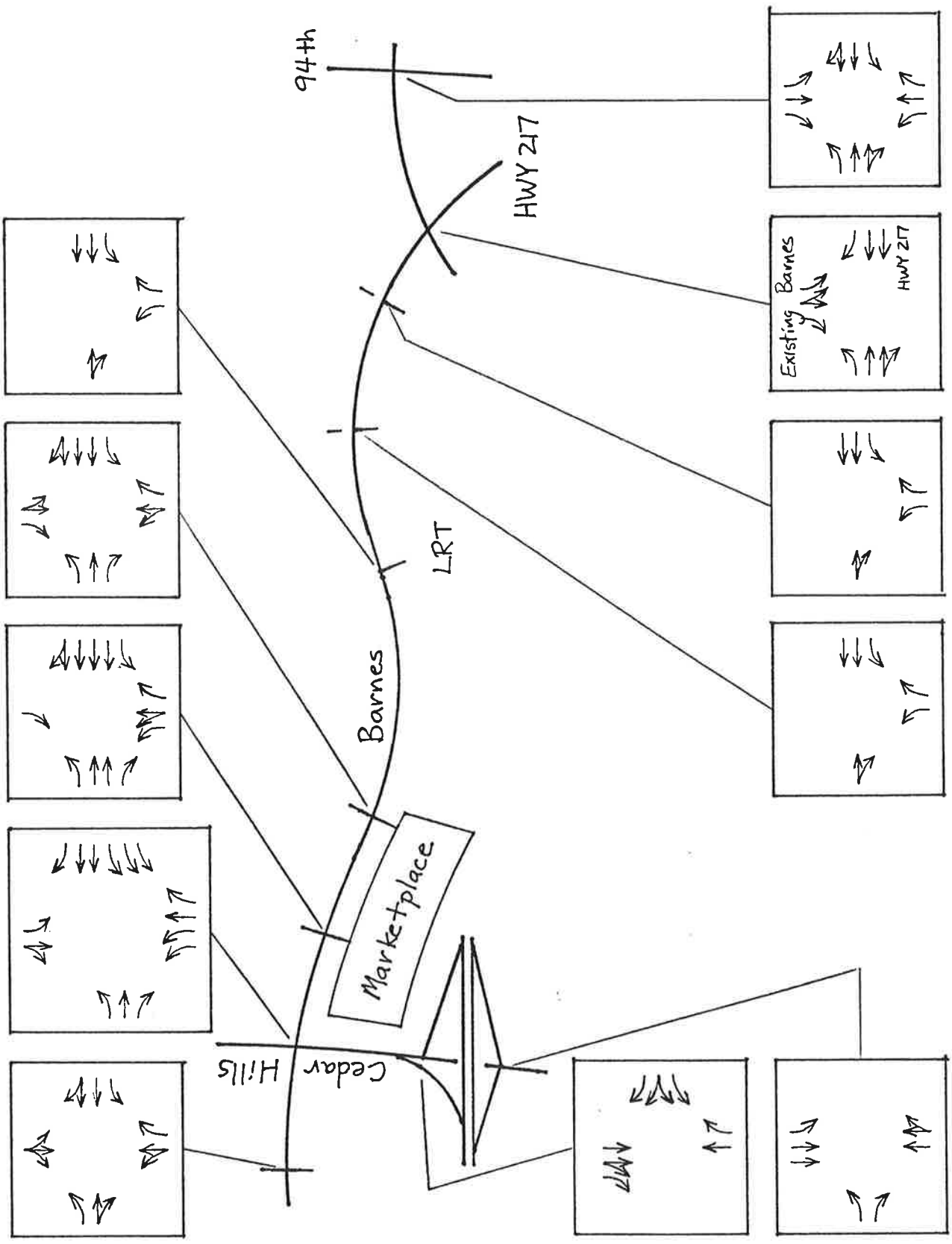

INTERSECTION CONFIGURATIONS 1998

FIGURE 4C

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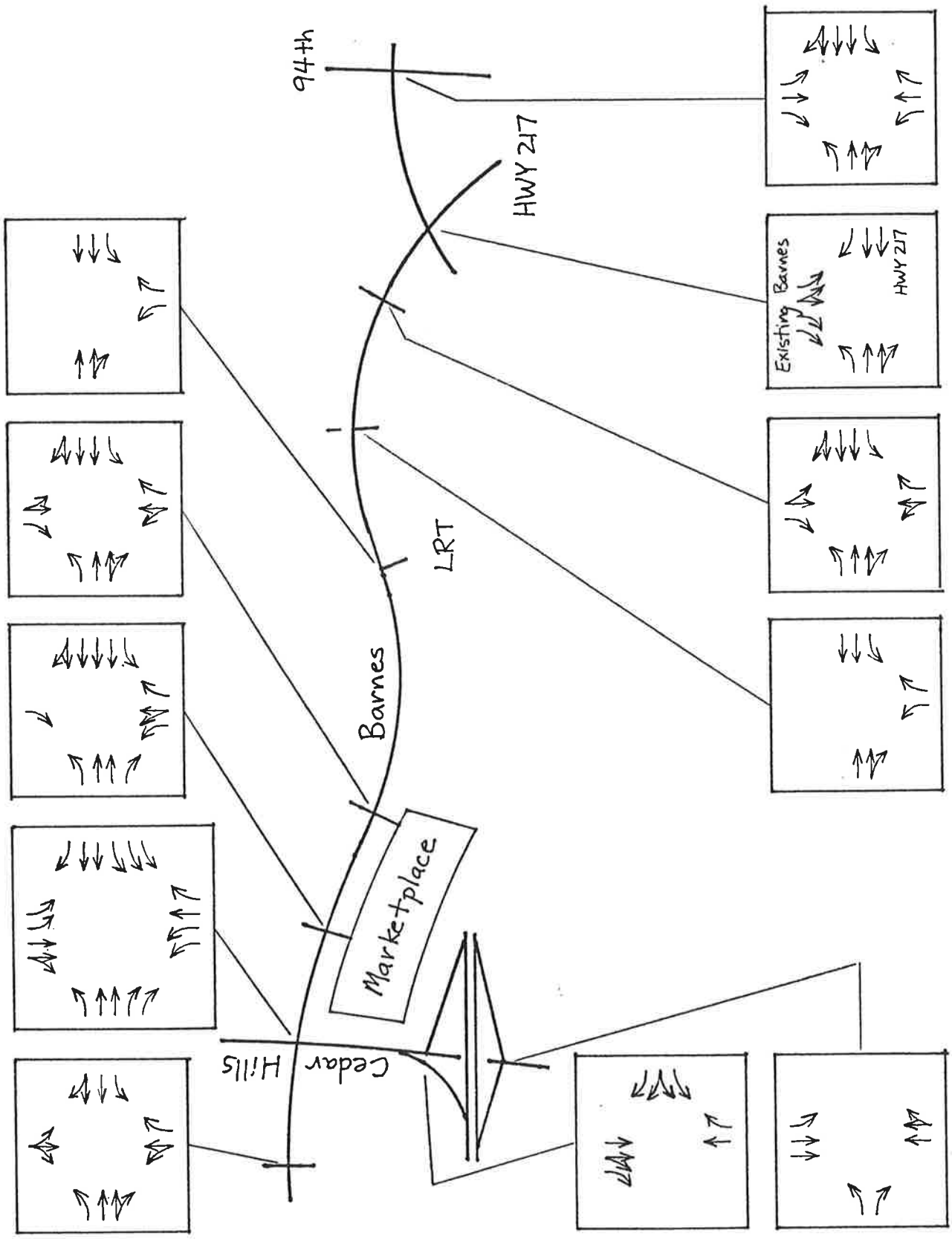

INTERSECTION CONFIGURATIONS 2005

FIGURE 4D

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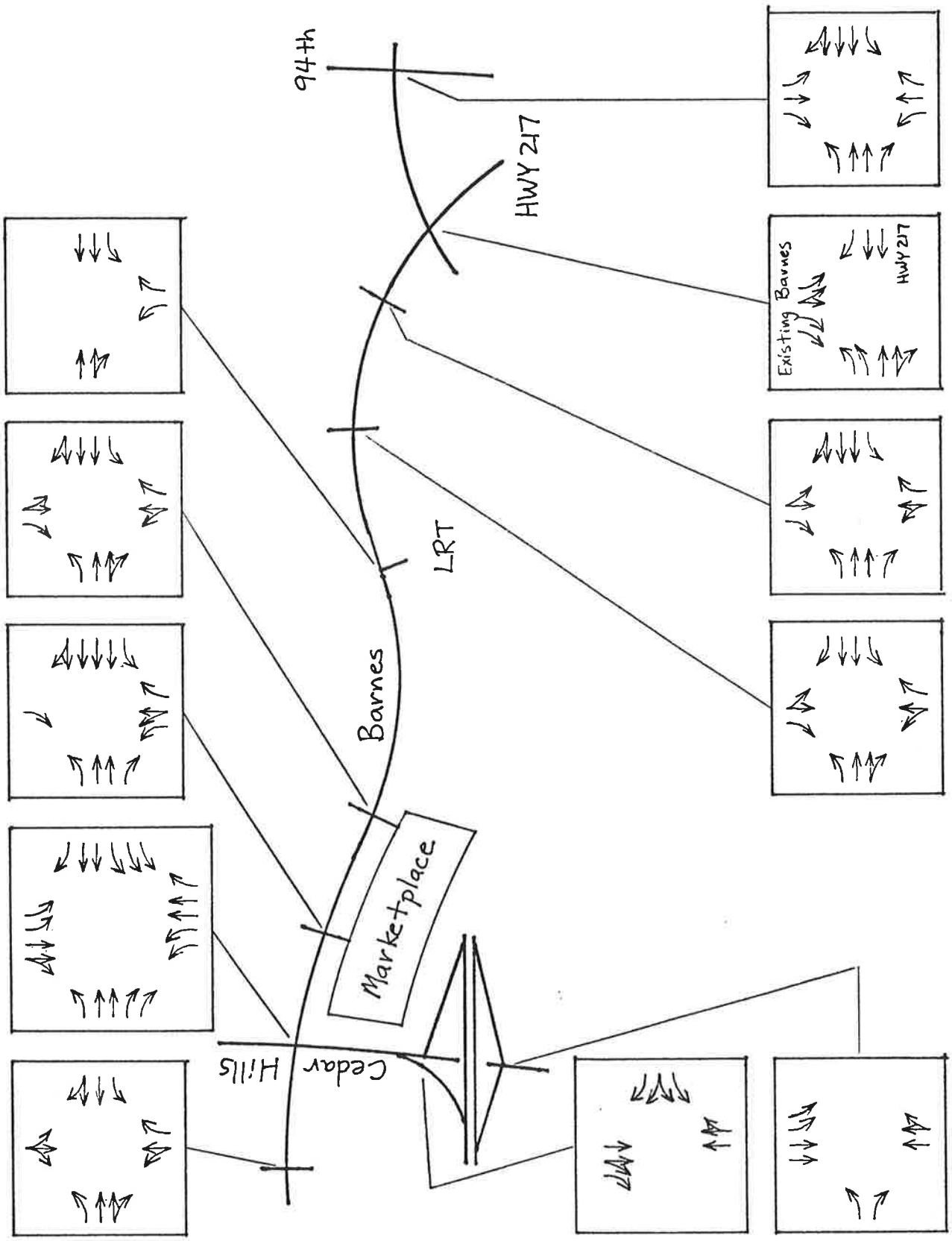

INTERSECTION CONFIGURATIONS 2010

FIGURE 4E

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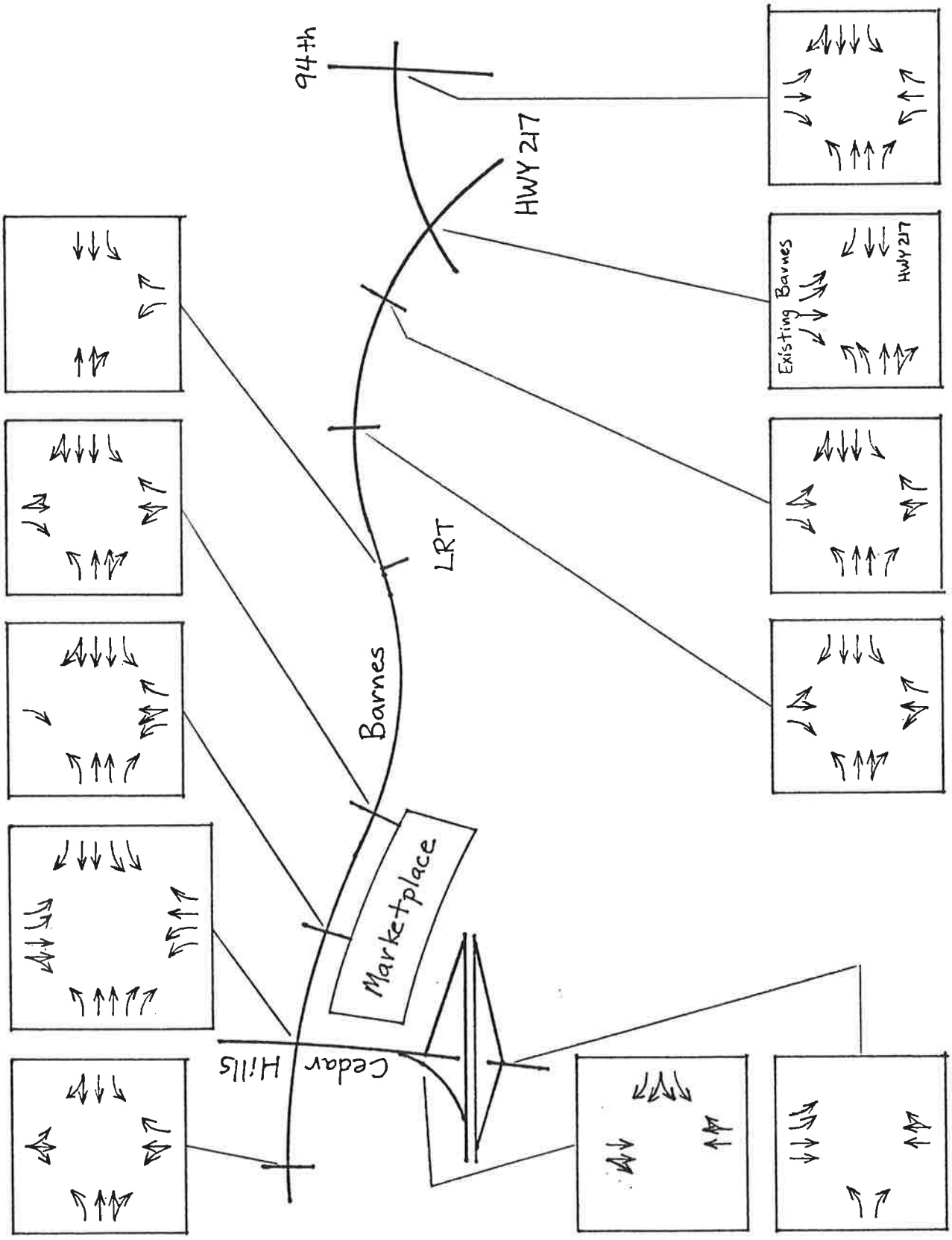

INTERSECTION CONFIGURATIONS 2010

FIGURE 4F RECOMMENDED REVISION

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A future improvement planned by ODOT will involve widening of US 26 and construction of weave ramps on the highway to eliminate the westbound merge area between Hwy 217 and Cedar Hills Blvd. The weave ramps are currently scheduled for construction in 1998 at which time ODOT may allow reconstruction of the Barnes Road onramp to US 26 westbound from the north end of Hwy 217. This study indicates the significant negative effects which will occur over time by continuing to route all Barnes Road traffic from east of Hwy 217 through the Barnes Extension to access US 26 at Cedar Hills Blvd. Without construction of a replacement onramp, left turns from Barnes Road westbound to US 26 and Cedar Hills Blvd. southbound will require triple left turn lanes to maintain an intersection volume/capacity ratio of 0.95 and marginally acceptable level of service, even without full buildout of Peterkort office-commercial space.

Meetings with ODOT road design engineers indicated that they may be willing to consider this type of improvement after completion of the weave ramps. Until the weave ramps are completed, the additional Barnes Road volume would exceed weaving capacity on US 26 from Hwy 217 to Cedar Hills Blvd.

This analysis includes a fundamental assumption that traffic flow on both US 26 and Hwy 217 are maintained in such a manner that traffic entering onto the highways from surface streets and ramps can operate without downstream impedance.

FUTURE TRAFFIC CONDITIONS:

Determination of future traffic volumes is based upon redistribution of existing traffic volumes, inflation of existing traffic volumes based upon information gleaned from the County EMME2 model (reflecting growth of pass-thru traffic), and the addition of traffic generated by Peterkort and surrounding site developments.

Comparisons have been made against volume projections made in separate County studies and studies prepared by ODOT for their current construction projects. Meetings with County, ODOT, and Tri-Met staffs resulted in a general concurrence with the analysis methods employed in this study for determining traffic volumes and assignments of redistributed traffic.

IV. DEVELOPMENT POTENTIAL

Figure 5 presents the Development Matrix which summarizes the estimated development projects, project phasing/timing, and roadway improvements timing used in this analysis. The Matrix was prepared at the initial stages of this analysis in order that timing and development/road projects could be reviewed and concurred with by the development team and review agencies. The Matrix references both Peterkort site development assumptions and assumptions made regarding offsite development. **Figure 5A** provides a map illustrating the location of each of the developments listed in the Matrix.

PETERKORT PROPERTIES:
Development of the Peterkort Town Center was initially assumed to include a traditional mix of retail uses including fast food restaurants. Since initiation of this study, the design has changed to exclude these uses, but for the purposes of the traffic analysis they are retained to create "Worst Case" conditions.

The balance of Peterkort property is assumed for development consistent with current zoning. This will result in a mix of retail, office-commercial, and residential uses. The development team has established the estimated development scenario for the 1995, 1998, 2005, and 2010 design years as shown on the Development Matrix. Following is a summary of "Worst Case" full buildout development density utilized in this study for Peterkort properties:

Town Center Retail	
Anchors	115,000 s.f.
Fast Food (Drive-Thru)	3,000 s.f.
Fast Food (Drive-Thru)	3,000 s.f.
Bank (With Drive-Thru)	3,000 s.f.
Video Store	8,000 s.f.
In-Line Retail Shops	20,500 s.f.
Office-Commercial	
Main Site (Site I)	1,000,000 s.f.
East Site (Site II)	590,000 s.f.
North Site (Site III)	100,000 s.f.
North Office-Commercial	260,000 s.f.
Residential	1,250 units

Figure 5A illustrates the location of the four office-commercial sites. Residential development would be accessed from the Cedar Hills Blvd. extension, north of Johnson Creek.

Future development of Peterkort properties will be in response to market conditions. It is again noted that this study addresses master planning information, but its specific purpose at this time is limited to support of the development application for the Town Center Retail complex.

DEVELOPMENT MATRIX INDEX MAP

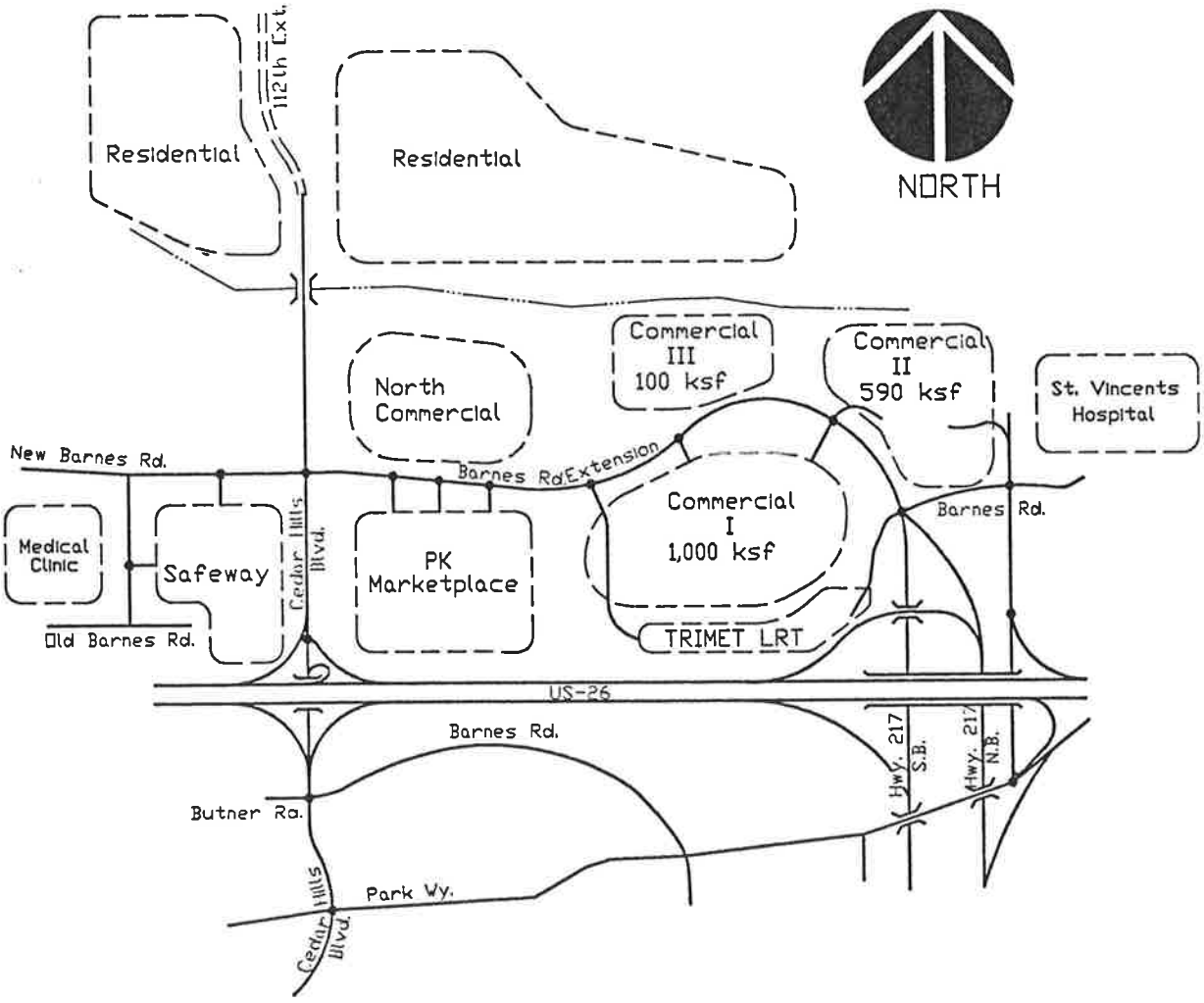
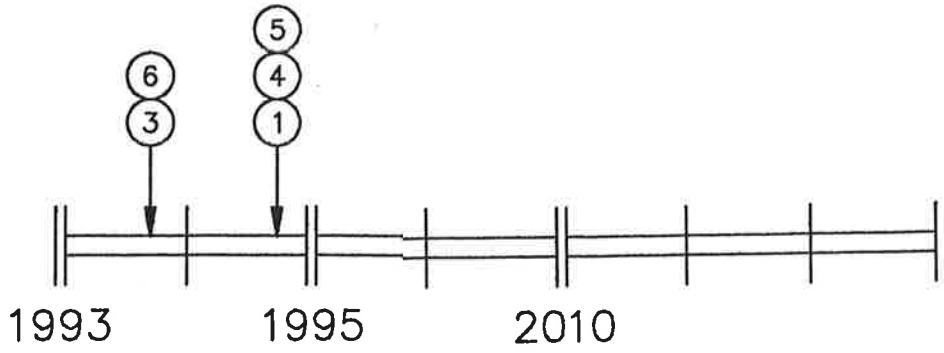


FIGURE 5A



1993: DEVELOPMENT STATUS

Marketplace Design
Development Approvals

1995: TUS

Market	KSF
Fast	KSF
Fast	KSF
Bank	KSF
Vide	KSF
Inlin	KSF
Westsic	KSF
Medica	FDU
	KSF
	KSF
	KSF
	KSF
	KSF

2010: DEVELOPMENT STATUS

Marketplace Phase I–II	115 KSF
Fast Food (Drive–Thru)	3 KSF
Fast Food (Drive–Thru)	3 KSF
Bank (Drive–Thru)	3 KSF
Video Store	8 KSF
Inline Retail Shops	20.5 KSF
Westside Retail	105 KSF
Residential[1]	1250 SFDU
Commercial Site I	450 KSF[2]
Commercial Site II	400 KSF[3]
Commercial Site III	100 KSF[4]
North Commercial Site	260 KSF
Tri–Met LRT Station	
Medical Office	25 KSF

1995:

2010: SYSTEM STATUS

(1)	BARNE 2–la 2–w	BARNES ROAD: 5–lane 2–way traffic
(2)	CEDAR No B	CEDAR HILLS INTERCHANGE: Braid ramp completed
(3)	112th / Exter	112th AVENUE: Extended to Cornell Road
(4)	HWY 21 Ramp	HWY 217 NB TO US26 WB: Ramp completed
(5)	BARNE Tunn	BARNES ROAD TO HWY 217 SB: Tunnel completed
(6)	BARNE Via E C	BARNES ROAD TO US26 WB: Via Barnes Road / Cedar Hills Blvd.

1. Residential development est. 1250
2. Commercial Site I Buildout est. 1
3. Commercial Site II Buildout est. 5
4. Commercial Site III Buildout est. 1

PETERKORT MARKETPLACE
TRAFFIC IMPACT ANALYSIS
MEI PROJECT NO. 293222

STAGES 11/01/93 16:06 1:1.00

ADJACENT PROPERTIES:
In addition to development of Peterkort properties, this study also addresses development of surrounding properties based upon information received from Washington County staff. Projects include development of a 25,000 square foot medical clinic west of Cedar Hills Blvd. on Barnes Road, development of a 105,000 square foot retail shopping center south of Barnes Road adjacent to Cedar Hills Blvd., construction of the Light Rail Transit station, and completion of the St. Vincent's Hospital addition which is currently under way. The location of these developments is illustrated in **Figure 5A**.

TOWN CENTER DEVELOPMENT:

The proposed Peterkort Town Center development is shown on the site plans presented as **Figure 2A** and **Figure 2B**. Site development assumed in this analysis consists of the following uses:

Town Center Retail	
Anchors	115,000 s.f.
Fast Food (Drive-Thru)	3,000 s.f.
Fast Food (Drive-Thru)	3,000 s.f.
Bank (With Drive-Thru)	3,000 s.f.
Video Store	8,000 s.f.
In-Line Retail Shops	20,500 s.f.

Delivery trucks will be served at the east access for ingress and the main access for egress. It is expected that the complex will be constructed in two phases with all but 8,000 square feet of in-line retail shops completed for the initial project' opening.

Current site development plans shown on Figure 2A and Figure 2B address two options, both of which eliminate the high-turnover restaurant pads that were assumed in this analysis. Following is a summary of the two current development scenarios.

Use:	**Scenario A**	**Scenario B**
Anchors	**114,000 s.f.**	**69,400 s.f.**
Home Improvement	**0 s.f.**	**59,887 s.f.**
Quality Sit-Down Restaurant	**5,000 s.f.**	**5,000 s.f.**
Bank (With Drive-Thru)	**3,300 s.f.**	**3,300 s.f.**
Bank (With Drive-Thru)	**3,000 s.f.**	**3,000 s.f.**
Video Store	**7,000 s.f.**	**7,000 s.f.**
In-Line Retail Shops	**28,120 s.f.**	**28,120 s.f.**

BACKGROUND GROWTH:
Background traffic growth represents traffic increases caused by development of properties outside of the study area. Depending upon the location of these developments, generated traffic may route through the arterial roadways within the study area.

To assess this element of traffic growth, MEI worked with County staff and METRO staff to utilize the EMME2 traffic model. Analysis was made of model generated traffic volumes for 1985 and 2010 conditions including modeling of all Peterkort properties as undeveloped in 2010 to avoid duplication of development generated traffic. Exponential growth rates were calculated for individual road segments and specific turning movements. This increase in traffic has been combined with existing redistributed traffic volumes and site generated traffic.

TRIP GENERATION ANALYSIS:
Trip generation calculations were prepared utilizing the Fifth Edition Trip Generation Manual, published by the Institute of Transportation Engineers. This publication contains a summary of traffic surveys taken across the country for a range of land uses. Surveys correlate traffic generation for each land use against variables such as number of employees, parking spaces, number of dwelling units, and building area.

Following is a listing of ITE Land Use Codes and descriptions utilized to estimate Town Center and other developments' traffic:

Town Center:

ITE Code 820	Shopping Center
ITE Code 834	Fast Food Restaurant (With Drive-Thru)
ITE Code 912	Bank (With Drive-Thru)
MEI Survey	Video Store

Offsite:

Tri-Met	Tri-Met Light Rail Station
ITE Code 720	Medical Office
ITE Code 710	Office-Commercial Developments
Buttke Study	St. Vincent's Hospital Expansion
ITE Code 210	Residential Single Family Dwelling Units

Trip generation projections for Average Weekday Daily Traffic, AM Peak Hour, and PM Peak Hour are all summarized on the following tables:

Table 1 - 1995 Trip Generation
Table 2 - 1998 Trip Generation
Table 3 - 2005 Trip Generation
Table 4 - 2010 Trip Generation
Table 5 - 2010 Trip Generation (Office-Commercial Buildout)

For retail and fast food restaurant land uses, a large component of the clientele is diverted from existing traffic already passing by the site. Traffic generated by these types of projects is comprised of either Primary Trips, Diverted-Link Trips, or Pass-By Trips.

Primary trips are vehicle trips made by clientele who create a trip to the store or restaurant because of the goods or services provided by that particular facility. These consumers would not be making a retail-only destined vehicular trip were it not for the development of these particular retail establishments.

TABLE 1

Peterkort Traffic Trip Generation
1995

9-24-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	127.5	8226	118	69	383	383	
Fast Food w/drive	834	6	3793	170	163	114	105	
Bank w/drive	912	3	896	16	13	63	68	
Video Store	*	8	1700	0	0	71	71	
Total		144.5	14615	304	245	631	627	
Marketplace New Trips								
Retail			4936	71	41	230	230	60
Fast Food w/drive			2086	94	90	63	58	55
Bank w/drive			672	12	10	47	51	75
Video Store			1275	0	0	53	53	75
Total			8969	177	141	393	392	
Westside Retail	820	62	5242	77	45	242	242	
New trips			3145	46	27	145	145	60
Residential	210	0	0	0	0	0	0	
Commercial Office								
Site I	710	0	0	0	0	0	0	
Site II	710	0	0	0	0	0	0	
Site III	710	0	0	0	0	0	0	
Commercial Total	710	0	0	0	0	0	0	
North Comm. Office	710	0	0	0	0	0	0	
Tri-Met LRT	*	*	0	0	0	0	0	
Medical Office	720	25	713	62	33	29	68	
TOTAL	*	*	20570	443	323	902	937	
TOTAL NEW TRIPS			12827	285	201	567	605	

TABLE 2

Peterkort Traffic Trip Generation
1998

9-24-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	135.5	8545	122	72	398	398	
Fast Food w/drive	834	6	3793	170	163	114	105	
Bank w/drive	912	3	896	16	13	63	68	
Video Store	*	8	1700	0	0	71	71	
Total		152.5	14934	308	248	646	642	
Marketplace New Trips								
Retail			5127	73	43	239	239	60
Fast Food w/drive			2086	94	90	63	58	55
Bank w/drive			672	12	10	47	51	75
Video Store			1275	0	0	53	53	75
Total			9160	179	143	402	401	
Westside Retail	820	105	7286	105	62	338	338	
New trips			4372	63	37	203	203	60
Residential	210	420	3870	73	207	256	138	
Commercial Office								
Site I	710	350	3618	450	56	80	388	
Site II	710	0	0	0	0	0	0	
Site III	710	0	0	0	0	0	0	
Commercial Subtotal	710	350	3618	450	56	80	388	
Commercial Total			3075	383	48	68	330	
North Comm. Office	710	200	2370	291	36	53	257	
Tri-Met LRT	*	*	3123	310	84	50	344	
Medical Office	720	25	713	62	33	29	68	
TOTAL	*	*	35914	1599	726	1452	2175	
TOTAL NEW TRIPS			27226	1428	596	1073	1799	

TABLE 3

Peterkort Traffic Trip Generation
2005

9-24-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	135.5	8545	122	72	398	398	
Fast Food w/drive	834	6	3793	170	163	114	105	
Bank w/drive	912	3	896	16	13	63	68	
Video Store	*	8	1700	0	0	71	71	
Total		152.5	14934	308	248	646	642	
Marketplace New Trips								
Retail			5127	73	43	239	239	60
Fast Food w/drive			2086	94	90	63	58	55
Bank w/drive			672	12	10	47	51	75
Video Store			1275	0	0	53	53	75
Total			9160	179	143	402	401	
Westside Retail	820	105	7286	105	62	338	338	
New trips			4372	63	37	203	203	60
Residential	210	840	7328	133	378	479	258	
Commercial Office								
Site I	710	350	3111	392	48	68	330	
Site II	710	300	2666	336	42	58	283	
Site III	710	0	0	0	0	0	0	
Commercial Subtotal	710	650	5777	728	90	126	613	
Commercial Total			4910	619	77	107	521	
North Comm. Office	710	260	2890	357	44	64	312	
Tri-Met LRT	*	*	3123	310	84	50	344	
Medical Office	720	25	713	62	33	29	68	
TOTAL	*	*	42051	2003	939	1732	2575	
TOTAL NEW TRIPS			33363	1832	809	1353	2199	

TABLE 4

Peterkort Traffic Trip Generation
2010

9-24-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	135.5	8545	122	72	398	398	
Fast Food w/drive	834	6	3793	170	163	114	105	
Bank w/drive	912	3	896	16	13	63	68	
Video Store	*	8	1700	0	0	71	71	
Total		152.5	14934	308	248	646	642	
Marketplace New Trips								
Retail			5127	73	43	239	239	60
Fast Food w/drive			2086	94	90	63	58	55
Bank w/drive			672	12	10	47	51	75
Video Store			1275	0	0	53	53	75
Total			9160	179	143	402	401	
Westside Retail	820	105	7286	105	62	338	338	
New trips			4372	63	37	203	203	60
Residential	210	1250	10568	187	533	685	369	
Commercial Office								
Site I	710	450	3645	463	57	79	384	
Site II	710	400	3240	411	51	70	341	
Site III	710	100	810	103	13	17	85	
Commercial Subtotal	710	950	7696	977	121	166	811	
Commercial Total			6542	830	103	141	689	
North Comm. Office	710	260	2890	357	44	64	312	
Tri-Met LRT	*	*	3123	310	84	50	344	
Medical Office	720	25	713	62	33	29	68	
TOTAL	*	*	47210	2306	1125	1978	2884	
TOTAL NEW TRIPS			38522	2135	995	1599	2508	

TABLE 5

Peterkort Traffic Trip Generation
Full Buildout of Commercial Sites

9-24-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	135.5	8545	122	72	398	398	
Fast Food w/drive	834	6	3793	170	163	114	105	
Bank w/drive	912	3	896	16	13	63	68	
Video Store	*	8	1700	0	0	71	71	
Total		152.5	14934	308	248	646	642	
Marketplace New Trips								
Retail			5127	73	43	239	239	60
Fast Food w/drive			2086	94	90	63	58	55
Bank w/drive			672	12	10	47	51	75
Video Store			1275	0	0	53	53	75
Total			9160	179	143	402	401	
Westside Retail	820	105	7286	105	62	338	338	
New trips			4372	63	37	203	203	60
Residential	210	1250	10568	187	533	685	369	
Commercial Office								
Site I	710	1000	7039	905	112	150	733	
Site II	710	590	4153	534	66	89	433	
Site III	710	100	704	90	11	15	73	
Commercial Subtotal	710	1690	11896	1529	189	254	1239	
Commercial Total			10112	1300	161	216	1053	
North Comm. Office	710	260	2890	357	44	64	312	
Tri-Met LRT	*	*	3123	310	84	50	344	
Medical Office	720	25	713	62	33	29	68	
TOTAL	*	*	51410	2858	1193	2066	3312	
TOTAL NEW TRIPS			42722	2687	1063	1687	2936	

Pass-By trips are created when motorists are travelling past the site as an element of a separate origin to destination trip. This may be a work to home trip or it may be a home to retail trip where this store creates either a new retail stop en route or replaces an existing retail destination. Pass-By trips are considered as traffic diverted from an adjacent roadway such as Barnes Road and Cedar Hills Blvd. This results in a reallocation of existing traffic to other intersection turning movements. The full impact of the site generated traffic volume is felt at the site accesses.

Diverted-Link trips are similar in description to Pass-By trips except that they must utilize a separate roadway link to access the site.

Table 6 summarizes the estimates of percentage Pass-By, Primary, and Diverted-Link trips for the various land uses addressed in this study.

Commercial-Office generated trips for the three areas adjacent to the Light Rail Transit Station assume a reduction of 15% for pedestrian, bicycle, and transit utilization. This reduction in vehicular trips was agreed upon by representatives of MEI, County, ODOT, and TriMet during meetings held in the Spring of 1993.

Table 6A and Table 6B summarize Town Center trip generation for current site development scenarios A and B, respectively. Daily traffic and PM peak hour total traffic will be comparable and slightly less than the "Worst Case" scenario on which this analysis is based. AM peak hour traffic will be considerably less than previously assumed. PM peak hour conditions controlled the roadway design considerations, thus the AM discrepancy is not critical to the findings of this report.

TABLE 6

Peterkort Traffic

Percent Pass-by and Diverted Link Trips		
Land Use	Primary Trips	Pass-by/D.L. Trips
Retail	60	40
Fast Food	55	45
Bank/Video	75	25
Commercial Office	100	0
Residential	100	0
LRT Center	100	0

TABLE 6A

Peterkort Traffic Trip Generation
Revised Development Option A

10-26-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	145.5	8934	128	75	417	417	
Quality Rest.	831	5	498	4	0	27	11	
Bank w/drive	912	6.3	1360	29	23	132	143	
Video Store	*	7	1488	0	0	62	62	
Total		163.8	12280	161	98	638	633	
Marketplace New Trips								
Retail			5360	77	45	250	250	60
Quality Rest.			448	4	0	24	10	90
Bank w/drive			1020	22	17	99	107	75
Video Store			1116	0	0	47	47	75
Total			7944	103	62	420	414	

TABLE 6B

Peterkort Traffic Trip Generation
Revised Development Option B

10-26-93	ITE Code	KSF/D	ADT	AM Enter	AM Exit	PM Enter	PM Exit	% New Trips
Marketplace								
Retail	820	100.5	7089	103	60	329	329	
Quality Rest.	831	5	498	4	0	27	11	
Bank w/drive	912	6.3	1360	29	23	132	143	
Video Store	*	7	1488	0	0	62	62	
Home Imp. Anchor	812	59.9	1836	78	39	88	100	
Total		118.8	10435	136	83	550	545	
Marketplace New Trips								
Retail			4253	62	36	197	197	60
Quality Rest.			448	4	0	24	10	90
Bank w/drive			1020	22	17	99	107	75
Video Store			1116	0	0	47	47	75
Home Imp. Anchor			1652	70	35	79	90	90
Total			6837	88	53	367	361	

V. TRIP DISTRIBUTION AND ASSIGNMENT

DISTRIBUTION ASSUMPTIONS:
Trip Distribution assumptions for this analysis were taken from previous traffic reports and METRO models. All distributions assume completion of both the Barnes Extension and the extension of Cedar Hills Blvd. north to Cornell Road. **Figure 6A-6O** illustrate trip distributions used in the analysis.

Retail Distribution:
Retail trip distributions were estimated based on METRO models and the Vehicular Access Report for the proposed shopping center at the southwest corner of Barnes Road and Cedar Hills Blvd. METRO Planning and Development ran selected zone assignments for two zones near the Peterkort Property . The zones used for retail distribution estimates include the Cedar Hills Shopping Center and the retail areas in the vicinity of Murray and Cornell Roads.

Trip distributions for the Bank/Video and Fast Food restaurants are based upon the retail distribution with minor changes made to account for each use's unique market area.

Commercial (Office) Distribution:
Trip distributions utilized for the Commercial sites are taken from a concurrently prepared traffic analysis involving MEI and TriMet staffs, prepared in early 1993 for the Transit Station.

Residential Distribution:
Residential trip distributions were determined in the same manner as retail distributions by utilizing METRO select zone assignments for an exclusively residential area near Cornell and Leahy Roads.

Light Rail Transit Station Distribution:
Light Rail Transit Station trip distribution was provided by TriMet's traffic engineer. The distribution includes both park and ride users and TriMet busses.

Medical Clinic Distribution:
The medical clinic trip distributions are assumed to be the same as the commercial office distributions.

Hospital Distribution:
Trip distributions for the St. Vincent Hospital expansion were taken from the Vehicular Access and Parking Needs for the St. Vincent Hospital and Medical Center prepared by Carl Buttke, Inc. in 1990. The report included trip assignments at the new access at 94th Street as well as at the intersection of Barnes Road at the Highway 217 ramps for the year 2005. A redistribution of existing Hospital traffic to the new access was also included. The distribution in the report assumes the Barnes Extension completed and the continued operation of the on ramp to Highway 26 westbound from Barnes Road at Highway 217.

At the time traffic counts were conducted by MEI staff, the new access at 94th Street was in full operation, but the new Hospital Expansion was not completed. Therefore, existing hospital traffic was not redistributed for this analysis. Only traffic generated by the Hospital Expansion was added at 94th Street.

TRIP ASSIGNMENTS:

Trip assignments were calculated utilizing L-TASS software. The L-TASS software is a traffic assignment spreadsheet system created by the Transportech Corporation. Data is input into the spreadsheets for trip generation and distribution for each land us as well as existing volumes and growth rates. The software then determines total trip assignments for all land uses by multiplying each land use's trip generation by the distribution. Trip assignments are added to the adjusted volumes to obtain the combined traffic volumes. L-TASS printouts are included in the appendix.

VI. INTERSECTION CAPACITY ANALYSIS

Intersection capacity and level of service calculations were completed in conformance with the methods presented in the 1985 Highway Capacity Manual, Special Report 209. The analysis utilized the Operations Method of evaluating signalized intersection operation. Calculations were completed for all study area intersections in 1993 and 1995, and 2010. Analysis of 1998 and 2005 interim years was completed at specific intersections where either new accesses were created in response to developments or capacity constraints necessitated review to determine the need for additional lanes.

The concept of level of service was formulated by transportation engineers and planners to establish a consistent and concise manner for the evaluation of operational capabilities at an intersection or roadway. The system grades operation on a scale of "A" to "F" where level of service "A" indicates smooth unimpeded flow and level "F" indicates constrained and congested flow. A qualitative and quantitative description of level of service for both signalized and unsignalized intersection operations follows.

Maintaining a level of service "D" is required by County standards, typically as measured during the peak 20 minutes of daily operation. Developments which cause intersection operation to decrease below a level "D" are typically required to mitigate impacts to achieve a "D" or better level of service. In addition to the level of service criteria, signalized intersections must operate with a volume-to-capacity ratio equal to or less than 0.95 during the peak 15 minutes of average daily operation. During the peak hour of average daily operation, this ratio must be equal to or less than 90%.

DESIGN YEAR CONDITIONS:
Figures 7A1 - 7D2 illustrate the combined traffic volumes for the 1995, 1998, 2005, and 2010 design years for both AM and PM peak hours. **Figure 7D3** and **Figure 7D4** illustrate 2010 design year traffic with construction of a Barnes Road onramp to the Sunset Highway at the Hwy 217 intersection.

The following tables summarize the levels of service and volume-to-capacity ratios for study area intersections during each of the design years. Calculation results shown reflect the effects of added lanes as needed to maintain acceptable levels of service and capacity. Lane configurations necessary to achieve the levels of service shown were presented in **Figures 4A - 4F**.

Table 7 - 1993 Level of Service (Existing Conditions)
Table 8 - 1995 Level of Service (Cycle Length = 90")
Table 9 - 1998 Level of Service (Cycle Length = 120")
Table 10 - 2005 Level of Service (Cycle Length = 120")
Table 11 - 2010 Level of Service (Cycle Length = 120")

LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	STOPPED DELAY PER VEHICLE (SECONDS)
A	$\leq$ 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	$\geq$ 60.00

LEVEL OF SERVICE CRITERIA
FOR
UNSIGNALIZED INTERSECTIONS

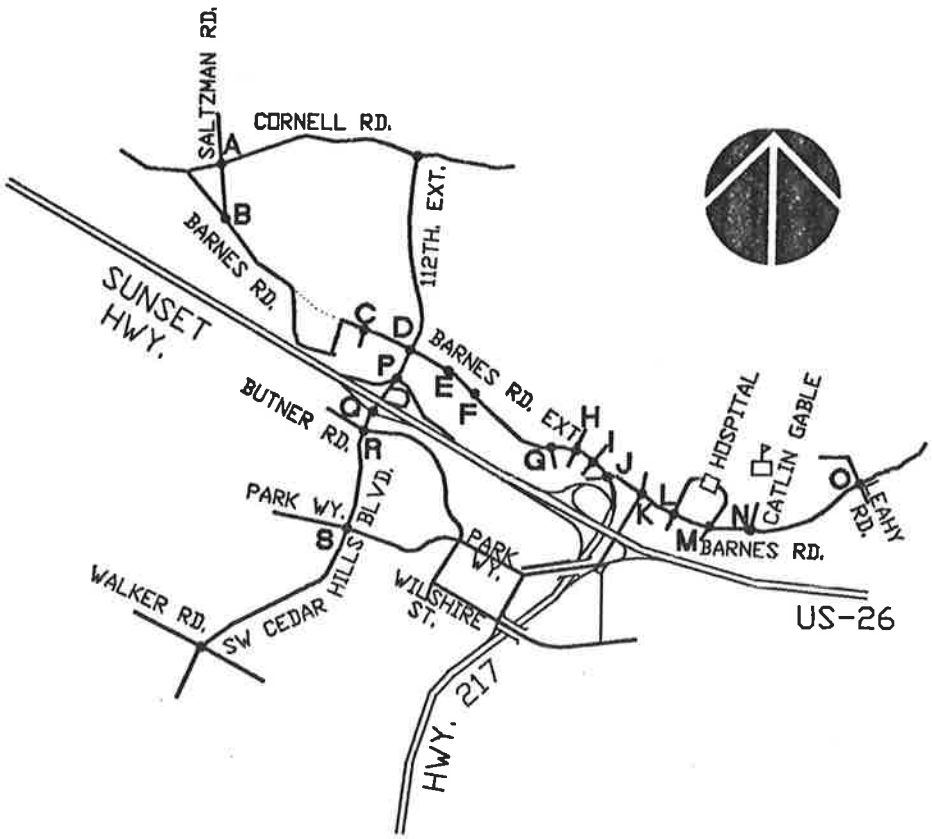
Reserve Capacity pcph	Level of Service	Expected Delay to Minor Street Traffic
>400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0- 99	E	Very long traffic delays
*	F	*

*When demand volumes exceed 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 improvement to the intersection.

Source: Transportation Research Board "Highway Capacity Manual", Special Report 209 (1985).

LEVEL OF SERVICE FOR SIGNALIZED INTERSECTIONS

LOS	GENERAL DESCRIPTION
A	•Very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. •Most vehicles do not stop at all. •Short cycle lengths may also contribute to low delay.
B	•Operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. •More vehicles stop than for LOS A, causing higher levels of average delay.
C	•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. •Individual cycle failures may begin to appear in this level. •The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	•Operation with delay in the range of 25.1 to 40.0 seconds per vehicle. •Influence of congestion becomes more noticeable. •Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios where v/c is the ratio of volume to capacity. •Many vehicles stop, and the proportion of vehicles not stopping declines. •Individual cycle failures are noticeable.
E	•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. •High delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. •Individual cycle failures occur frequently.
F	•Operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. •Occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. May also occur at high v/c ratios below 1.00 with many individual cycle failures. •Poor progression and long cycle lengths may also be major contributing causes to such delay levels.



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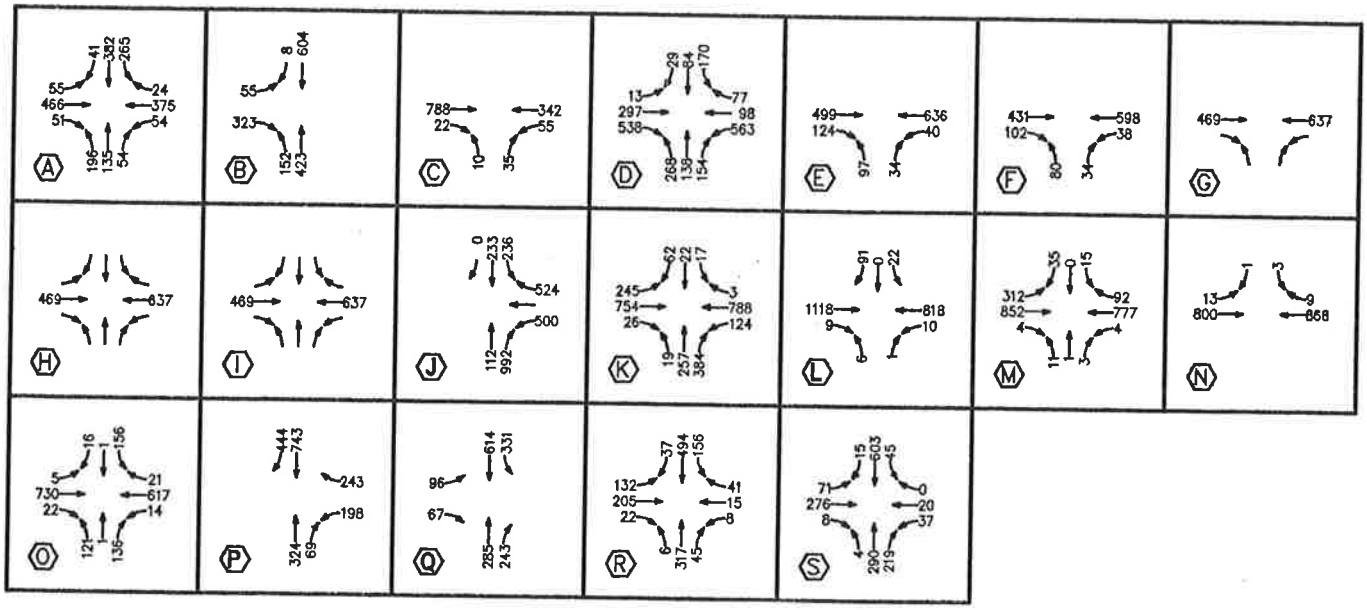

FIGURE 7A1

1995 TRAFFIC AM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

JOB NO. 293222

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Portland, Oregon 97201-0039
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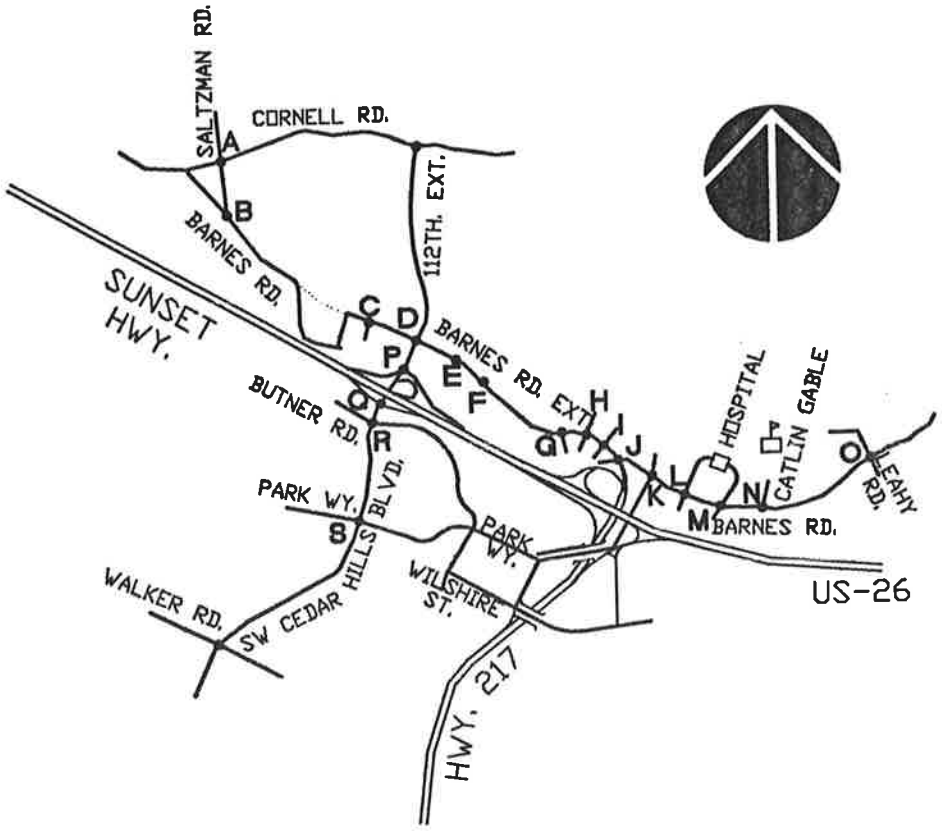

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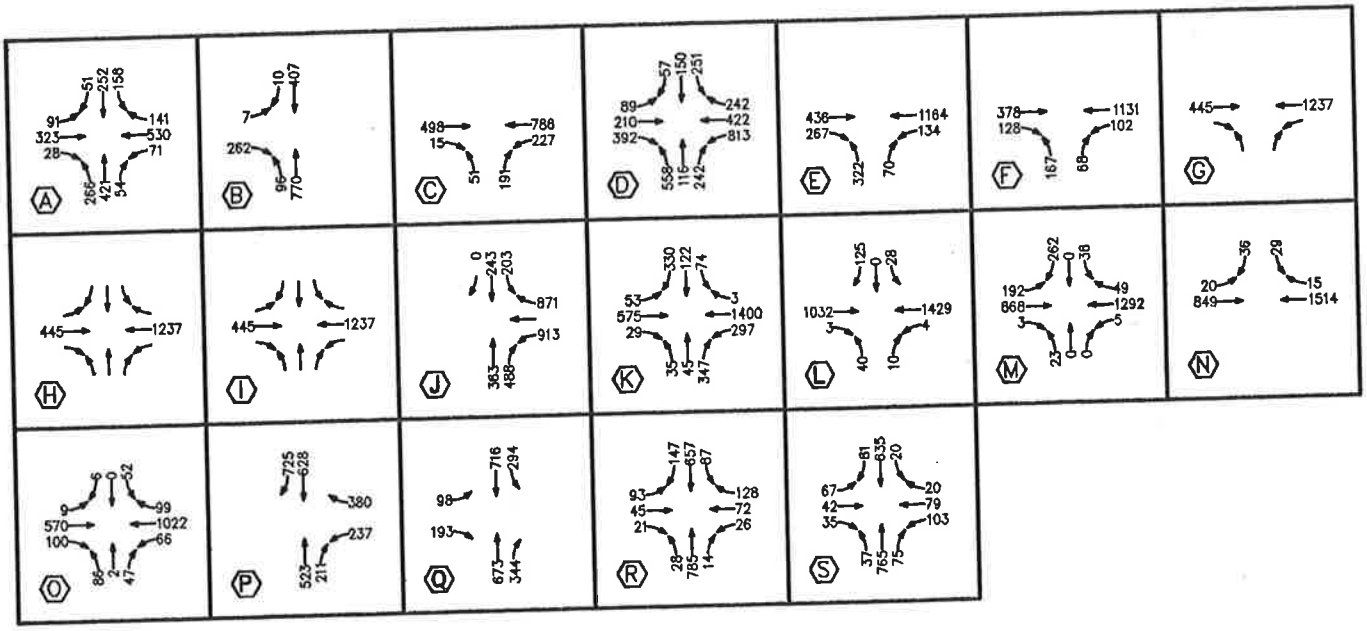

FIGURE 7A2

1995 TRAFFIC PM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

JOB NO. 293222

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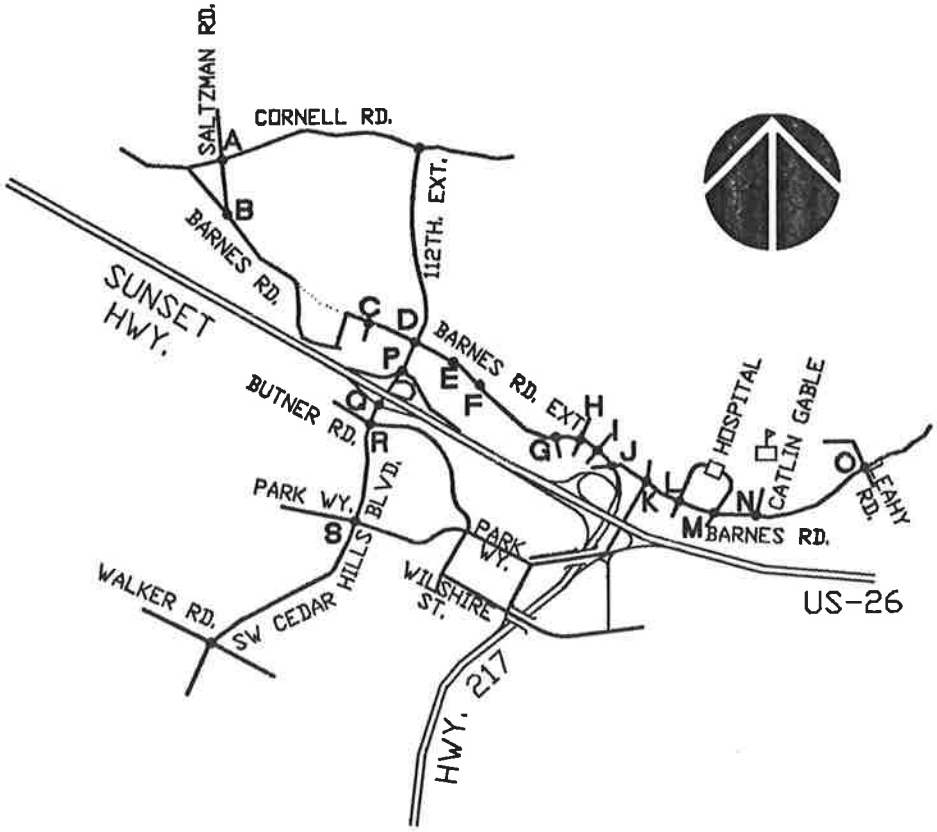

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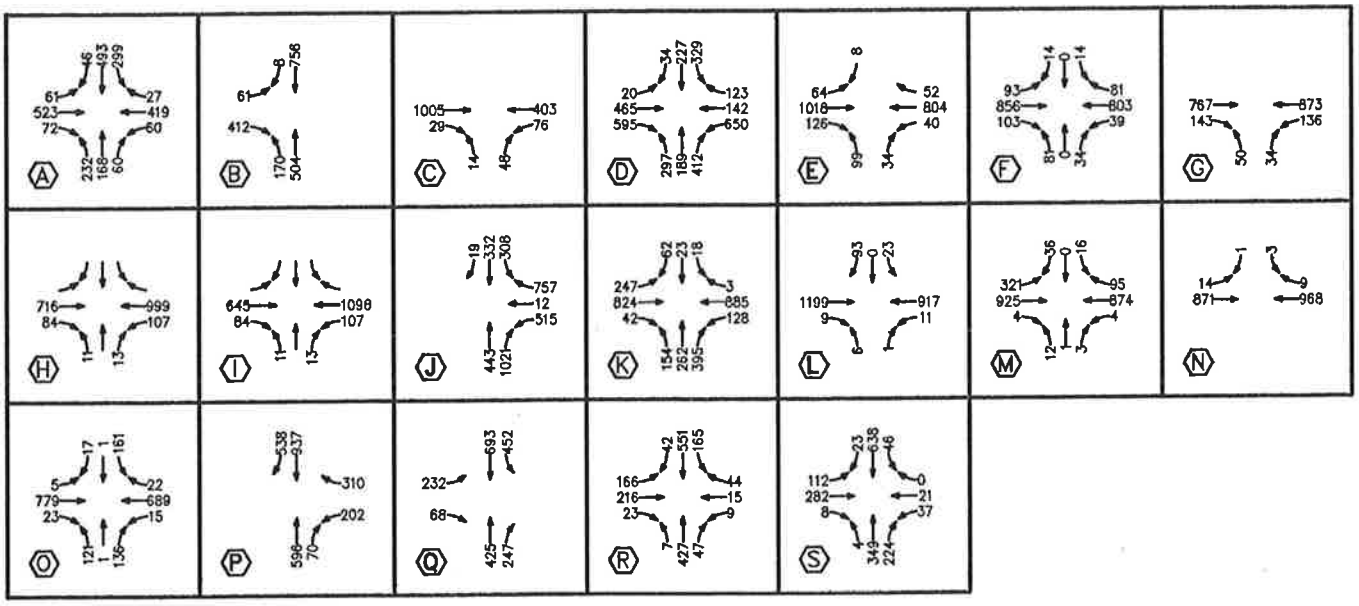

FIGURE 7B1

1998 TRAFFIC
AM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

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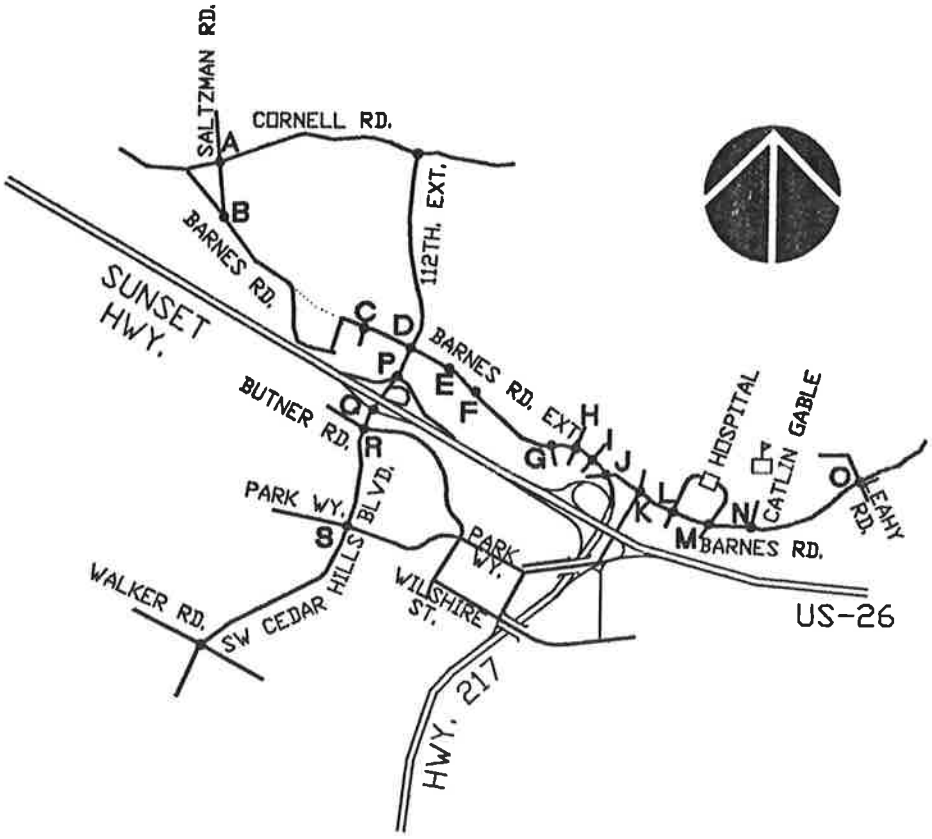

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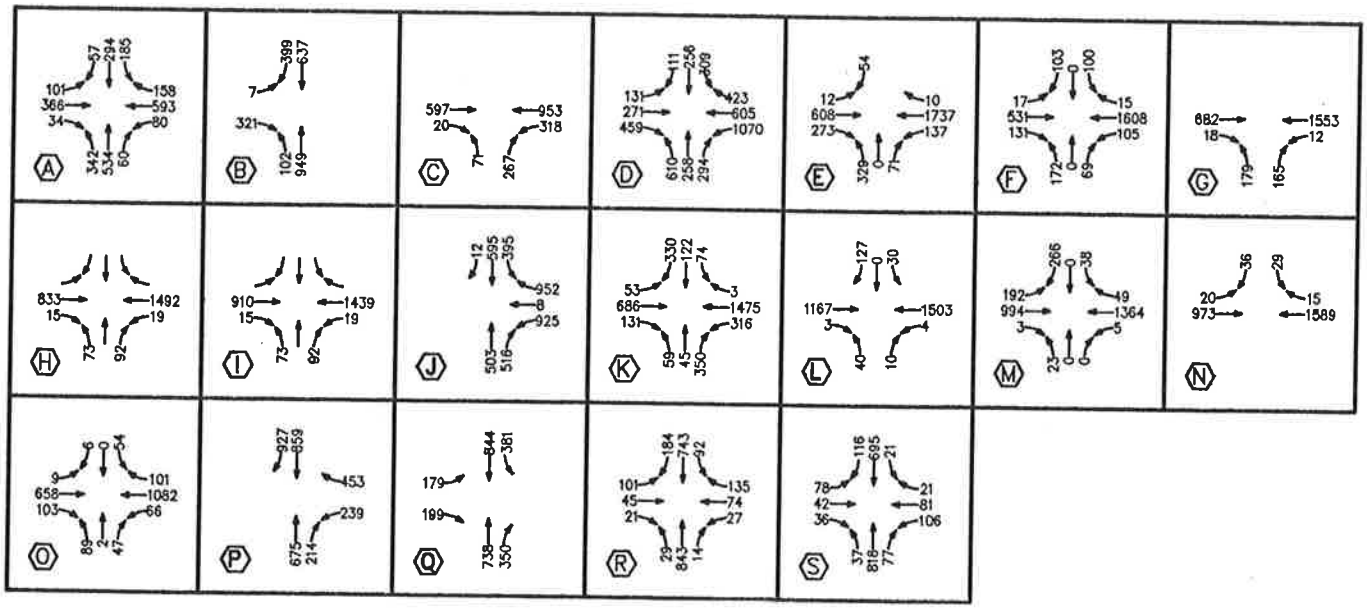

FIGURE 7B2

1998 TRAFFIC PM PEAK HOUR

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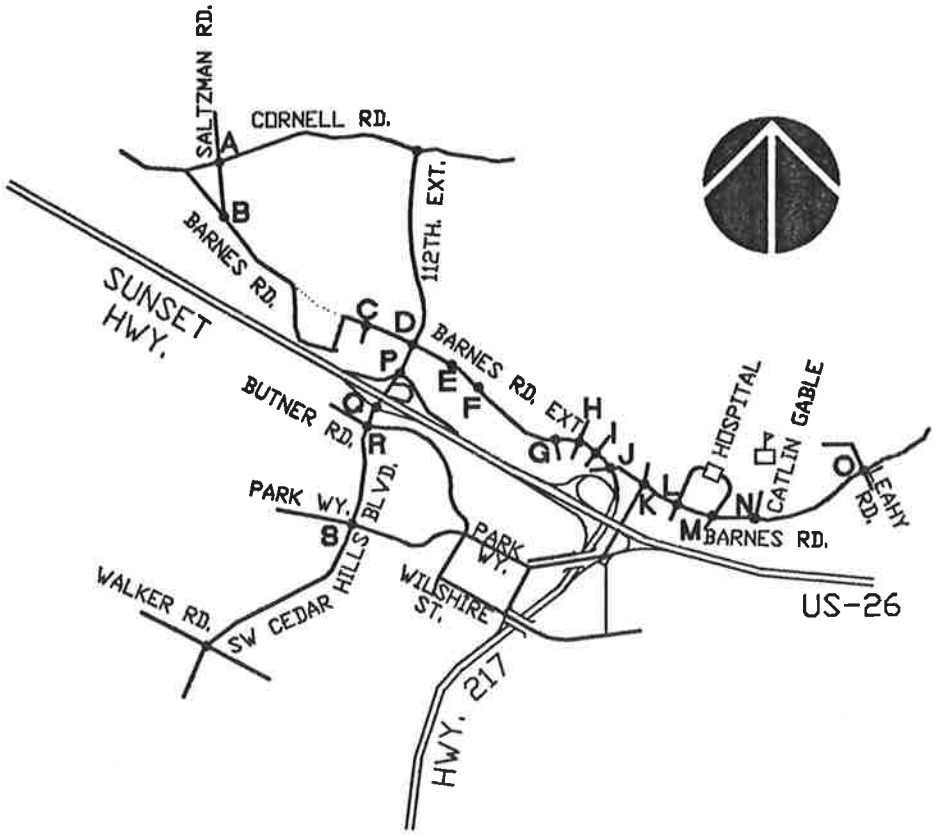
BY KDR/GLK
DATE 10/30/93
JOB NO. 293222



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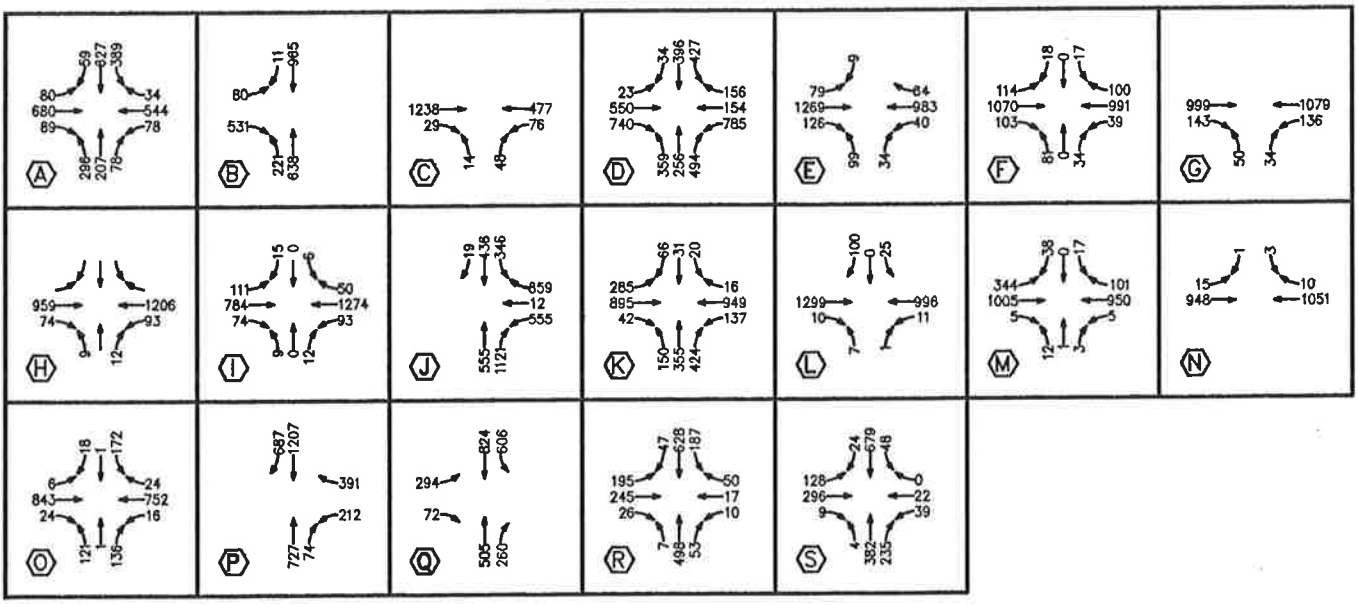

FIGURE 7C1

2005 TRAFFIC AM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

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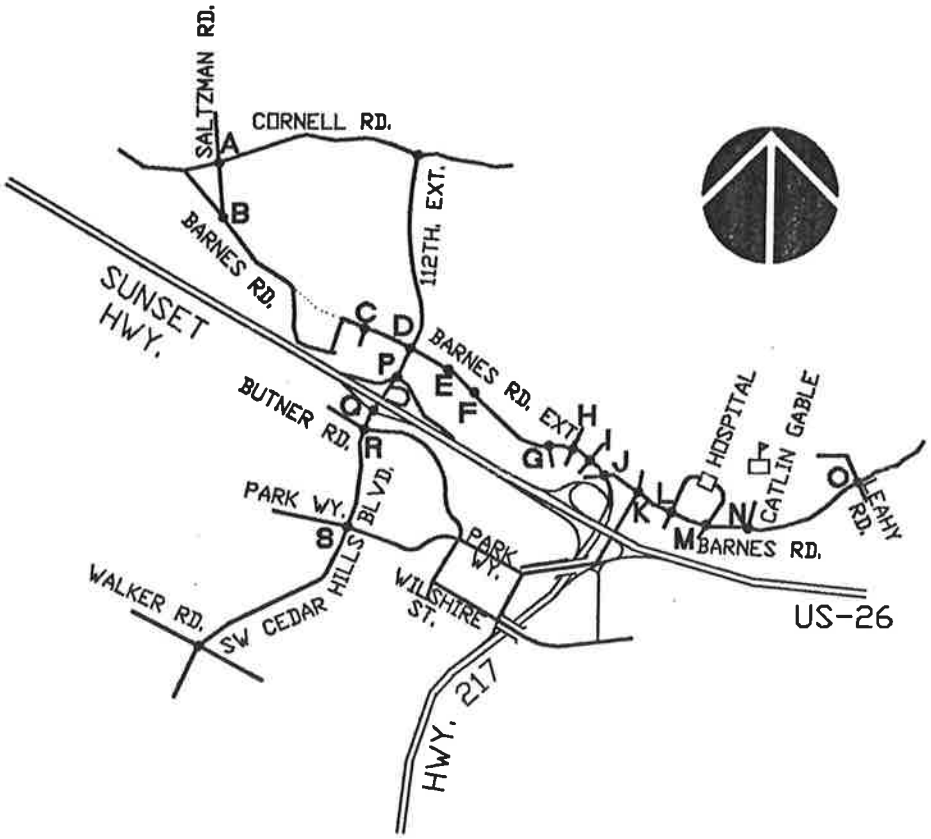

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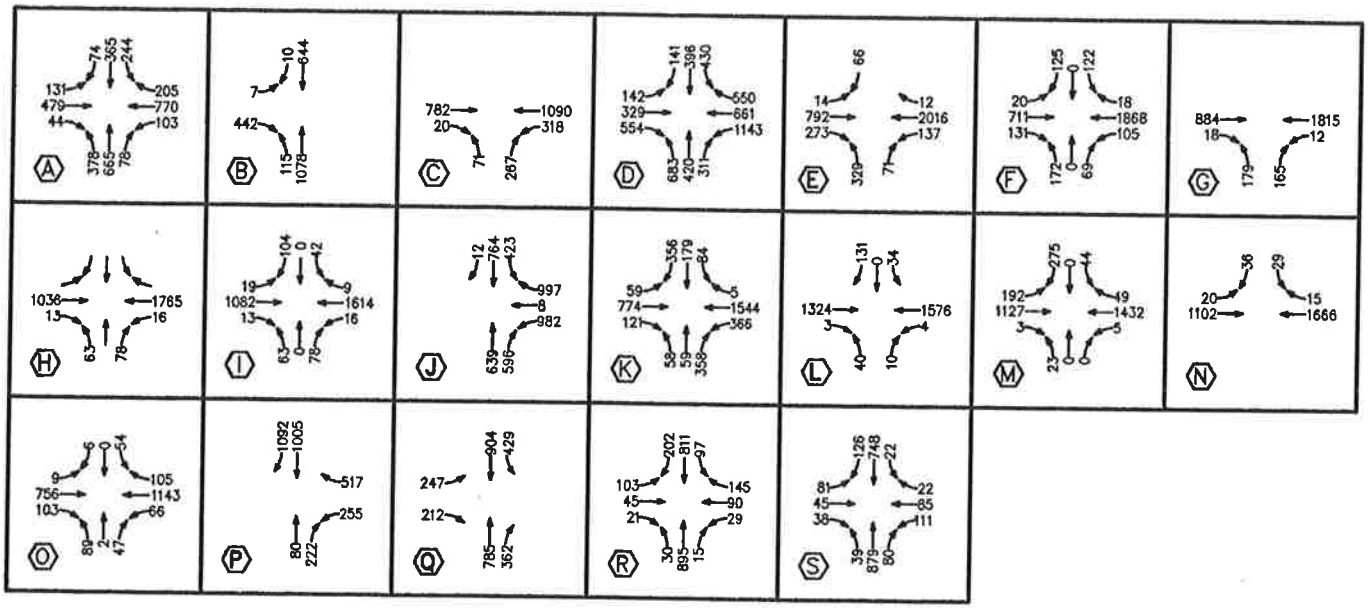

FIGURE 7C2

2005 TRAFFIC PM PEAK HOUR

BY KDR/GLK

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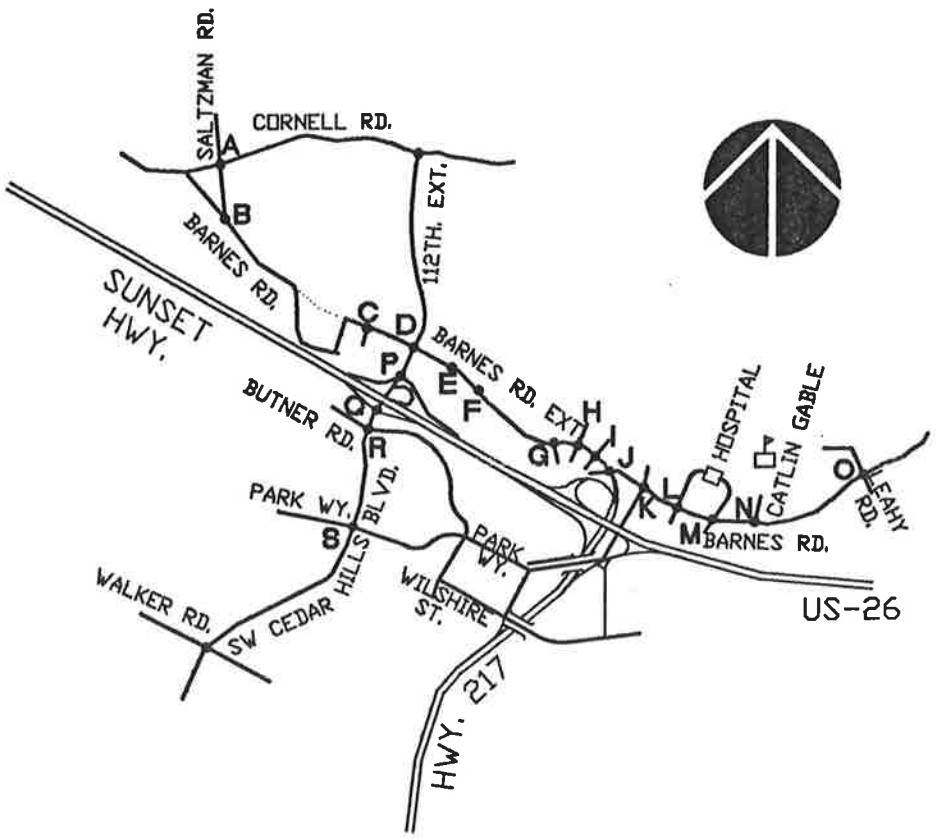

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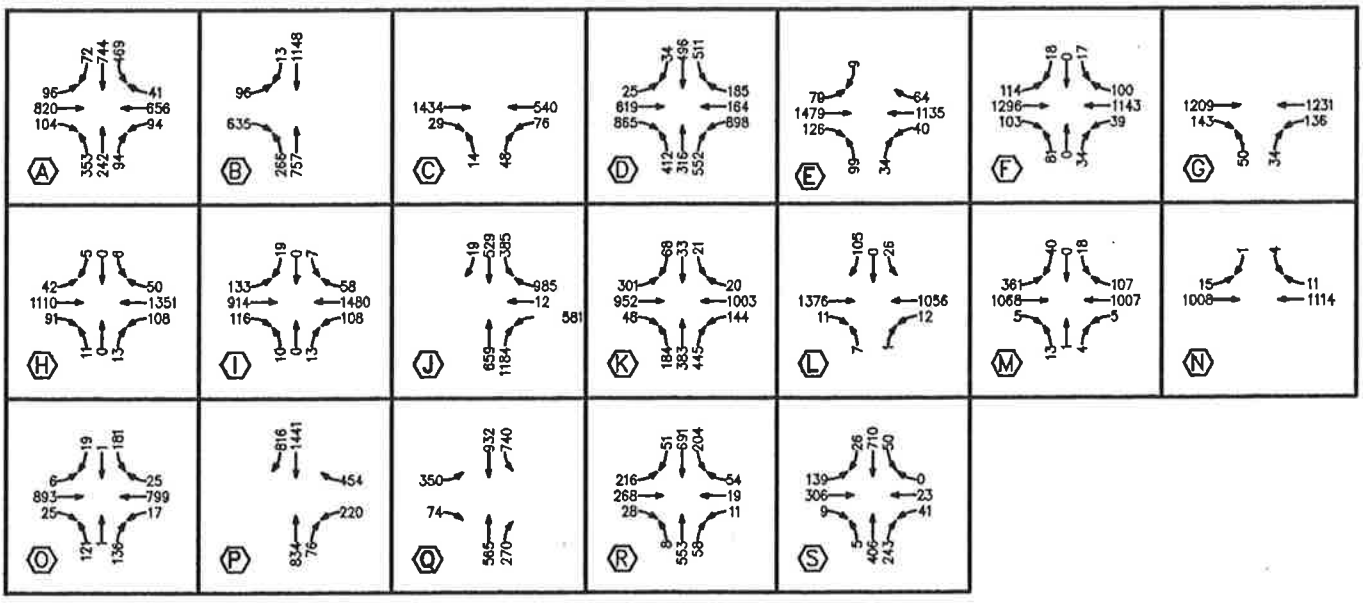

FIGURE 7D1

2010 TRAFFIC
AM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

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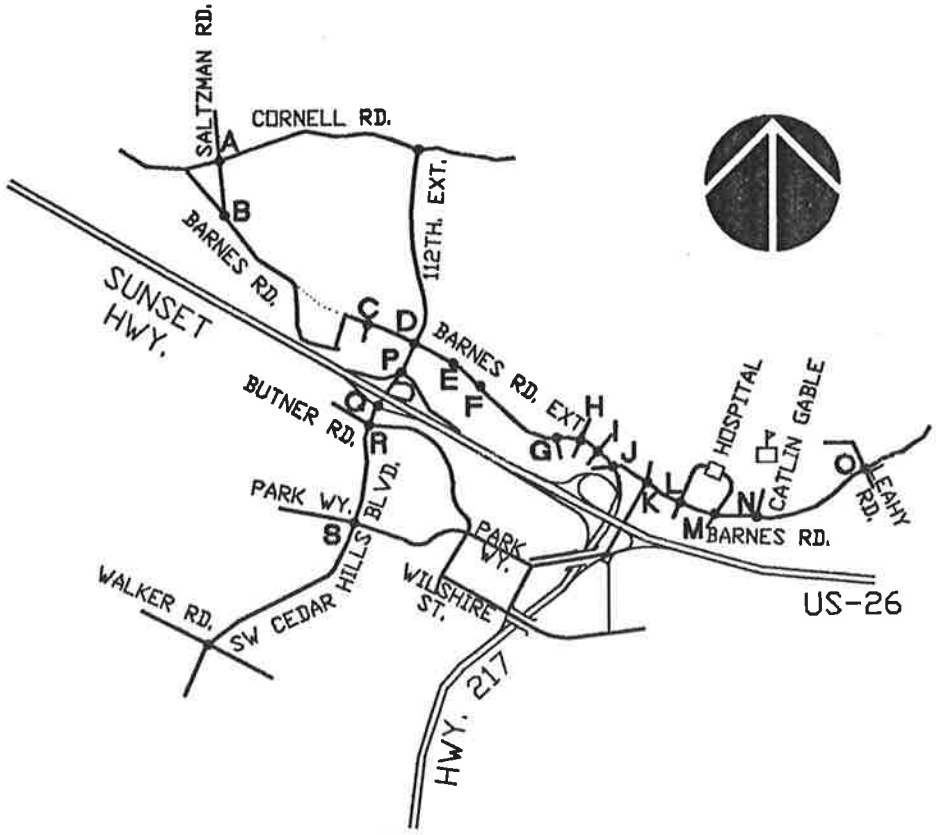

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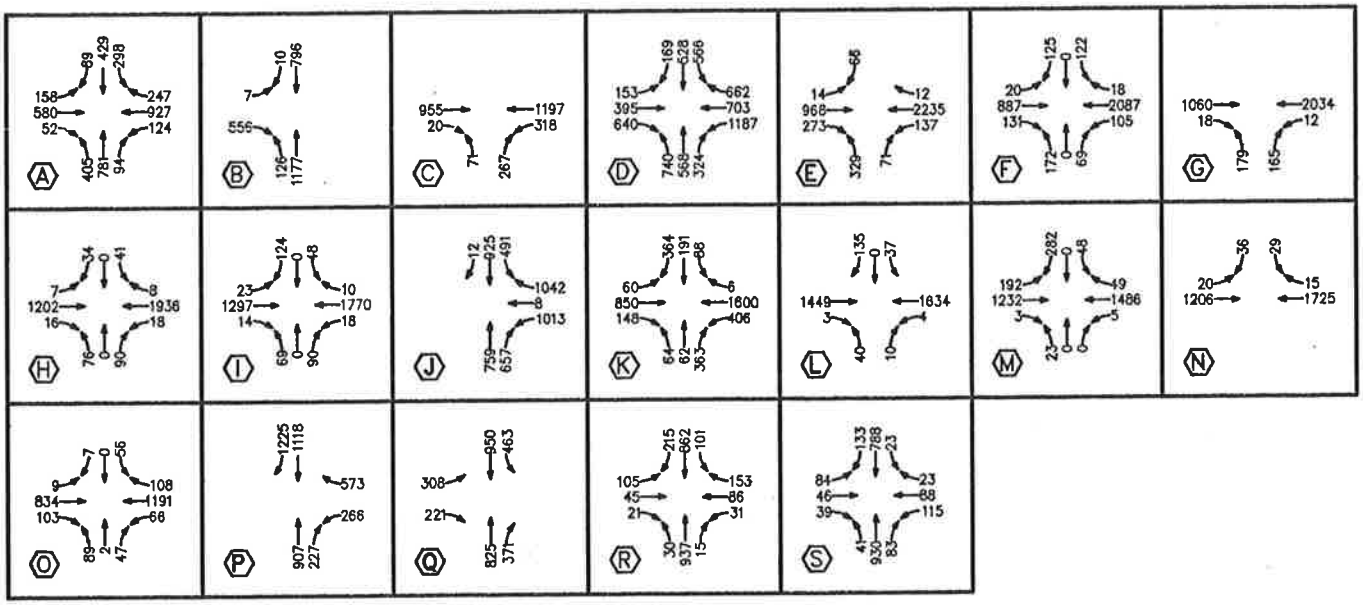

FIGURE 7D2

2010 TRAFFIC PM PEAK HOUR

BY KDR/GLK

DATE 10/30/93

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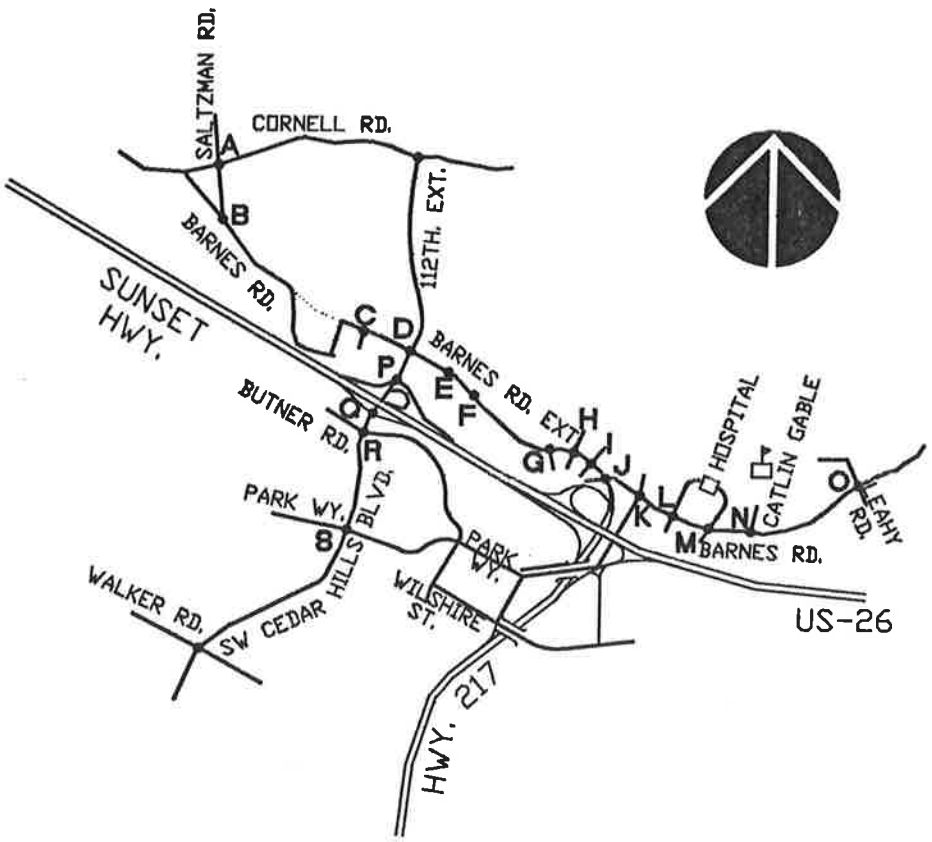

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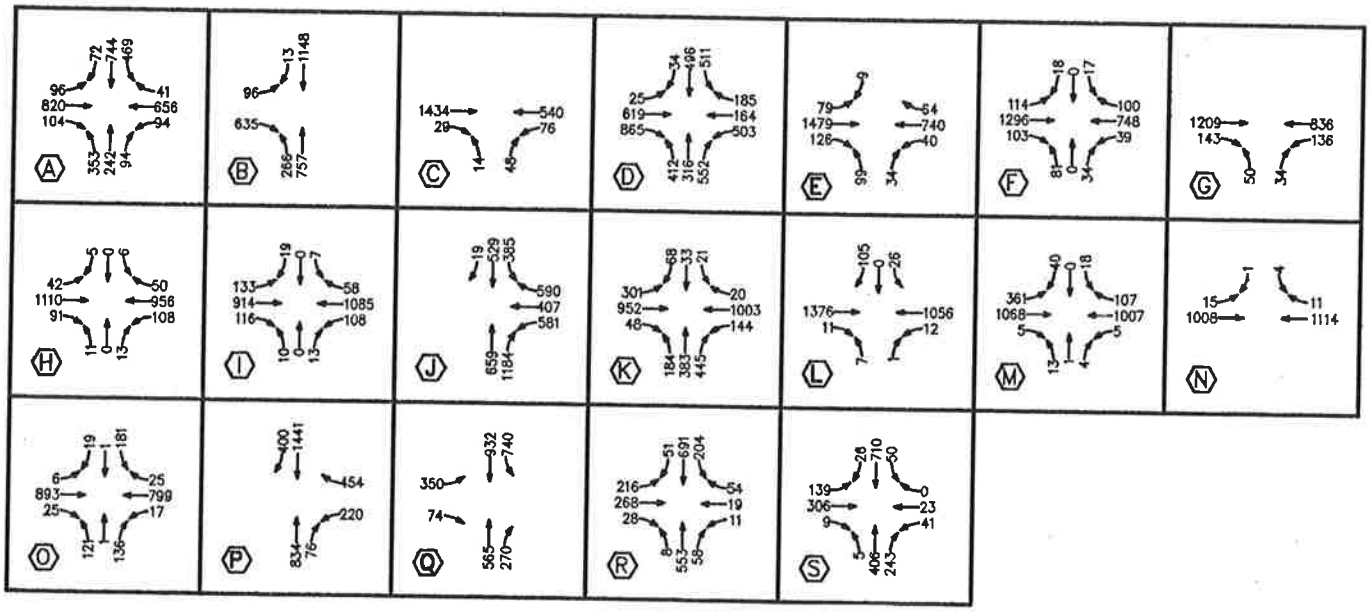

FIGURE 7D3

2010 TRAFFIC
AM PEAK HOUR-WITH BARNES ON-RAMP

BY KDR/GLK

DATE 10/30/93

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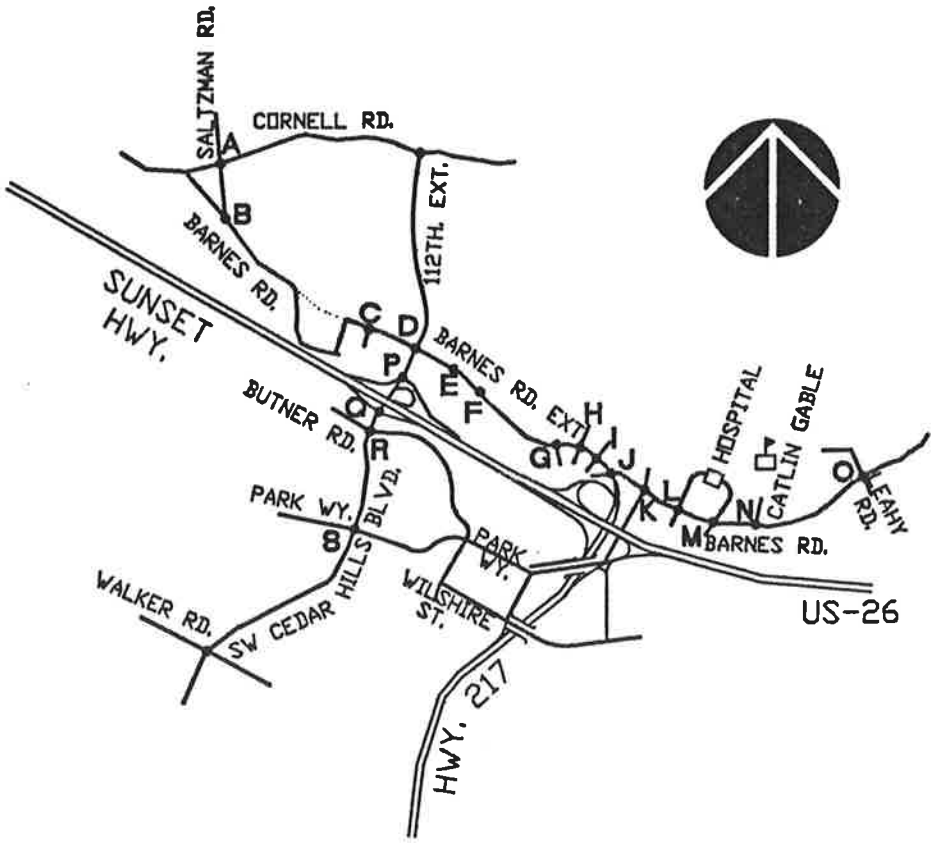

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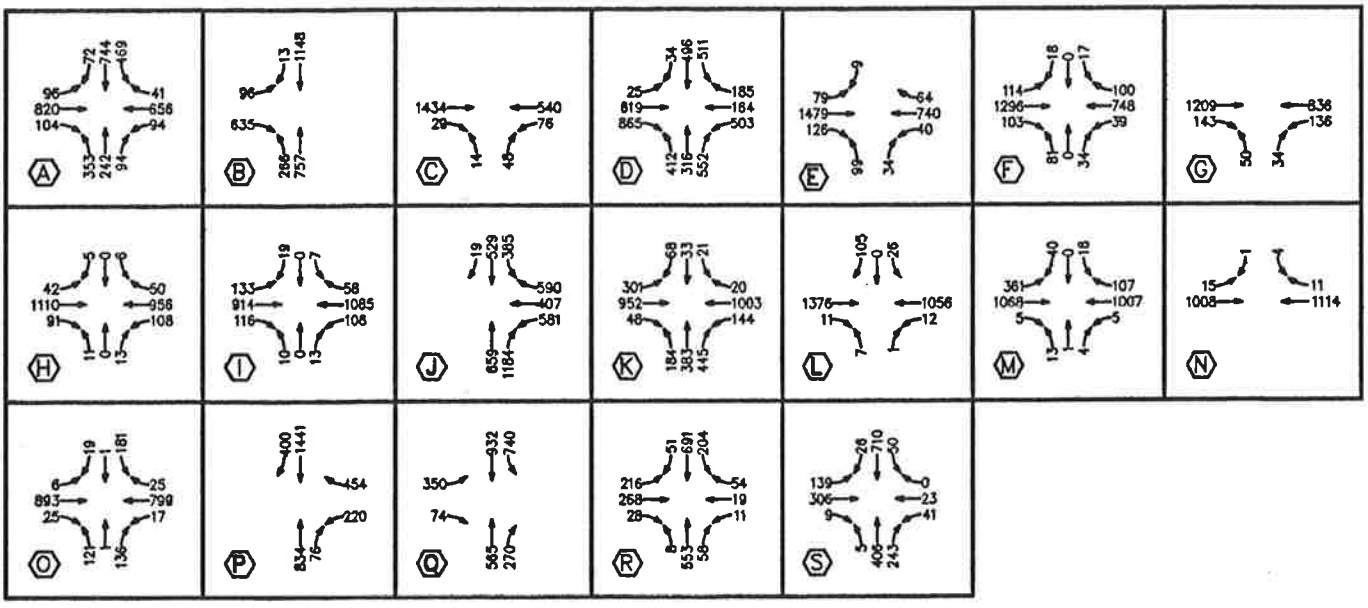

FIGURE 7D3

2010 TRAFFIC
AM PEAK HOUR-WITH BARNES ON-RAMP

BY KDR/GLK
DATE 10/30/93
JOB NO. 293222

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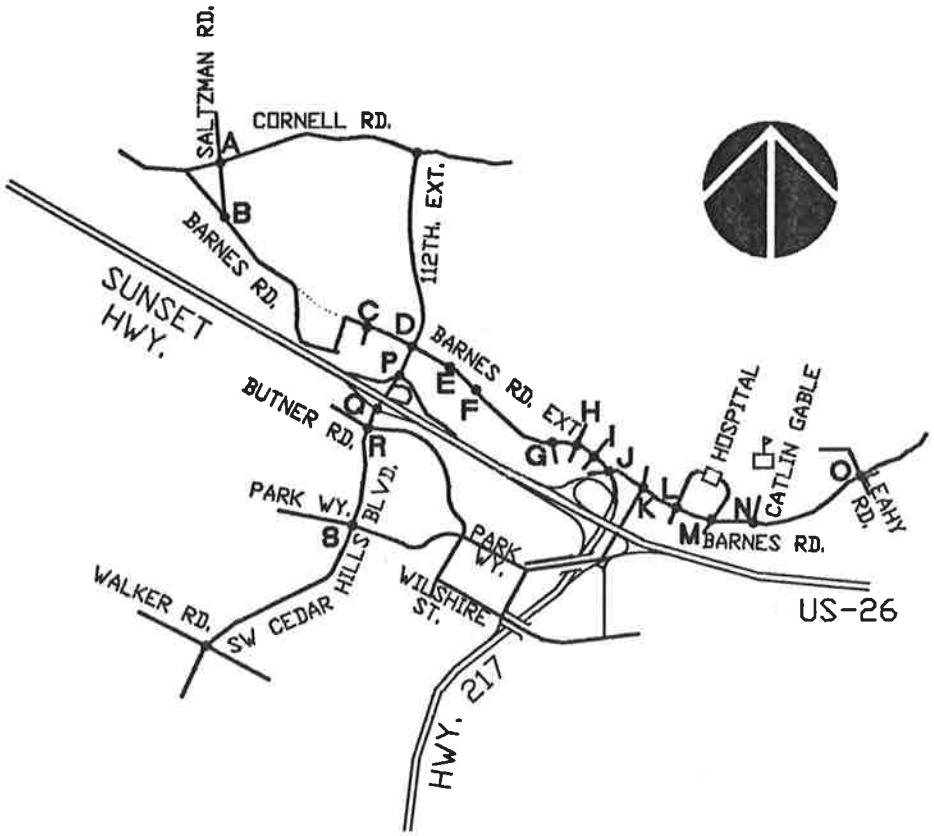

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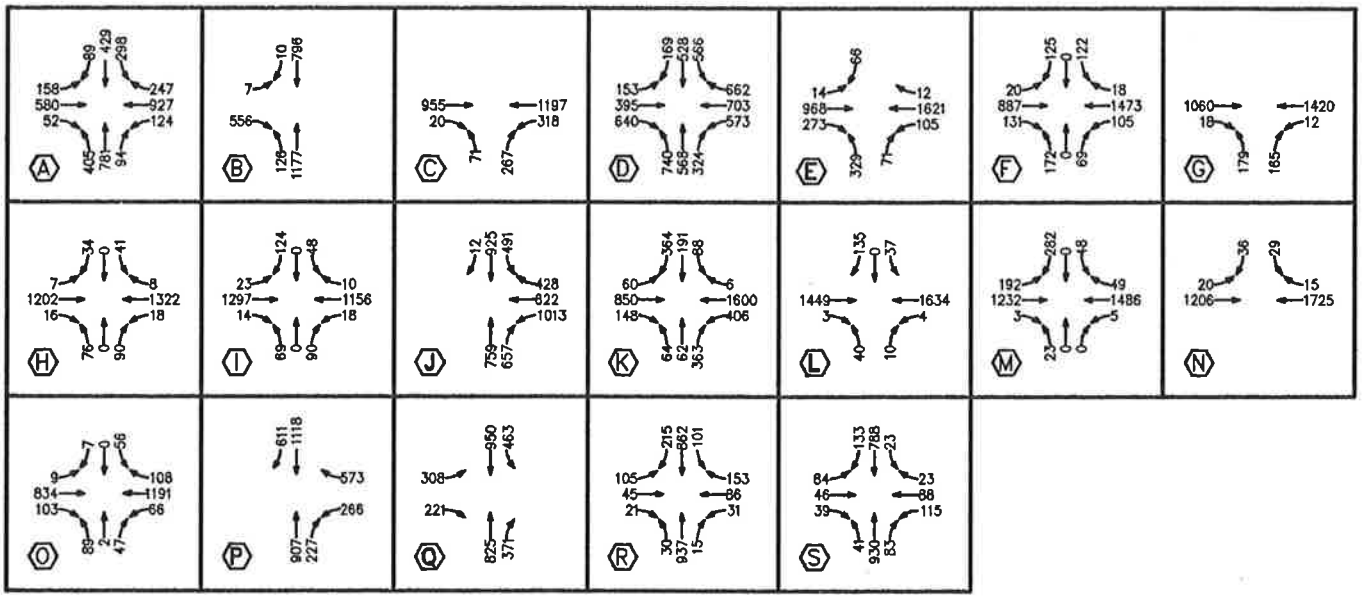

FIGURE 7D4

2010 TRAFFIC
PM PEAK HOUR-WITH BARNES ON-RAMP

BY KDR/GLK
DATE 10/30/93
JOB NO. 293222

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TABLE 7

INTERSECTION	1993 LEVEL OF SERVICE					
	AVERAGE AM			AVERAGE PM		
	V/C	AVG. DEL.	LOS	V/C	AVG. DEL.	LOS
Cornell / Saltzman	.85	28.8	D	.73	23.7	C
Barnes / Saltzman		CR = 64	E		CR = 111	D
Barnes / West Retail	---	---	---	---	---	---
Barnes / Cedar Hills	---	---	---	---	---	---
Barnes / Market West	---	---	---	---	---	---
Barnes / Market East	---	---	---	---	---	---
Barnes / Tri-Met LRT	---	---	---	---	---	---
Barnes / Office West	---	---	---	---	---	---
Barnes / Office East	---	---	---	---	---	---
Barnes / Hwy 217	---	---	---	---	---	---
Barnes / 94th	.66	16.7	C	.47	16.9	C
Barnes / Hospital West	.46	5.5	B	.56	5.7	B
Barnes / Hospital East	.58	9.0	B	.73	11.7	B
Barnes / Catlin Gable	.33	0.7	A	.57	2.9	A
Barnes / Leahy	.84	27.6	D	.87	20.0	C
Cedar Hills / North I/C	.48	8.5	B	.50	10.1	B
Cedar Hills / South I/C		CR = 28	E		CR = -6	F
Cedar Hills / Butner	.54	11.6	B	.49	8.8	B
Cedar Hills / Park Way	.50	9.7	B	.59	8.2	B

TABLE 8

INTERSECTION	1995 LEVEL OF SERVICE					
	AVERAGE AM			AVERAGE PM		
	V/C	AVG. DEL.	LOS	V/C	AVG. DEL.	LOS
Cornell / Saltzman	.80	24.8	C	.81	25.3	D
Barnes / Saltzman		CR = 86	E		CR = 132	D
Barnes / West Retail	.59	9.2	B	.66	13.1	B
Barnes / Cedar Hills	.84	28.2	D	.95	36.7	D
Barnes / Market West	.43	5.3	B	.80	11.7	B
Barnes / Market East	.43	5.0	B	.78	10.2	B
Barnes / Tri-Met LRT	---	---	---	---	---	---
Barnes / Office West	---	---	---	---	---	---
Barnes / Office East	---	---	---	---	---	---
Barnes / Hwy 217	.44	14.7	B	.73	19.5	C
Barnes / 94th	.63	19.7	C	.75	17.6	C
Barnes / Hospital West	.45	4.7	A	.54	6.6	B
Barnes / Hospital East	.59	11.6	B	.75	11.1	B
Barnes / Catlin Gable	.33	2.8	A	.56	5.2	B
Barnes / Leahy	.90	28.1	D	.96	34.4	D
Cedar Hills / North I/C	.32	5.3	B	.28	5.5	B
Cedar Hills / South I/C	.50	10.6	B	.71	12.2	B
Cedar Hills / Butner	.57	16.0	C	.52	12.3	B
Cedar Hills / Park Way	.54	9.8	B	.67	9.9	B

TABLE 9

INTERSECTION	1998 LEVEL OF SERVICE					
	AM			PM		
	V/C	AVG. DEL.	LOS	V/C	AVG. DEL.	LOS
Cornell / Saltzman	.94	34.8	D	.95	36.4	D
Barnes / Saltzman						
Barnes / West Retail	.76	16.7	C	.79	18.7	C
Barnes / Cedar Hills	.87	40.5	E	.94	38.7	D
Barnes / Market West	.46	4.5	A	.69	8.0	B
Barnes / Market East	.67	10.4	B	.77	14.8	B
Barnes / Trl-Met LRT	.78	13.5	B	.61	7.9	B
Barnes / Office West	.66	7.3	B	.64	5.5	B
Barnes / Office East	.61	6.4	B	.69	5.9	B
Barnes / Hwy 217	.58	15.6	C	.81	20.4	C
Barnes / 94th						
Barnes / Hospital West						
Barnes / Hospital East						
Barnes / Catlin Gable						
Barnes / Leahy	.91	33.1	D	.97	30.4	D
Cedar Hills / North I/C						
Cedar Hills / South I/C						
Cedar Hills / Butner						
Cedar Hills / Park Way						

TABLE 10

INTERSECTION	2005 LEVEL OF SERVICE					
	AM			PM		
	V/C	AVG. DEL.	LOS	V/C	AVG. DEL.	LOS
Cornell / Saltzman	.93	37.7	D	.91	35.8	D
Barnes / Saltzman						
Barnes / West Retail	.54	8.2	B	.65	13.4	B
Barnes / Cedar Hills	.76	28.9	D	.85	32.4	D
Barnes / Market West	.56	5.3	B	.79	9.6	B
Barnes / Market East	.81	14.3	B	.89	19.8	C
Barnes / Trl-Met LRT	.53	7.4	B	.69	7.3	B
Barnes / Office West	.43	4.6	A	.61	4.4	A
Barnes / Office East	.41	8.0	B	.46	6.2	B
Barnes / Hwy 217	.66	16.9	C	.90	24.7	C
Barnes / 94th						
Barnes / Hospital West						
Barnes / Hospital East						
Barnes / Catlin Gable						
Barnes / Leahy	.98	42.4	E	1.02	41.7	E
Cedar Hills / North I/C						
Cedar Hills / South I/C	.90	24.8	C	.86	22.4	C
Cedar Hills / Butner						
Cedar Hills / Park Way						

TABLE 11

INTERSECTION	2010 LEVEL OF SERVICE					
	AM			PM		
	V/C	AVG. DEL.	LOS	V/C	AVG. DEL.	LOS
Cornell / Saltzman	.93	37.7	D	.91	35.8	D
Barnes / Saltzman		CR = -82	F		CR = 62	E
Barnes / West Retail	.59	9.5	B	.68	16.0	C
Barnes / Cedar Hills	.82	31.8	D	.95	38.9	D
Barnes / Market West	.59	8.3	B	.53	9.5	B
Barnes / Market East	.57	8.4	B	.72	11.9	B
Barnes / Tri-Met LRT	.60	7.2	B	.76	7.3	B
Barnes / Office West	.52	6.9	B	.70	7.1	B
Barnes / Office East	.64	9.9	B	.68	7.7	B
Barnes / Hwy 217	.58	20.9	C	.80	23.8	C
Barnes / 94th	.81	26.5	D	.88	26.8	D
Barnes / Hospital West	.55	7.1	B	.63	9.3	B
Barnes / Hospital East	.69	16.4	C	.80	16.6	C
Barnes / Catlin Gable	.41	3.8	A	.62	5.9	B
Barnes / Leahy	.69	21.3	C	.62	11.5	B
Cedar Hills / North I/C	.56	5.0	A	.44	5.9	B
Cedar Hills / South I/C	.80	17.4	C	.81	17.5	C
Cedar Hills / Butner	.82	25.9	D	.60	16.9	C
Cedar Hills / Park Way	.68	11.1	B	.83	12.4	B

OFFSITE CONDITIONS:
Various intersections outside of the Peterkort property area are expected to require improvements. The intersection of Cornell Road and Saltzman will require a widening to provide 5 lanes on Cornell Road by approximately the year 2000. The Cornell/Barnes intersection, which is currently unsignalized, was not evaluated for capacity but has been noted as experiencing a relatively high accident frequency. The intersection of Saltzman and Barnes Road, also unsignalized, is expected to operate with a level of service "E" in 1995, and a level of service "F" by approximately year 2000.

The intersection of Barnes Road and Leahy Road will require a 5-lane section on Barnes Road by 1998 to maintain acceptable intersection capacity/level of service and signal corridor progression.

The southbound left turn lanes from Cedar Hills Blvd. to US 26 eastbound will need to be expanded to dual lanes by 2010. This will require widening of both Cedar Hills Blvd. and the freeway onramp. Background growth and development of future Peterkort residential areas are the primary cause of this needed improvement.

Review of the intersection of Barnes Road and Hwy 217 raises concerns with regard to the volume of vehicles projected for northbound Hwy 217 right turns to eastbound Barnes Road in the 2010 design year. ODOT plans to accommodate the existing 900 +/- vehicles per hour with a single yield controlled right turn lane. Some of these vehicles will attempt to weave across to turn left into NW 94th Avenue to reach the west entrance of St. Vincents Hospital. This will prove difficult by 2010 due to the need for creating dual left turn lanes from the Barnes Extension to the Existing Barnes roadway. Also, the right turn lane will be frequently blocked by queued northbound vehicles heading to the Barnes Extension. This analysis assumes free-flow of right turn traffic but it is recommended that dual right turn lanes be considered by 2010, operated under signalized control. This will provide both adequate capacity and alleviate weaving concerns described above.

FUTURE PETERKORT BUILDOUT CONDITIONS:
Operational analysis was completed at the two Barnes Road access intersections which will serve the primary office-commercial sites on the Peterkort property. It was estimated by the development team that approximately 56% of the space would be developed by year 2010. Since it would be unwise to design site frontage and intersection spacing for less than buildout conditions, a special review was undertaken to establish design requirements. It was determined that the lane configurations proposed by MEI for the 2010 design year will adequately accommodate full buildout of the office-commercial space. Following is a summary of the resulting capacity/level of service findings:

	AM PEAK HOUR	PM PEAK HOUR
Barnes Rd. at Main Access	V/C = 0.63 Avg. Delay = 9.3" L.O.S. = "B"	V/C = 0.76 Avg. Delay = 9.1" L.O.S. = "B"
Barnes Rd. at East Access	V/C = 0.71 Avg. Delay = 14.3" L.O.S. = "B"	V/C = 0.71 Avg. Delay = 10.6" L.O.S. = "B"

Vehicular storage requirements were also calculated at these two intersections for buildout conditions. The results are presented in Section VIII of this report.

BARNES ONRAMP TO US 26:
Analysis of 2010 design year conditions indicates the need to either construct triple westbound to southbound left turn lanes at the Barnes/Cedar Hills Blvd. intersection, or else construct a new onramp to US 26 westbound from the Barnes/Hwy 217 intersection. Removal of Barnes Road traffic generated east of Hwy 217 (over 600 vph to US 26 westbound) will significantly improve operations on the Barnes Extension, particularly at the most constrained intersection which is Barnes/Cedar Hills Blvd.

With removal of this traffic by construction of a new onramp, the required lane configurations would be as illustrated in **Figure 4F**. The revised intersection capacity and level of service would be approximately as follows:

	AM PEAK HOUR	PM PEAK HOUR
Barnes Rd. at Cedar Hills Blvd.	V/C = 0.84 Avg. Delay = 30.9" L.O.S. = "D"	V/C = 0.93 Avg. Delay = 37.4" L.O.S. = "D"
Barnes Rd. at Hwy 217	V/C = 0.62 Avg. Delay = 20.3" L.O.S. = "C"	V/C = 0.82 Avg. Delay = 23.9" L.O.S. = "C"

The results shown above do not reflect redistribution of office-commercial traffic which is still assumed to access US 26 westbound via Cedar Hills Blvd. The results shown are thus conservative for the Barnes/Cedar Hills Blvd. intersection and slightly unconservative for the Barnes/Hwy 217 intersection.

Intersection capacity and level of service calculations are available in the Appendix of this report which has been published under a separate cover.

VII. ARTERIAL ANALYSIS

Analysis of arterial coordination has been completed in conjunction with evaluation of individual intersections' operation. The procedure used involves initial calculation of capacity, level of service, and phase timing for individual intersections followed by analysis of arterial progression using PASSER2 software. PASSER2 analysis is then fine-tuned onto manual time-space diagrams which may then require recalculation of individual intersections' timing, capacity, and level of service using software simulating 1985 Highway Capacity Manual analysis methods. Arterial coordination was reviewed for 1995 and 2010 design years.

Arterial progression has been reviewed for both the AM and PM peak hours for three corridors, Barnes Road Extension, Cedar Hills Blvd., and existing Barnes Road. The Barnes Road Extension was considered to be the critical system since it lies between the two others. The Barnes/Cedar Hills Blvd. intersection is the critical intersection on the entire system and was thus used to establish the coordination sequence for both the Barnes Extension system and the Cedar Hills Blvd. system. The Barnes/Hwy 217 intersection phasings and timings generated in the Barnes Extension system were used to establish the sequencing of the Existing Barnes Road system.

Cycle lengths utilized in this analysis are consistent with those used for evaluation of individual intersections' capacity and level of service. A 90 second cycle length was found to be adequate for 1995 conditions, to both maintain capacity and also allow pedestrian crossing times without causing a traffic signal to go out-of-sync in response to a pedestrian demand. Due to increases in vehicle traffic and physical roadway widths, design years 1998 and beyond were found to require a 120" cycle. In 1998, the 120" cycle is necessitated by the need to adequately serve pedestrian green times. By 2010, the 120" cycle is needed to serve both vehicular and pedestrian needs.

PASSER2 software does not allow for the progression of turning movements, only through movements. Both the Barnes Road Extension and Cedar Hills Blvd. progression analyses include increased eastbound and southbound directional bandwidths respectively to account for progression of high volume turning movements either following or preceding through movements. The result is an increased efficiency for the progression of the corridor.

In order to optimize progression efficiency, phase rotations at the intersection of Barnes Road and Cedar Hills Blvd. change between the AM and PM peak hours in 1995 and 2010.

BARNES ROAD EXTENSION ANALYSIS:
Progression on the Barnes Road Extension was analyzed first, with adjustments made to accommodate Cedar Hills Blvd. progression. Westbound progression begins with the traffic from Hwy 217 northbound and ends with the left turn and westbound through movements at Cedar Hills Blvd. The traffic from HWY 217 received priority in progression over Barnes Road traffic due to concerns of queuing onto the freeway. The left turns to Cedar Hills Blvd. were progressed to accommodate Barnes Road traffic continuing on Hwy 26 westbound which is currently being served by a ramp at Hwy 217. Eastbound progression on the Barnes Extension begins with eastbound traffic at Cedar Hills Blvd. and ends with left turns to existing Barnes Road and through traffic onto Hwy 217 southbound. In addition to the eastbound traffic at Cedar Hills Blvd., the northbound right turns are progressed in the morning and the southbound left turns are progressed in the evening.

The location of the Town Center west access, in relation to the progression diagram, does not allow enough green time to serve both north and south approaches without significantly reducing the arterial bandwidths. The side streets must be run on a split phase instead of a common green due to the two northbound left turn lanes. However, a leading eastbound left turn into the north approach does not affect the westbound band width. The time allotted for the eastbound left turn can be used to run an overlapping southbound right turn, leaving only the southbound left turns unserved. These left turns can be accommodated at the east Town Center access. Our progression analysis on the Barnes Road Extension has assumed that southbound left turns will not be allowed at the Town Center west access.

Figures 8A-8D are the time-space diagrams for the Barnes Road Extension. The results of the progression analysis are listed in Table 12.

TABLE 12

Barnes Road Extension Progression Results						
Year	Time Period	Cycle (sec)	Eastbound Band (sec)	Westbound Band (sec)	Speed (mph)	Efficiency
1995	AM	90	33	25	35	32
	PM	90	20	24	35	24
2010	AM	120	49	42	34	38
	PM	120	44	35	35	33

CEDAR HILLS BLVD. ANALYSIS:
Progression on Cedar Hills Blvd. begins at Butner Road for the northbound traffic, ending with the northbound through phase at Barnes Road. The northbound left turns to Barnes Road westbound are also progressed with the exception of the 1995 morning analysis. This is not critical since only a small portion of northbound to westbound left turn traffic originates from south of Butner Road.

TABLE 14

Existing Barnes Road Progression Results						
Year	Time Period	Cycle (sec)	Eastbound Band (sec)	Westbound Band (sec)	Speed (mph)	Efficiency
1995	AM	90	33	28	33	34
	PM	90	19	38	33	32
2010	AM	120	46	48	33	39
	PM	120	44	42	33	36

VIII. VEHICULAR QUEUING ANALYSIS

INTERSECTION STORAGE REQUIREMENTS:
Determination of required vehicular storage space is determined as a function of approach volumes, cycle lengths, signal green time allocated to the movement, and relationship to coordinated traffic platoon arrival. The analysis assumes an average car plus headway length of 25' and peaking or surge factors of 1.50 for retail use and 2.0 for office-commercial use. **Table 15** presents a summary of expected lane storage lengths for the 2010 design year. Lane storage requirements for the two accesses serving the main office-commercial site were designed for full buildout conditions as denoted in the table. Calculations are available in the Appendix which is published under a separate cover.

Storage lengths shown in **Table 15** reflect the peak length calculated for either AM or PM peak hour conditions. Typically, left turn maximum queue lengths into office-commercial sites peaks in the AM peak hour while left turns into the retail accesses peak during the PM peak hour. Left turns from Barnes Road to Cedar Hills Blvd. and to Existing Barnes peak during the PM peak hour, thus creating offset peak left turn queues for the closest spaced intersections.

Storage lengths indicated for the through lanes reflect the storage of vehicles arriving from other Peterkort property accesses and not from outside of the study area. Traffic originating from outside of the study area is typically all progressed through the corridor. Since this is the primary source of traffic feeding arterial left turn lanes, through lane queuing will not impede the ability of left turning vehicles to access the left turn refuge lanes.

ACCESS AND CHANNELIZATION EFFECTS:
Required storage lengths for intersection sidestreet approaches are utilized to provide site designs which will allocate adequate approach length and control for traffic signals to operate in an efficient manner. This requires ensuring unimpeded inbound flow and control of egress flow to feed vehicles into the queue from the "back of the line" instead of into the middle of the queue. The current site plan for the Town Center complex has established approaches of sufficient length to accomplish these needs. When inadequate storage space is provided, vehicles cannot fully utilize the signal green time allotted to the driveway approach. This results in unnecessary delays and onsite congestion.

Arterial storage requirements effect the length of left and right turn lanes. Where left turn lanes are placed back-to-back for adjacent intersections, adequate distance must be provided to safely and efficiently store the necessary turning vehicles in both directions while also providing an adequate transition distance in between. Typically, the required length of left turn storage in both directions at adjacent intersections, plus length for the required reversing transition curve, will establish the minimum spacing necessary between intersections. This distance is then compared against County-established minimum access spacings which are a function of roadway classifications. Where adequate intersection spacing distance is not attainable, the design must consider the construction of side-by-side left turn lanes.

TABLE 15
LANE STORAGE REQUIREMENTS

INTERSECTION	2010 DESIGN YEAR							
	Eastbound		Westbound		Northbound		Southbound	
	LT	TH/RT	LT	TH/RT	LT	TH/RT	LT	TH/RT
Barnes / West Retail	100	350	290	280	100	215	---	170
Barnes / Cedar Hills	165	330	260	400	285	345	305	350
Barnes / Market West	100	210	145	235	175	100	---	100
Barnes / Market East	125	335	120	210	165	100	115	115
Barnes / LRT	---	280	150	265	250	185	---	---
Barnes / Office West	100*	230	280*	245	190*	185*	100*	100*
Barnes / Office East	260*	230	300*	230	190	200*	100*	175*
Barnes / Hwy 217	---	---	195	---	---	500	200	135
Barnes / 94th	405*	225	370	340	275*	375*	150*	370*

* Full Buildout Conditions

Figure 11 illustrates the lane channelization which will be necessary for design year 2010 traffic based upon the results of this analysis. **Figure 12** indicates the recommended channelization for 2010 which will require the construction of a new onramp to US 26 from Barnes Road, beginning at the Barnes/Hwy 217 intersection. Traffic travelling onto US 26 can be adequately served within the necessary signal green time already allocated for westbound Barnes Road traffic turning to Hwy 217 southbound. The addition of this onramp, which could not occur until the US 26 weave ramps are completed, will significantly improve operation along the Barnes Extension and the Barnes/Cedar Hills Blvd. intersection by reducing vehicle delays, pollution, fuel consumption, and need for additional lanes.

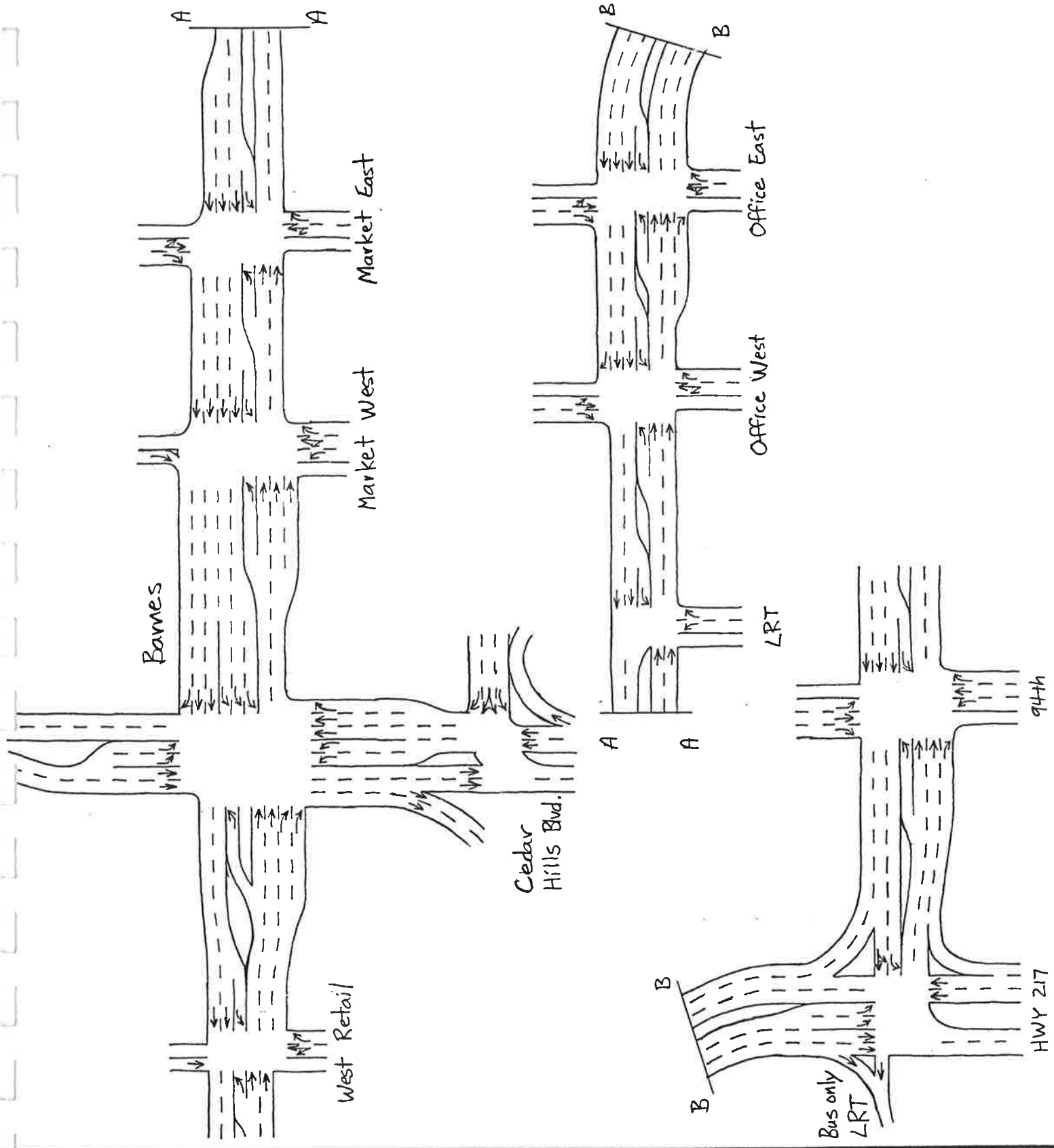

FIGURE 11

2010 LANE CONFIGURATION PLAN

MACKENZIE ENGINEERING INCORPORATED
CIVIL • STRUCTURAL • TRANSPORTATION
0690 S.W. BANCROFT STREET • P.O. BOX 69039
PORTLAND, OREGON 97201-0039 • (503) 224-9560 • FAX (503) 228-1285

BY BTA

DATE 10-27-93

JOB NO. 293222.01

SHT. _____ OF _____

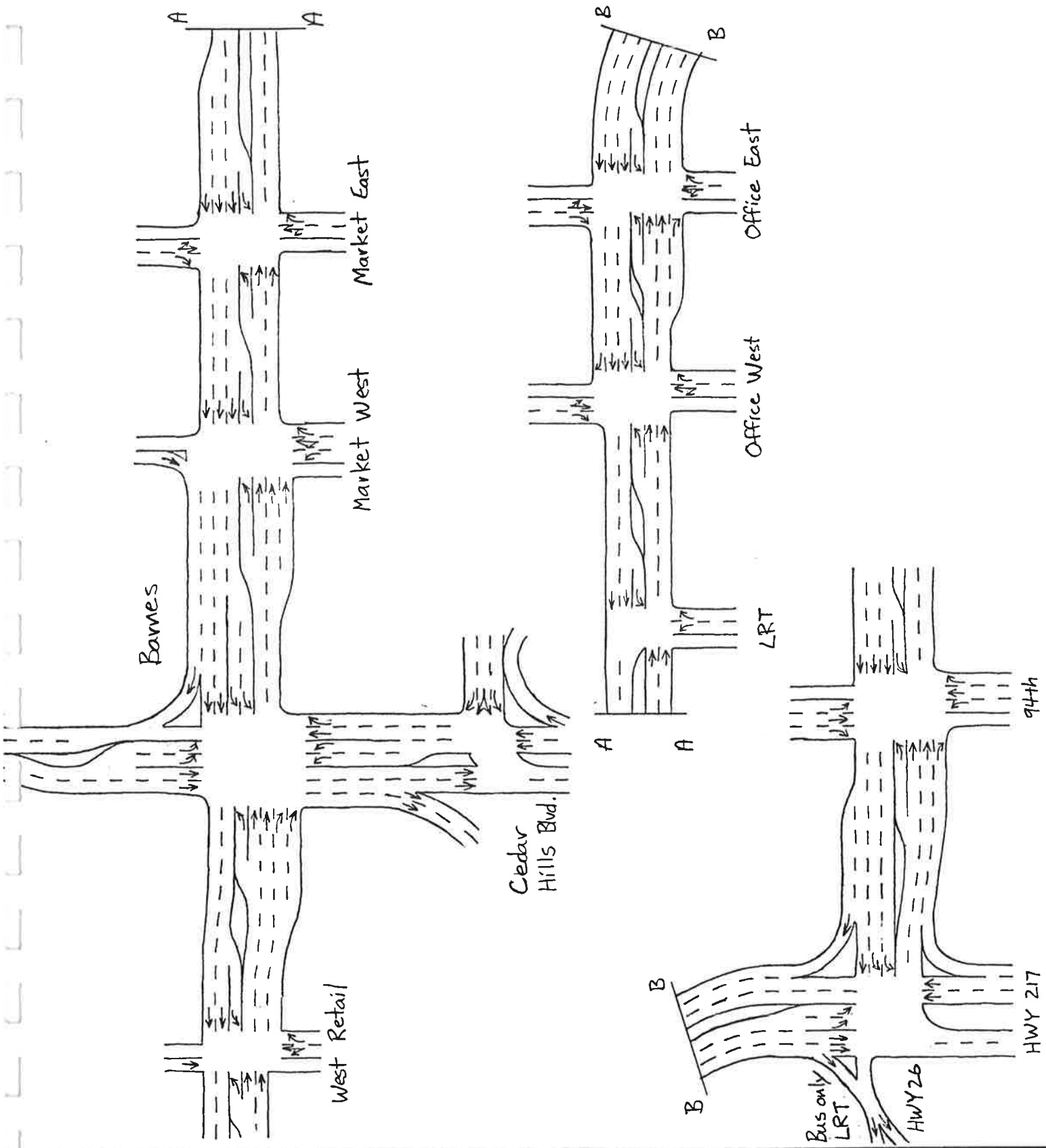

FIGURE 12 WITH BARNES ON RAMP

2010 LANE CONFIGURATION PLAN

MACKENZIE ENGINEERING INCORPORATED
CIVIL • STRUCTURAL • TRANSPORTATION
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IX. CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this analysis is to address the traffic impacts generated by development of the proposed Peterkort Town Center retail complex. This analysis has addressed the issues relating to this project but also addressed phased and complete buildout of the Peterkort properties within the study area. The information provided regarding future developments will serve the Peterkorts and County as master planning guidelines, but also will be necessary at this time in support of an Access Management Plan process needed to obtain approval of the proposed retail access locations. The conclusions and recommendations drawn from this analysis will be separated in order that the mitigation for the Town Center project be clearly distinguished from the long-term improvements which have been projected within this analysis.

Town Center Retail Development

This analysis has determined that the proposed Town Center retail development can be adequately served with the creation of two accesses, both signalized, onto the Barnes Road extension. The main, or westerly, access will require three egress lanes and one ingress lane. Access should be controlled into the approach lanes to allow 175' of unimpeded storage space. This is necessary to allow the most efficient utilization of the limited signal green time provided to this driveway. The egress lanes should be striped and signed to provide dual left turn lanes and a separate right turn lane. Upon future development of office-commercial space north of this intersection, the middle left turn lane would be revised to be a shared left-thru lane. Future office-commercial development would not be provided with a left turn egress since it has been determined that it would significantly impede arterial progression.

The easterly intersection will require two egress lanes with a single inbound lane. Egress lanes would provide separate left turn and right turn lanes. Future development of office-commercial space north of this intersection will require that the left turn lane become a shared left-thru lane. The future traffic signal would operate on a common green phase for both the north and south approaches.

Figure 4B illustrated the lane improvements found to be necessary to serve traffic generated by the Town Center retail development. It is recommended that the site development construct the 2010 design year frontage improvements on Barnes Road. This will provide two eastbound through lanes across the frontage, transitioning back to one eastbound lane east of the site. Also, an eastbound to southbound right turn lane is recommended into the main site access for 2010 design year capacity.

The Cedar Hills Blvd. frontage of the site will likely require widening in response to extension of Cedar Hills Blvd. to Cornell Road. Widening work should begin at the US 26 westbound offramp where the island being constructed by ODOT would be removed to open a second northbound through lane. The offramp would be rechannelized to provide a left turn lane, a shared left-right turn lane, and a separate right turn lane. All movements would be signal controlled, requiring removal of the free-flow offramp right turn being operated by ODOT. Across the site's frontage, it is recommended that widening occur to provide dual northbound to westbound left turn lanes, a single northbound through lane, and a separate

northbound to eastbound right turn lane. If attempts to construct a Barnes Road onramp to US 26 westbound from Hwy 217 fail, an additional lane of widening will be required on the site's frontage by 2010 to construct a fifth northbound lane.

The main access is recommended to be located centered on Barnes Road Station 59+00 and the easterly access is recommended to be located at Station 66+10.

ACCESS MANAGEMENT PLAN - MASTER PLAN TRAFFIC

An Access Management Plan requires analysis of accesses in the vicinity of the project site for safety, capacity, location, and arterial roadway operation. These elements have been addressed by this study with the area addressed extending from Leahy Road on the east to the Cornell/Saltzman intersection on the west. The information generated in this study is highly detailed and informative in evaluating the long-term transportation system needs within the area surrounding the Town Center site.

The report has detailed the development assumptions upon which these conclusions have been drawn. The timing of developments has been estimated and will occur in response to market demand. The analysis has reviewed traffic conditions for 1995, 1998, 2005, and 2010 design years with the goal of estimating the necessary roadway improvements which will be needed to adequately serve traffic demand. In this light, the capacity and levels of service for intersections studied all fall within acceptable standards since the analyses assume the addition of new roadway lane improvements where needed to maintain minimum capacity needs. The results of this work can best be summarized then through graphic illustration of the roadway lane configurations anticipated for each of the design years.

Figures 4B, **4C**, and **4D** were presented earlier in this report to illustrate the lane requirements for the 1995, 1998 and 2005 design years respectively. In general, 1995 conditions will only require a 2 or 3-lane section for bi-directional traffic flow on Barnes Road, with left turn lanes provided at intersections. 1998 traffic conditions will require provision of two westbound lanes, a left turn lane at intersections, and a single eastbound lane on Barnes Road. Full 5-lane channelization, with two lanes in each direction, will be needed by 2005. Individual intersections will require additional turn lanes during these design years as summarized on the graphics.

Figure 11 presents the lane configurations necessary to serve the anticipated 2010 design year traffic. The analysis has determined that triple left turn lanes would be required at Barnes/Cedar Hills Blvd. to serve the estimated volume of traffic. It is recommended that the County and ODOT plan to reconstruct the onramp to US 26 from Hwy 217 which would serve Barnes Road traffic generated east of, and in the vicinity of Hwy 217. This would eliminate the need to route over 600 vehicles per hour the length of the Barnes Extension and would allow dual westbound to southbound left turn lanes to continue to operate acceptably at Barnes/Cedar Hills Blvd. It should be recognized that the Barnes/Cedar Hills intersection, even with the triple lanes shown in **Figure 11**, would operate at 95% capacity. This is with only 62% of the entire Peterkort office-commercial space developed. Full development of Peterkort office-commercial space beyond 2010 would require substantial improvements beyond those shown.

Figure 12 has been prepared to illustrate the lane configurations which would be needed in 2010 with the construction of the Barnes Road onramp at Hwy 217. It is highly recommended that Washington County and ODOT consider a future project to construct the replacement onramp to reduce congestion and driver delay, reduce pollution, and reduce fuel consumption. This ramp can not be opened until after completion of the freeway weave ramps currently scheduled by ODOT for 1998.

An Access Management Plan serves as a guide to the location of proposed and future access to arterial roadways. This document has evaluated the existing, proposed, and future intersection and access locations to determine a solution which will serve potential development sites and yet still allow acceptable arterial roadway operations. Six accesses were considered onto Barnes Road to serve tributary developments. Their recommended locations are summarized in the following table:

West Retail Site	Sta. 48+12
West Town Center Access	Sta. 59+00
East Town Center Access	Sta. 66+10
TriMet Access	Sta. 78+60
Office-Comm. Main Access	Sta. 85+70
Office-Comm. East Access	Sta. 91+70

The Cedar Hills Blvd. intersection is located at Station 53+12 and the Existing Barnes/Hwy 217 intersection is located at Station 98+70.

Side-by-side left turn lanes would need to be provided between Cedar Hills Blvd. and the West Retail Site, unless the access is located further to the west. Side-by-side turn lanes may be acceptable since dual left turn lanes east of Cedar Hills Blvd. will already create the additional left turn median width west of Cedar Hills Blvd. An issue to be considered is possible consolidation of the primary West Retail property with an adjacent parcel and the County's plans involving NW 114th Avenue. These issues remain to be answered with regard to this access' location, but the location of the other five intersections are recommended for the roadway stations shown.

In addition to providing insight into short-term and long-term transportation system requirements in this area, this analysis provides a comprehensive database of information from which site specific development applications can be measured. This will allow traffic engineers and planners representing both the County and developers a source of information for future development activity.