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CAPE COD COMMISSION

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ROUTE 28
TRAFFIC CIRCULATION STUDY
YARMOUTH - ORLEANS

*** Draft Existing Conditions Report***
by the
Cape Cod Commission
Transportation Staff

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March 15, 1992

Prepared in cooperation with the Massachusetts Highway Department and the U. S. Department of Transportation, Federal Highway Administration

Table of Contents

List of Figures iii

List of Tables iv

1.0 INTRODUCTION 1

BACKGROUND 1

STUDY AREA 5

Environmental Parameters 5

Land Use 5

Route Identification Conventions 8

Management Segments 8

2.0 SUMMARY OF EXISTING CONDITIONS 11

TRAFFIC VOLUMES 11

Seasonal P.M. Peak Hour Volumes 12

Seasonal P.M. Turning Movement Counts 12

SAFETY OVERVIEW 17

LAND USE & LEVEL OF DEVELOPMENT 20

CAPACITY ANALYSIS 22

CONCLUSION 25

APPENDICES 26

List of Figures

Figure 1.1 - Study Area Road Map 3
Figure 1.2 - Environmental Parameters 6
Figure 1.3 - Land Use Map 7
Figure 1.4 - Schematic of Route 28 Corridor with Management Sections 10
Figure 2.1 - Peak Season Daily Traffic Volumes 13
Figure 2.2 - Average Daily Traffic Volumes 14
Figure 2.3 - Seasonal P.M. Peak Hour Volumes 15
Figure 2.4 - Seasonal P.M. Peak Hour Turning Movements 16
Figure 2.5 - Accidents Per Mile by Management Segment 18
Figure 2.6 - Accident Severity by Management Segment 19
Figure 2.7 - Level of Development 21
Figure 2.8 - Peak Season Intersection Levels of Service 24

List of Tables

Table 1.1 - Study Area Statistics 4

Table 2.1 - Route 28 Capacity Analysis 23

1.0 INTRODUCTION

This report is the fourth and final part of a corridor planning study which is being conducted by the Cape Cod Commission (CCC) as part of a transportation planning contract with the Massachusetts Highway Department. The purpose of the study is to address the needs of the entire length of Route 28 on Cape Cod. This portion of the study examines Route 28 from the Eastham-Orleans Rotary to the Yarmouth-Barnstable town line.

BACKGROUND

The unique geography of Cape Cod has had an indelible impact on its transportation infrastructure. Figure 1.1 shows the primary transportation routes through the study area. It can be seen that Routes 6A, 6, and 28 provide for the principal longitudinal traffic flows. In addition to the Cape's narrow shape which forces regional traffic to pass through many towns, the transportation infrastructure is also restricted by physical barriers such as rivers, bays, ponds, and wetlands. Although the Cape is only six and a half miles wide on the average, is more than ten times as long, or 63 miles.

The study area encompasses 6 towns. These range from large towns with urbanized areas, such as Yarmouth, to small rural towns, such as Chatham. Selected statistics for study area towns are contained in Table 1.1. Although the towns in the study area are dissimilar in size and population, all exhibit a characteristic population swell during the summer tourist season. This influx of summer residents and visitors places a tremendous strain on the Cape's transportation network.

The continuing growth of traffic in the study area has made it critical that a study be performed in order to develop recommendations for improvements in traffic safety and circulation. Long term plans need to be developed for the corridor so that additional safety and circulation problems can be avoided in the future. Interim improvements and new development should be consistent with the long term plan.

The study area suffers primarily from conflicts between highway function and land use intensity. The Federal - Aid Highway Systems in The Commonwealth of Massachusetts Atlas designates Routes 28 as an arterial of statewide significance and describes its basic function as "...the movement of large numbers of people and vehicles by way of long distance travel corridors." The land use along much of Route 28, however, has led to a large volume of traffic using this route for direct land access. Increased demands on the highway for both mobility and land access has led to congestion and thus degraded the basic function of Route 28 - mobility. More important, however, congestion has links to reductions in safety. These two issues, mobility and safety, will be the primary focus of this report.

Traffic patterns at the western end of the study area are strongly influenced by conditions in the Hyannis area. Conditions in this regional urban center have been addressed in the *Barnstable* portion of the corridor study and are currently being addressed in a transportation study being conducted by the Town of Barnstable in conjunction with Yarmouth and several major traffic generators. The complexity and interdependence of traffic flows in this area illustrates the importance of communication and cooperation between local, regional, and state agencies. This portion of the Route 28 study, as well as the Barnstable portion, should provide invaluable information for agencies involved in the Hyannis study.

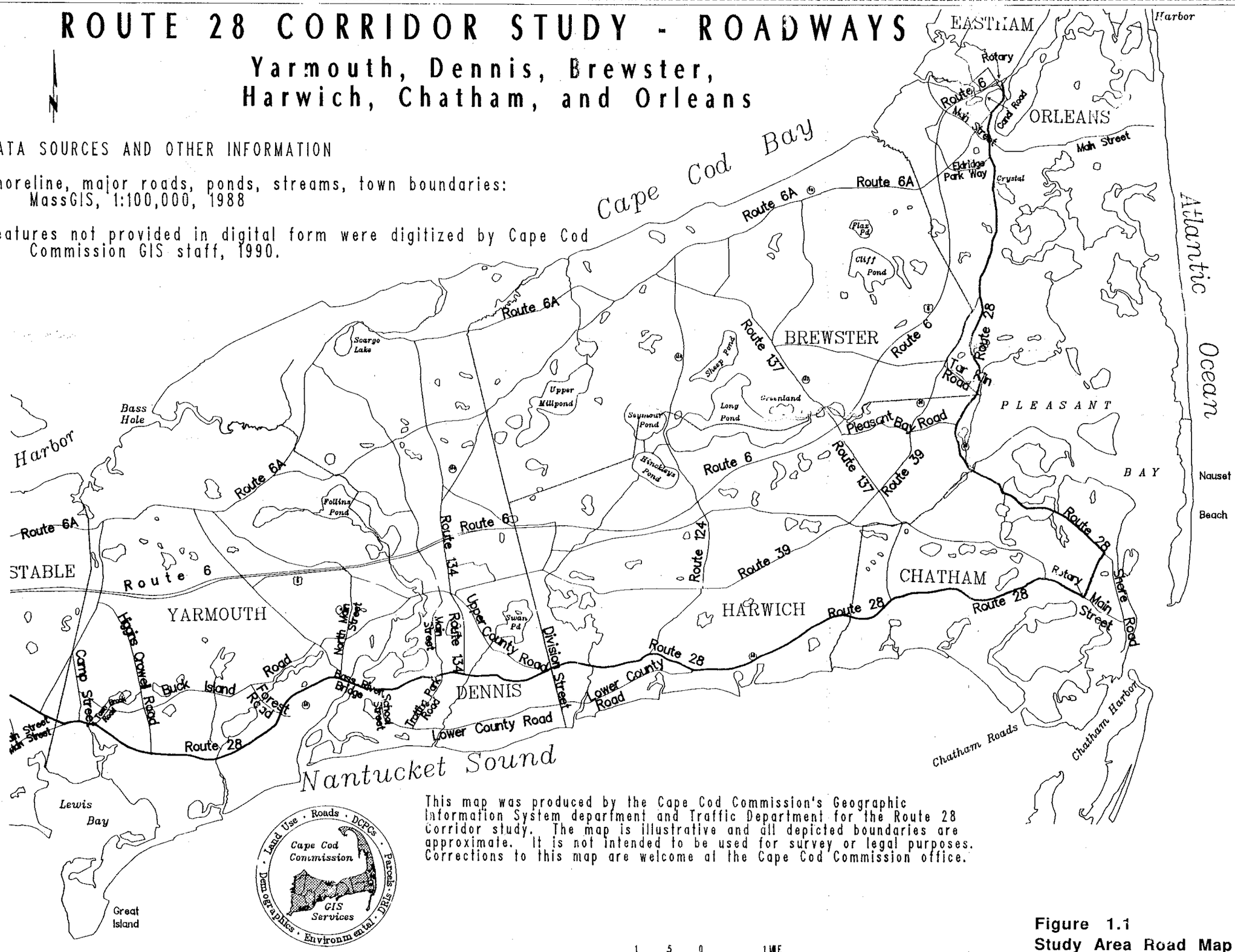
ROUTE 28 CORRIDOR STUDY - ROADWAYS

Yarmouth, Dennis, Brewster, Harwich, Chatham, and Orleans

DATA SOURCES AND OTHER INFORMATION

Shoreline, major roads, ponds, streams, town boundaries:
MassGIS, 1:100,000, 1988

Features not provided in digital form were digitized by Cape Cod Commission GIS staff, 1990.



This map was produced by the Cape Cod Commission's Geographic Information System department and Traffic Department for the Route 28 Corridor study. The map is illustrative and all depicted boundaries are approximate. It is not intended to be used for survey or legal purposes. Corrections to this map are welcome at the Cape Cod Commission office.

Map created March 12, 1992

Figure 1.1
Study Area Road Map

Barnstable County Population 1990-2000

TOWN	1990 CENSUS	% OF TOTAL	PEAK PROJECTION 1990	% OF TOTAL	PROJECTED RESIDENTS 2000	% OF TOTAL	1990-2000 DIFFERENCE	1990-2000 % CHANGE	PROJECTED PEAK 2000	% OF TOTAL	1990-2000 DIFFERENCE	1990-2000 % CHANGE
BARNSTABLE	40,949	21.94%	81,800	15.26%	51,300	22.29%	10,351	25%	96,800	16.02%	15,000	18%
BOURNE	16,064	8.61%	37,900	7.07%	18,400	8.00%	2,336	15%	42,500	7.03%	4,600	12%
BREWSTER	8,440	4.52%	26,300	4.91%	10,400	4.52%	1,960	23%	33,200	5.49%	6,900	26%
CHATHAM	6,579	3.53%	23,600	4.40%	8,200	3.56%	1,621	25%	25,500	4.22%	1,900	8%
DENNIS	13,864	7.43%	62,900	11.73%	19,300	8.39%	5,436	39%	65,700	10.87%	2,800	4%
EASTHAM	4,462	2.39%	21,800	4.07%	5,200	2.26%	738	17%	24,300	4.02%	2,500	11%
FALMOUTH	27,960	14.98%	69,300	12.93%	32,100	13.95%	4,140	15%	76,200	12.61%	6,900	10%
HARWICH	10,275	5.51%	31,300	5.84%	13,600	5.91%	3,325	32%	34,300	5.68%	3,000	10%
MASHPEE	7,884	4.22%	25,800	4.81%	11,800	5.13%	3,916	50%	34,800	5.76%	9,000	35%
ORLEANS	5,838	3.13%	16,700	3.12%	7,400	3.22%	1,562	27%	18,500	3.06%	1,800	11%
PROVINCETOWN	3,561	1.91%	18,800	3.51%	3,800	1.65%	239	7%	19,400	3.21%	600	3%
SANDWICH	15,489	8.30%	29,200	5.45%	19,000	8.26%	3,511	23%	37,000	6.12%	7,800	27%
TRURO	1,573	0.84%	15,900	2.97%	2,200	0.96%	627	40%	17,700	2.93%	1,800	11%
WELLFLEET	2,493	1.34%	16,800	3.13%	3,100	1.35%	607	24%	18,800	3.11%	2,000	12%
YARMOUTH	21,174	11.35%	58,000	10.82%	24,300	10.56%	3,126	15%	59,700	9.88%	1,700	3%
COUNTY TOTAL	186,605	100.00%	536,100	100.00%	230,100	100.00%	43,495	23%	604,400	100.00%	68,300	13%
MASSACHUSETTS	6,016,425											

Note: Peak population represents year-round residents plus seasonal residents and overnight visitors in transient accommodations including camps.

SOURCE: U.S. Census,1990 (resident population); projections of1990 peak population and resident and peak population in 2000, by Cape Cod Planning and Economic Development Commission, 1982

Table 1.1 - Study Area Statistics

STUDY AREA

The study area boundary is illustrated in Figure 1.1. It can be seen that the scope of the study includes sections of Route 28 which pass through six towns. The extent of the study scope was necessary because of the regional nature of this transportation corridor. To the west, the study will include roadways in Barnstable which are used as links to the Route 6 interchange at Willow Street. To the northeast, the study will include analysis of the Eastham/Orleans rotary. The constraints of geography and travel demand has had affects on roadways other than Route 28. Many local roadways which serve as alternatives to Route 28 receive special attention because of the interrelationship between these roadways and Route 28.

Environmental Parameters

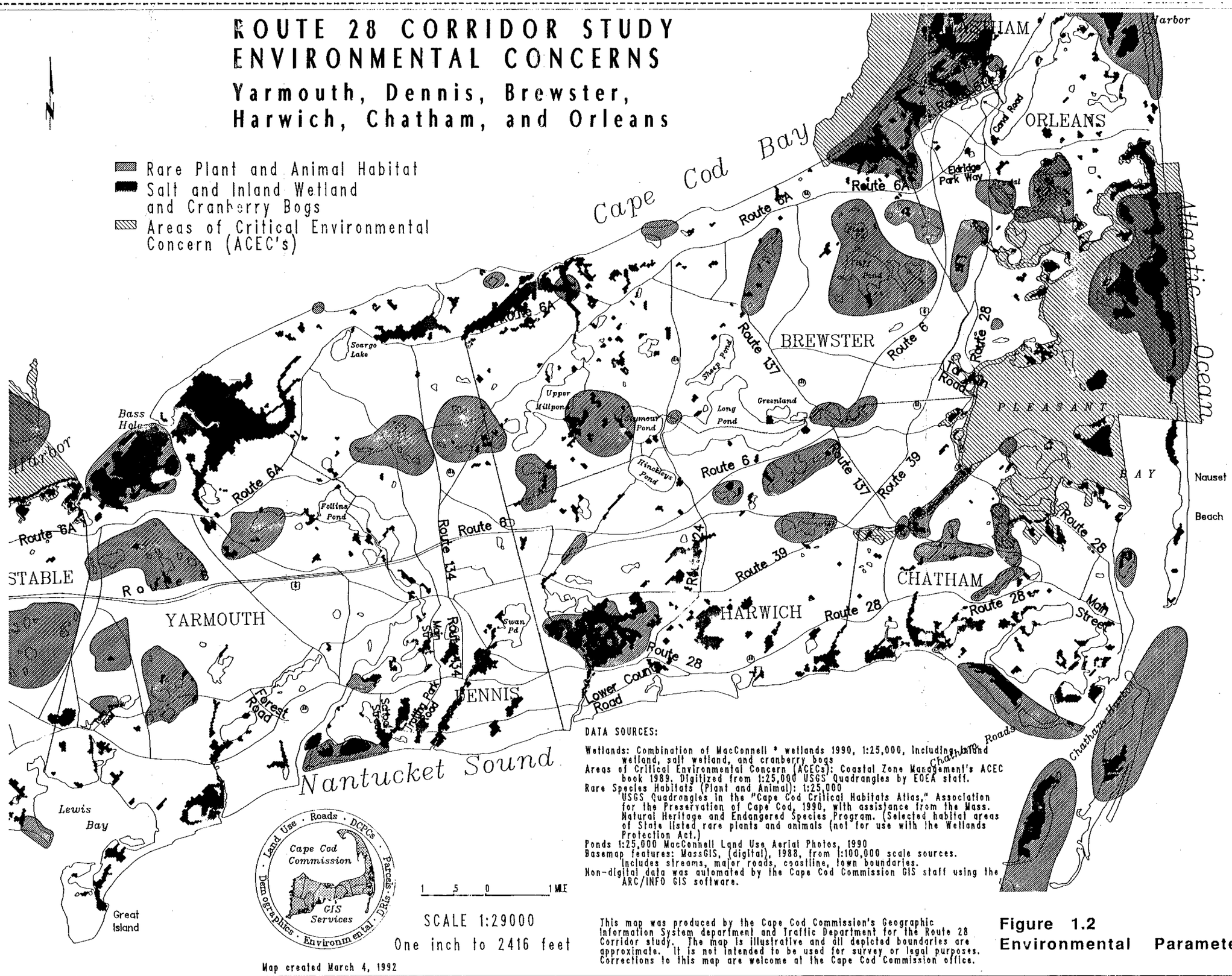
Environmentally sensitive areas are shown on Figure 1.2. Included are entities such as ponds, streams, and wetlands; rare animal and vegetation habitats, and Areas of Critical Environmental Concern (ACECs). ACECs have been designated by Secretary of the Executive Office of Environmental Affairs through an extensive process of research, public review, and input at the local level. Also included are historical sites registered by the Massachusetts Historic Commission.

Land Use

Land use categories are identified and presented in Figure 1.3. The uses identified for much of the corridor are for the most part Residential and Commercial, with significant stretches of Woodland in the segment from Orleans to Chatham. Also, shown are other categories such as Industrial (including gravel pits), Transportation (airports), Open Land & Recreation, Wetlands, and Waste Disposal (including landfills).

ROUTE 28 CORRIDOR STUDY
ENVIRONMENTAL CONCERNS

Yarmouth, Dennis, Brewster, Harwich, Chatham, and Orleans



DATA SOURCES:

Wetlands: Combination of MacConnell * wetlands 1990, 1:25,000, including inland wetland, salt wetland, and cranberry bogs
Areas of Critical Environmental Concern (ACECs): Coastal Zone Management's ACEC book 1989. Digitized from 1:25,000 USGS Quadrangles by EOEA staff.
Rare Species Habitats (Plant and Animal): 1:25,000
USGS Quadrangles in the "Cape Cod Critical Habitats Atlas," Association for the Preservation of Cape Cod, 1990, with assistance from the Mass. Natural Heritage and Endangered Species Program. (Selected habitat areas of State listed rare plants and animals (not for use with the Wetlands Protection Act.)
Ponds 1:25,000 MacConnell Land Use Aerial Photos, 1990
Basemap features: MassGIS, (digital), 1988, from 1:100,000 scale sources. Includes streams, major roads, coastline, town boundaries.
Non-digital data was automated by the Cape Cod Commission GIS staff using the ARC/INFO GIS software.

This map was produced by the Cape Cod Commission's Geographic Information System department and Traffic Department for the Route 28 Corridor study. The map is illustrative and all depicted boundaries are approximate. It is not intended to be used for survey or legal purposes. Corrections to this map are welcome at the Cape Cod Commission office.

Figure 1.2
Environmental Parameters

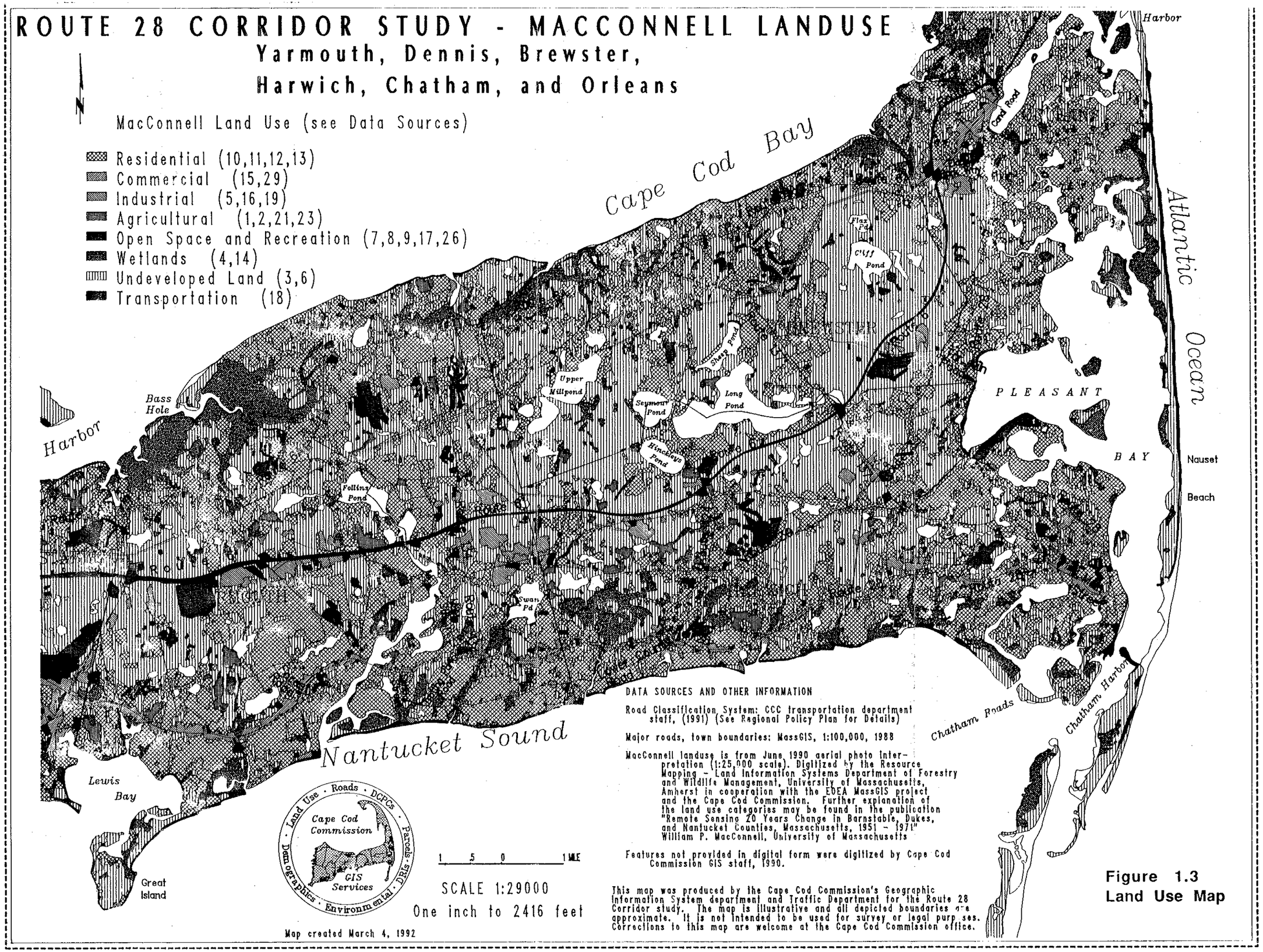


Figure 1.3
Land Use Map

Route Identification Conventions

Cape Cod's geography has lead to many a driver's confusion when faced with the signs denoting the general direction of travel on the route being opposite of the cardinal direction. For example, drivers travelling south from Eastham to Chatham along Route 28 in Orleans are following signs indicating "Route 28 North." This system has some logic: the origin, or "zero" mile of Route 28 is the Eastham/Orleans Rotary. Since Route 28 eventually ends in New Hampshire, a driver's journey from beginning to end would be northbound overall, despite significant stretches on the Cape which are southbound and even eastbound. The convention used in this report is to refer to travel on Route 28 in the direction of upwardly increasing mile markers as *Upbound* and travel towards the Eastham/Orleans Rotary (at Mile 0.00) as *Downbound*. Intersecting streets may be referred to geographically: the approaches from the beaches on Nantucket Sound or the Atlantic Ocean may be referred to as *Landbound*, with the opposite approach referred to as *Beachbound*. The text of the report includes the MHD directional classification where Route 28N is equivalent to Upbound and Route 28S is equivalent to Downbound. Additional references to locations may also be included where helpful. For example, Route 28S in Orleans is Downbound, "towards Eastham."

Management Segments

The characteristics of the study area roadway are not uniform along its entire length. For this reason, this portion of Route 28 has been divided into *management segments*. This system is a "top-down" approach: we recognize that changes within the management segments can affect all segments' performances as components of the highway network. The basis for this segmentation scheme resulted from the following constraints:

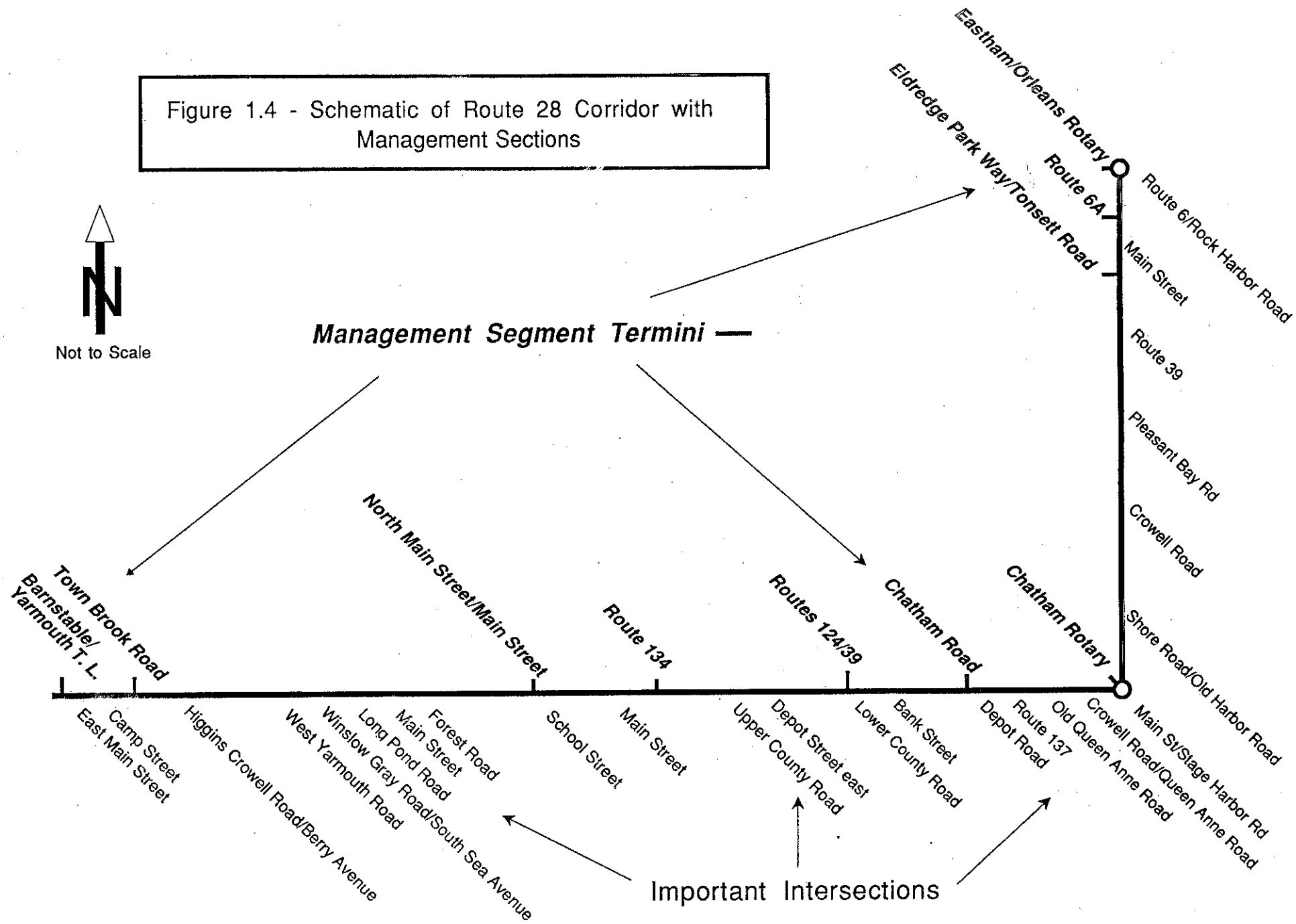
- Geographical - vehicular origins and destinations, availability of alternate routes, etc.
- Roadway Function - the conflict between mobility and local access.
- Roadside Development - variety of land uses influences regional travel patterns as well as turning conflicts.
- Traffic Volumes - an overall result of above factors, among others.
- Right-of-Way - travelled way, adjacent environment: wetlands, historic structures, etc.
- Magnitude of Potential Solutions - opportunities for improvement given all of the above factors.

The termini of Route 28 management segments are defined as the following intersections:

Management Section	Intersection to Intersection	Segment Length (miles)
A	Eastham/Orleans Rotary [0.00] to Route 6A	0.50
B	Route 6A [0.50] to Eldredge Park Way/Tonsett Rd	0.75
C	Eldredge Park Way/Tonsett Rd [1.25] to Chatham Rotary	8.55
D	Chatham Rotary [9.80] to Chatham Road	4.60
E	Chatham Road [14.40] to Routes 124 & 39	2.70
F	Routes 124 & 39 [17.10] to Route 134	3.15
G	Route 134 [20.25] to N. Main/Main Streets (Yarmouth)	2.00
H	N. Main/Main Streets (Yarmouth) [22.25] to Town Brook Rd	4.50
I	Town Brook Rd [26.75] to Yarmouth/Barn. town line [27.30]	0.55

These segments are presented in Figure 1.4 along with other important intersections. Note that the orientation of the intersecting streets is based solely on importance: management segment termini are shown on the Land side of Route 28 and other important intersections are shown on the Beach side. The actual orientation of each varies, and is shown in the study area map of Figure 1.1.

Figure 1.4 - Schematic of Route 28 Corridor with Management Sections



2.0 SUMMARY OF EXISTING CONDITIONS

For this draft of the existing conditions report, samples of link and intersection volumes and operations will be presented in a series of tables and graphs. The following table includes a list of selected representative links and intersections, one for each management segment, that will be used throughout the text.

Management Segment	Selected Representative Link	Selected Representative Intersection
A	Eastham/Orleans Rotary to Canal St	Route 6A
B	Main St to Eldredge Pkwy	Main Street (Orleans)
C	Route 39 to Pleasant Bay Rd (Orleans-Harwich town line)	Route 39 (Orleans)
D	Queen Anne Road to Old Queen Anne Rd	Old Queen Anne Road (north leg)
E	Bank St to Lower County Rd	Lower County Road
F	Depot St (east) to Upper County Rd (Harwich-Dennis town line)	Route 134
G	School St to N. Main St (Dennis-Yarmouth town line	Main St (Dennis)/Trotting Park Rd
H	Forest Rd to Main St (S. Yarmouth)	Forest Road
I	E. Main St (Hyannis) to Yarmouth Rd (Yarmouth-Barnstable town line)	Camp Street

Worksheets and other information pertaining to other locations along the corridor are included in the appendix.

TRAFFIC VOLUMES

Seasonal traffic volumes along key segments of study area roadways are substantial -

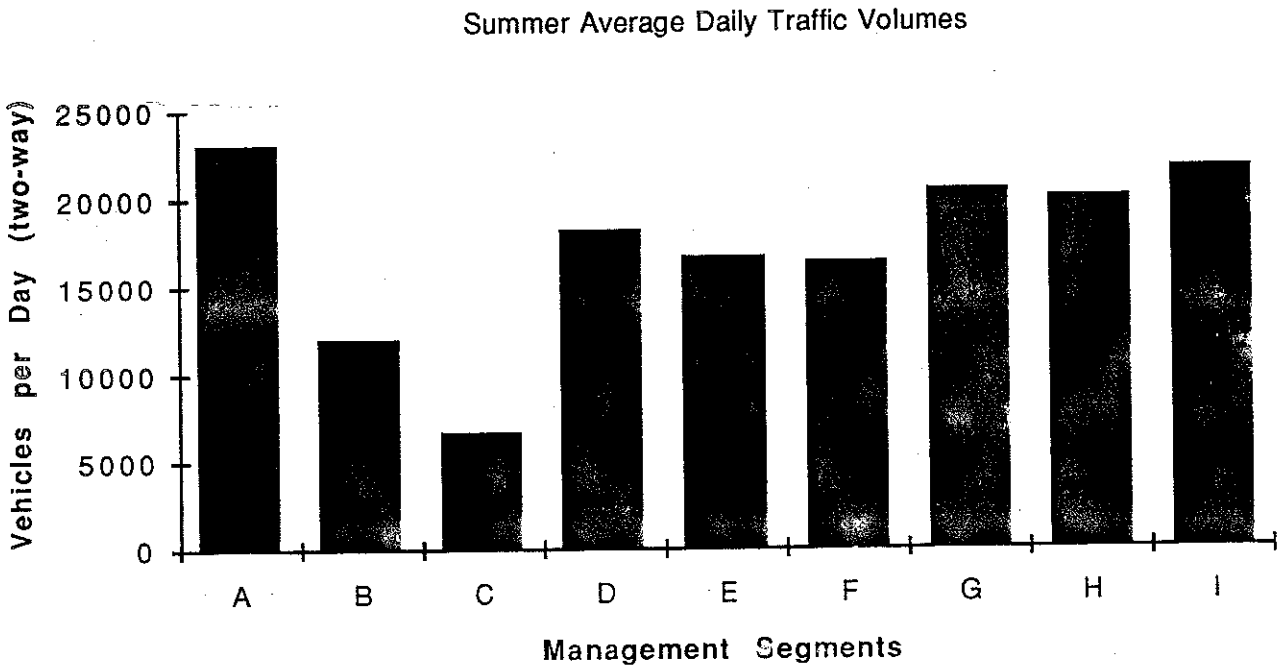
approximately 22,000 vehicles per day on Route 28 at either end of the study area. Peak season traffic volumes at selected locations are presented in Figure 2.1. These volumes can be compared to average annual traffic volumes, shown in Figure 2.2 to illustrate the seasonal traffic increase. The average seasonal increase in traffic volumes from average annual volumes to July volumes was almost 37% in 1991. The Commission's *1991 Traffic Counting Report* can be referred to for a more in-depth discussion of seasonal traffic fluctuations.

Seasonal P.M. Peak Hour Volumes

Seasonal P.M. Peak Hour volumes for the selected locations are presented in Figure 2.3. The highest flow occurs along the segment between Route 6A and the Eastham/Orleans Rotary with about 1780 vehicles per hour. This segment is a confluence of Route 6A and Route 28, hence the sharp decline of volumes in the following segment. The lowest occurred in the third segment, very rural in character, from Orleans to Chatham with about 600 vehicles per hour. Volumes increase in the more commercially active segment from the Chatham Rotary into Harwich to about 1420 vehicles per hour, then decrease for the less active segment from Chatham Road to Routes 124/39 to about 1340 vehicles per hour. The four segments through the remainder of Harwich, Dennis, and Yarmouth generally have the highest volumes for their length: 1520, 1460, 1420, and 1540 vehicles per hour, respectively.

Seasonal P.M. Turning Movement Counts

Figure 2.4 shows a the results of all turning movement counts performed or collected for this report. A complete listing is available in the appendix.



Management Section	Intersection to Intersection	Segment Length (miles)
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B	Route 6A [0.50] to Eldredge Park Way/Tonsett Rd	0.75
C	Eldredge Park Way/Tonsett Rd [1.25] to Chatham Rotary	8.55
D	Chatham Rotary [9.80] to Chatham Road	4.60
E	Chatham Road [14.40] to Routes 124 & 39	2.70
F	Routes 124 & 39 [17.10] to Route 134	3.15
G	Route 134 [20.25] to N. Main/Main Streets (Yarmouth)	2.00
H	N. Main/Main Streets (Yarmouth) [22.25] to Town Brook Rd	4.50
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Figure 2.1 - Peak Season Daily Traffic Volumes

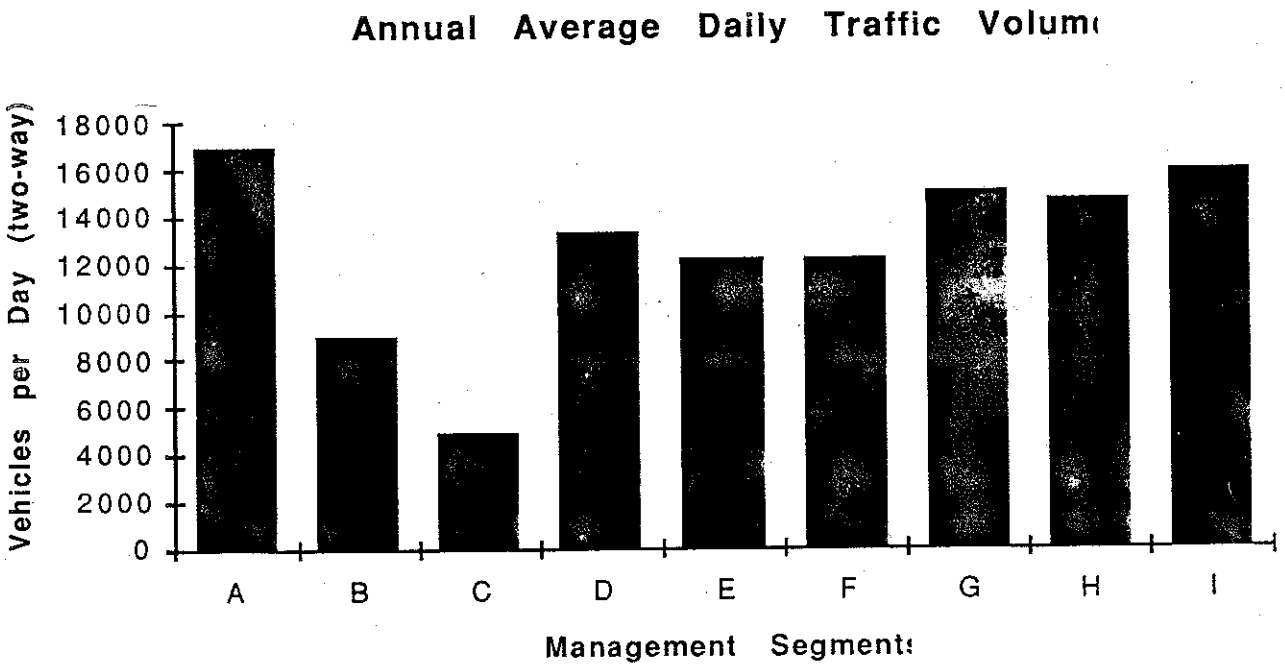

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Figure 2.2 - Average Daily Traffic Volumes

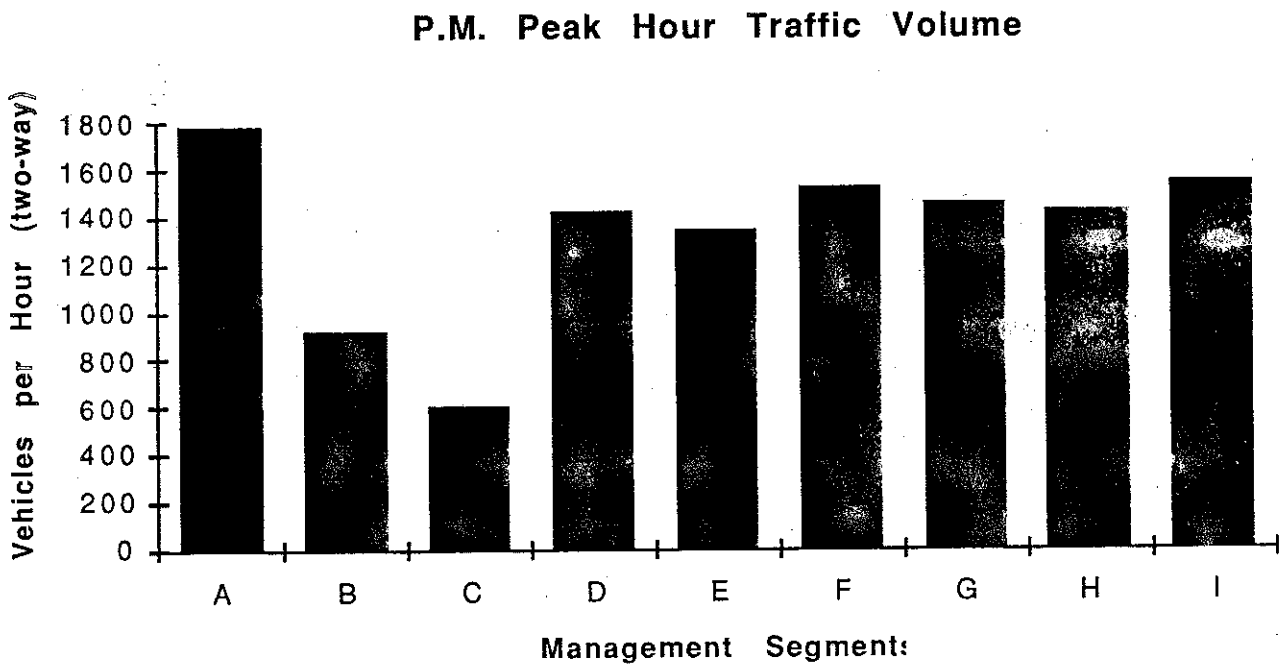

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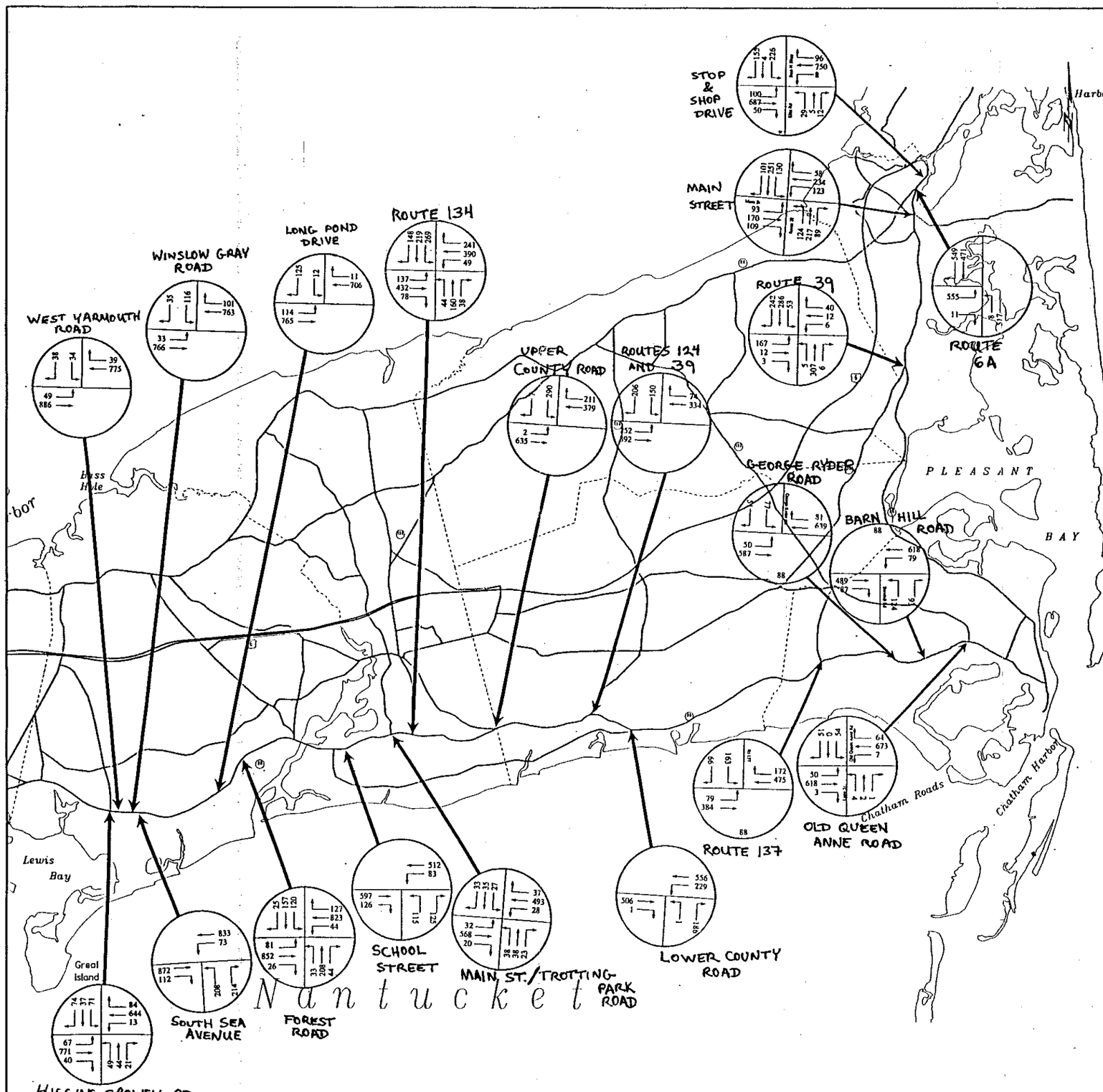
Figure 2.3 - Seasonal P.M. Peak Hour Volumes



CAPE COD REGIONAL TRANSPORTATION CLASSIFICATION MAP

Yarmouth, Dennis, Brewster, Harwich, Chatham, and Orleans

Figure 2.4
Seasonal P.M. Peak Hour Turning Movements

DATA SOURCES AND OTHER INFORMATION

Road Classification System: CCC transportation department staff, (1991) (See Regional Policy Plan for Details)

Public Bus Routes: Peter Pan, Bonanza, Plymouth and Brockton, and Regional Transit Authority bus schedules. (1990)

Railroads: MassGIS, 1:100,000, 1988

Airports: MacConnel Land use data (1990)

Shoreline, ponds, coastline, major roads, town boundaries: MassGIS, 1:100,000, 1988

Features not provided in digital form were digitized by Cape Cod Commission GIS staff, 1990.

MacConnell land use is from June 1990 aerial photo interpretation as digitized by the Resource Mapping - Land Information Systems, Department of Forestry and Wildlife Management, University of Massachusetts, Amherst in cooperation with EOEA MassGIS Project.

Land Use · Roads · DCPCs · Parcels · DRIs · Environmental · Demographics
Cape Cod Commission
GIS Services

This map was produced by the Cape Cod Commission's Geographic Information System department and Traffic Department for the Regional Policy Plan.
The map is illustrative and all depicted boundaries are approximate. It is not intended to be used for survey or legal purposes.

Precise boundaries and designations should be further refined through towns' Local Comprehensive Plans.

Map created Nov. 11, 1991

SAFETY OVERVIEW

Accident data for the entire study area section of Route 28 were provided by MHD for the years 1988, 1989, and 1990. For this draft of the existing conditions report a full safety analysis will not be presented. However, our analysis has yielded the following findings:

A total of 1232 accidents occurred during the study period on Route 28, of which 483 were recorded in sufficient detail to ascertain their location. Of these 483, 282 were Property Damage Only Accidents, 199 were Injury Accidents, and 2 accidents included Fatalities. It was assumed in the analysis that the 749 un-locatable accidents occurred in a distribution consistent with the severity and general location of the 482 locatable accidents. Therefore, the values presented in the results are factored to account for all 1232 accidents, not just the 483 with identifiable locations.

Figure 2.5 shows the overall density of accidents along the corridor by management segment. Notice that the general trend begins with a moderate amount for the segment from the rotary to Route 6A, drops severely in the lesser travelled and developed portions of Orleans and Chatham, then increases dramatically through the segments approaching Hyannis. This relationship is shown in another way in Figure 2.6 by accident severity.

The accident severity method used in this study is called the Equivalent Property Damage Only (EPDO) method. This method requires assigning a numerical value for the type and degree of severity. Consistent with the state of Massachusetts' methodology, accidents involving a fatality are given 10, accidents involving personal injury are given a 5, and accidents involving property damage only are given a 1. The total EPDO is then calculated for each segment. The relationships of the segments' may be more dramatic in Figure 2.6 than in Figure 2.5, since the more severe accidents have a greater effect on the results.

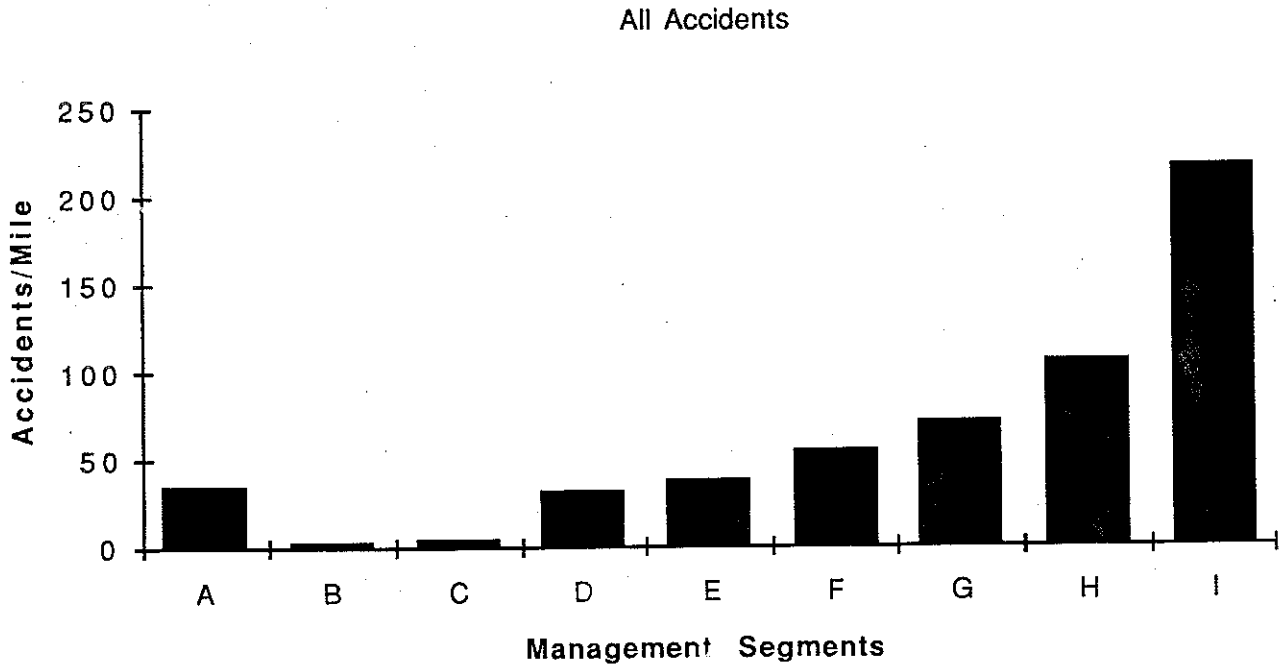


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Figure 2.5 - Accidents Per Mile by Management Segment

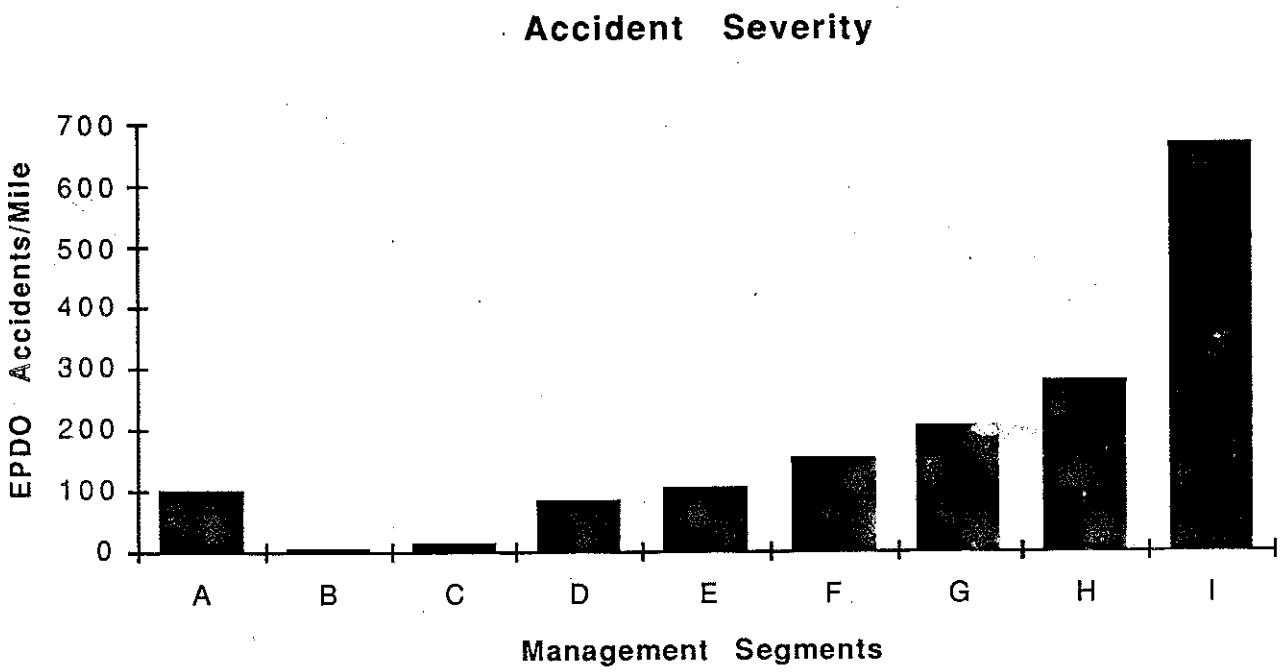

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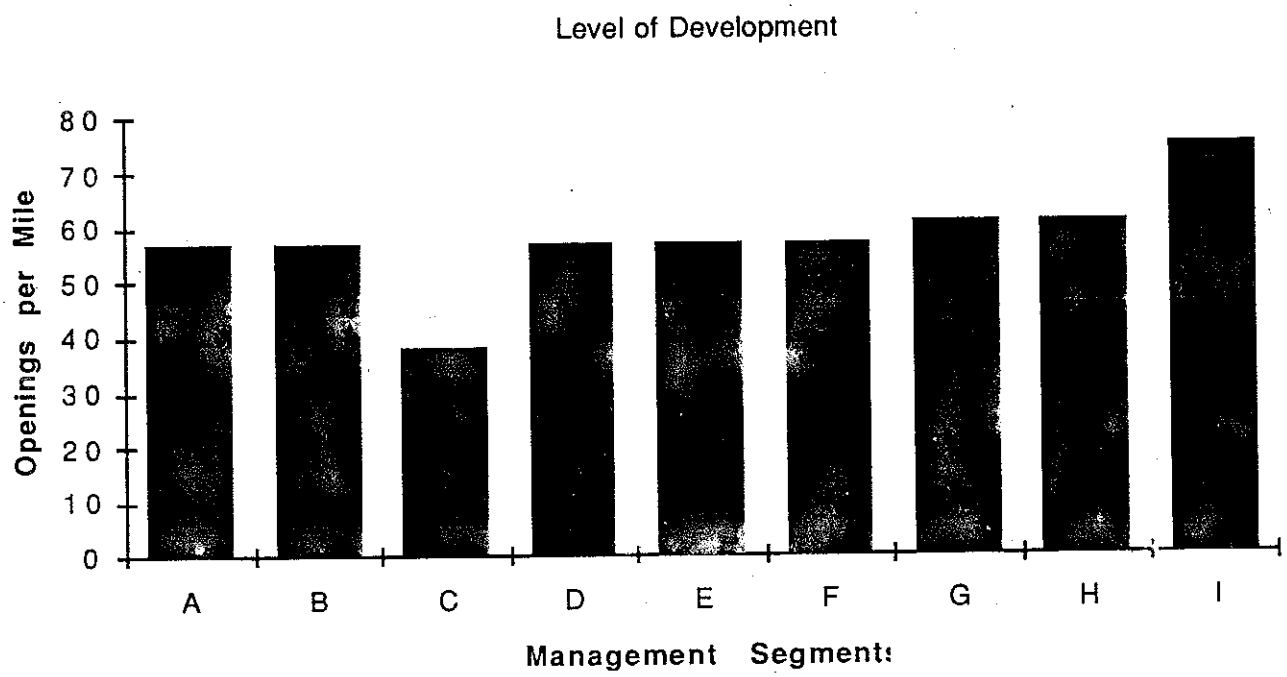
Figure 2.6 - Accident Severity by Management Segment

LAND USE & LEVEL OF DEVELOPMENT

Characteristics such as mileage,the number of intersecting street openings (a street crossing the route is counted as having two openings), and the number of private (including commercial as well as residential) driveways, for each segment are tallied to determine the total number of openings, the density of openings per mile, and the "Level of Development" (L.O.D.). The category L.O.D. is made in reference to Access Management for Streets and Highways published by the Federal Highway Administration in 1982.

Route 28 is generally a two lane highway in the study area. Land use varies along the route. Typical land uses are: rural, residential and commercial. Commercial activity ranges from historic "Main Street" to "tourist-oriented" strip development. Curb cut densities (including street) in the most developed segments range from 61 to 75 openings per mile. Density in the least developed segment of Route 28 is about 38 openings per mile. The remaining segments have densities of about 57 openings per mile. These densities are presented in Figure 2.7.

Although each access point is a means of convenience for local travel, these are a source of conflict for through travel. L.O.D. can be a key indicator of the safety deficiencies of these segments and can be referred to when examining the concentrations of accidents in the following chapter. The hazards of unchecked curb cut growth are magnified by inadequate spacing: on the average, the construction of each new curb cut decreases by half the existing spacing for that roadway segment.



Management Section	Intersection to Intersection	Segment Length (miles)
A	Eastham/Orleans Rotary [0.00] to Route 6A	0.50
B	Route 6A [0.50] to Eldredge Park Way/Tonsett Rd	0.75
C	Eldredge Park Way/Tonsett Rd [1.25] to Chatham Rotary	8.55
D	Chatham Rotary [9.80] to Chatham Road	4.60
E	Chatham Road [14.40] to Routes 124 & 39	2.70
F	Routes 124 & 39 [17.10] to Route 134	3.15
G	Route 134 [20.25] to N. Main/Main Streets (Yarmouth)	2.00
H	N. Main/Main Streets (Yarmouth) [22.25] to Town Brook Rd	4.50
I	Town Brook Rd [26.75] to Yarmouth/Barn. town line [27.30]	0.55

Figure 2.7 - Level of Development

CAPACITY ANALYSIS

Results of capacity analysis for selected Route 28 links and intersections are presented in Table 2.1. The results for the segments are consistent with the other factors mentioned above. The first segment with its relatively high volume has a low level of service, but not so low as the segments from Chatham center through Yarmouth. This is due to the additional capacity available by the 4-lane cross-section from the Rotary to Route 6A. The rural segments from Orleans to Chatham experience comparatively better volume/capacity and levels of service. The selected intersections' capacity analyses may or may not be representative of their segments as a whole; the reader should consult the full listing in the appendix. A different summary of the capacity analyses is presented in Figure 2.8. Most intersections referred to in Figure 2.4 now are shown with the existing P.M. Peak Hour Peak Season level of service for each. The diagrams for the unsignalized locations indicate the critical maneuvers and reserve capacity upon which the level of service is based. Information for signalized locations includes the average vehicular delay and the level of service.

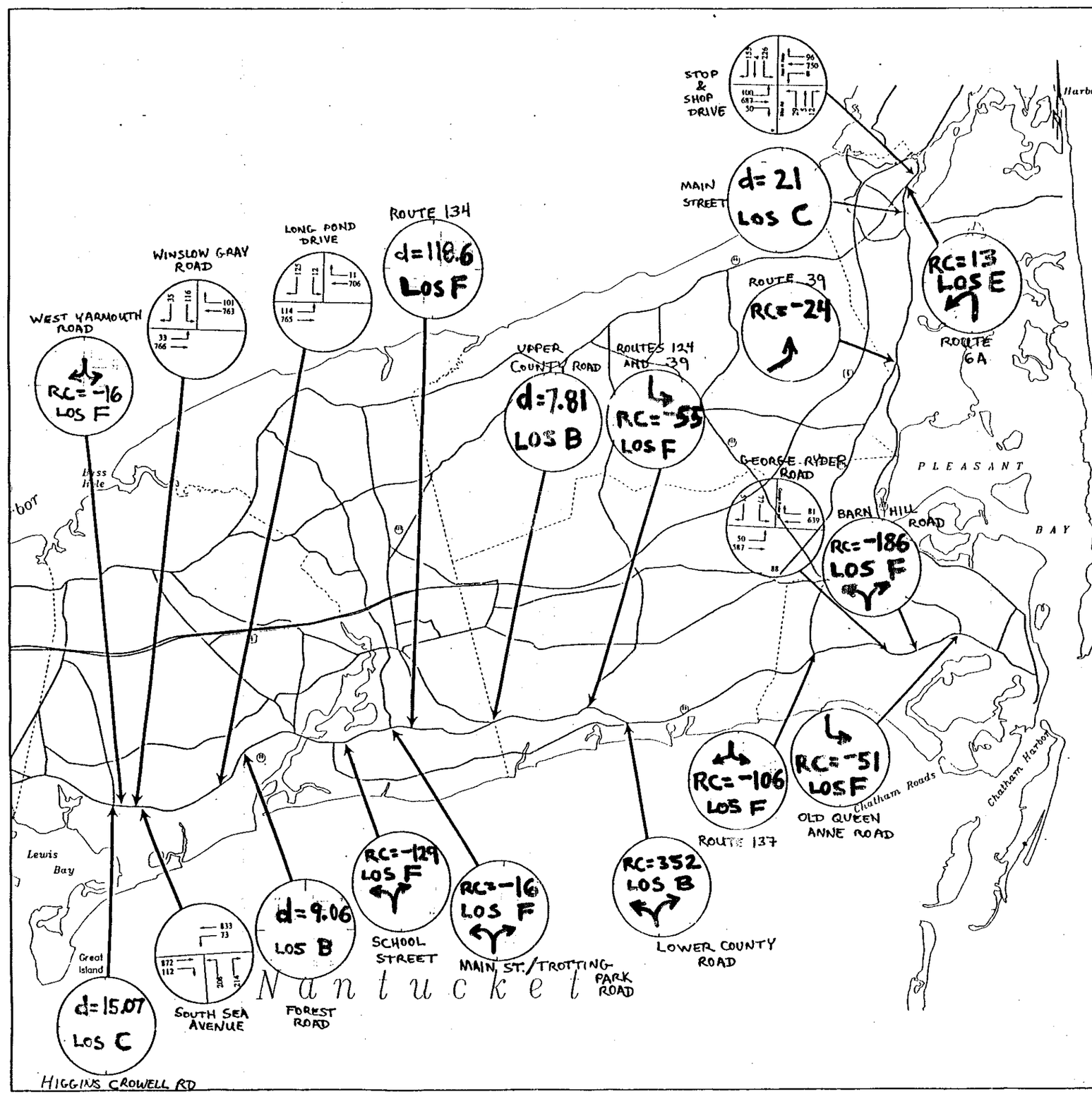
TABLE 2.1 - Route 28 Capacity Analyses

P.M Peak Hour Existing Summer Conditions

	MANAGEMENT SEGMENTS								
	A	B	C	D	E	F	G	H	I
SELECTED LINK ANALYSES									
Downbound Volumes	903	429	282	673	597	718	779	673	792
Upbound Volumes	875	487	318	744	746	571	685	749	747
Two-Way Volumes	1778	916	600	1417	1343	1288	1464	1420	1539
V/C	0.69	0.50	0.33	0.70	0.68	0.66	0.71	0.71	0.73
LOS*	D	D	D	E	E	E	E	E	E
SELECTED INTERSECTION ANALYSES									
Reserve Capacity of Critical Manuever	0	n/a	-24	-51	352	n/a	-16	n/a	-158
Average Delay	n/a	21.02	n/a	n/a	n/a	118.57	n/a	9.06	n/a
LOS**	E	C	F	F	B	F	F	B	F

* Note: LOS based on service level flow rates.
**Note: LOS based on average seconds of delay for signalized locations or reserve capacity of critical manuever for unsignalized intersections.

Segment	Selected Representative Link	Selected Representative Intersection
A	Eastham/Orleans Rotary to Canal St	Route 6A
B	Main St to Eldredge Pkwy	Main Street (Orleans)
C	Route 39 to Pleasant Bay Rd (Orleans-Harwich t.l.)	Route 39 (Orleans)
D	Queen Anne Rd to Old Queen Anne Rd	Old Queen Anne Rd (north leg)
E	Bank St to Lower County Rd	Lower County Road
F	Depot St (east) to Upper County Rd (Har.-Dennis t.l.)	Route 134
G	School St to N. Main St (Dennis-Yarmouth t.l.)	Main St (Dennis)/Trotting Pk
H	Forest Rd to Main St (S. Yarmouth)	Forest Road
I	E. Main St (Hyannis) to Yarmouth Rd (Yarmouth-Barnstable t.l.)	Camp Street



CAPE COD REGIONAL TRANSPORTATION CLASSIFICATION MAP

Yarmouth, Dennis, Brewster, Harwich, Chatham, and Orleans

Figure 2.8
Peak Season Intersection Levels of Service

DATA SOURCES AND OTHER INFORMATION

Road Classification System: CCC transportation department staff, (1991) (See Regional Policy Plan for details)

Public Bus Routes: Peter Pan, Bonanza, Plymouth and Brockton, and Regional Transit Authority bus schedules. (1990)

Railroads: MassGIS, 1:100,000, 1988

Airports: MassCensus Land use data (1990)

Shoreline, ponds, coastline, major roads, town boundaries: MassGIS, 1:100,000, 1988

Features not provided in digital form were digitized by Cape Cod Commission GIS staff, 1990.

MassCensus land use is from June 1990 aerial photo interpretation as digitized by the Resource Mapping - Land Information Systems, Department of Forestry and Wildlife Management, University of Massachusetts, Amherst in cooperation with EOEA MassGIS Project.

This map was produced by the Cape Cod Commission's Geographic Information System department and Traffic Department for the Regional Policy Plan.
The map is illustrative and all depicted boundaries are approximate.
It is not intended to be used for survey or legal purposes.

Precise boundaries and designations should be further refined through towns' Local Comprehensive Plans.

Map created Nov. 11, 1991

CONCLUSION

The Route 28 Corridor through this section of Cape Cod is characterized by a variety of problems and opportunities. In the Future Conditions Report to be submitted in May 1992, alternatives will be developed through a series of meetings with public officials from each of the study area towns. Forecasts of the impact future land use activities on travel demand will be evaluated against alternatives regarding the three elements of traffic impacts - the supply: roadway improvements and new roadway construction; demand: the type, intensity and quantity of development generating traffic; and travel demand management: the timing and efficiency of traffic using the network (through flextime, car-pooling, etc.).

Presentation of information in the Final Draft Report to be submitted at the end of August 1992, will include a higher level of detail base on the management section methodology introduced in this report. For each management section information will be provided including current and projected volumes and capacity analyses. Safety analyses will also be further detailed.

APPENDICES

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... Rte 28 ms00.50
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-12-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..... 5 (TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES..... 0
PERCENTAGE OF RECREATIONAL VEHICLES.. 0
DESIGN SPEED (MPH)..... 50
PEAK HOUR FACTOR..... 1
DRIVER POPULATION FACTOR..... 1 (WEEKDAY/COMMUTER)
LANE WIDTH (FT)..... 12
OBSTRUCTIONS..... NO
DISTANCE (FT) FROM ROADWAY EDGE..... 0
TYPE OF MULTILANE HIGHWAY..... SUBURBAN, UNDIVIDED

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.97	0.88	1.00	0.80

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES..... 2
INPUT VOLUME..... 1778
V/C RATIO..... .69
LEVEL OF SERVICE.....D
MAX. SERVICE FLOW RATE (pcphpl).. 1307
SPEED (mph)..... 37
DENSITY (pcpmpl)..... 38

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms01.25
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	46 / 54
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.98	.95
B	2.2	2	2.5	.7	.98	.94
C	2.2	2	2.5	.7	.98	.94
D	2	1.6	1.6	.7	.98	.95
E	2	1.6	1.6	.88	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 916
ACTUAL FLOW RATE: 916

LOS	SERVICE FLOW RATE	V/C
A	73	.04
B	289	.16
C	577	.32
D	1038	.57
E	2290	1

LOS FOR GIVEN CONDITIONS: D

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms09.80
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	47 / 53
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.98	.95
B	2.2	2	2.5	.7	.98	.94
C	2.2	2	2.5	.7	.98	.94
D	2	1.6	1.6	.7	.98	.95
E	2	1.6	1.6	.88	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 600
ACTUAL FLOW RATE: 600

LOS	SERVICE FLOW RATE	V/C
A	73	.04
B	291	.16
C	581	.32
D	1045	.57
E	2304	1

LOS FOR GIVEN CONDITIONS: D

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... te 28 ms14.40
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	47 / 53
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.98	.95
B	2.2	2	2.5	.7	.98	.94
C	2.2	2	2.5	.7	.98	.94
D	2	1.6	1.6	.7	.98	.95
E	2	1.6	1.6	.88	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1417
ACTUAL FLOW RATE: 1417

LOS	SERVICE FLOW RATE	V/C
A	73	.04
B	291	.16
C	581	.32
D	1045	.57
E	2304	1

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms17.10
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	44 / 56
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.96	.95
B	2.2	2	2.5	.7	.96	.94
C	2.2	2	2.5	.7	.96	.94
D	2	1.6	1.6	.7	.96	.95
E	2	1.6	1.6	.88	.96	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1343
ACTUAL FLOW RATE: 1343

LOS	SERVICE FLOW RATE	V/C
A	72	.04
B	285	.16
C	570	.32
D	1026	.57
E	2262	1

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms20.25
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	55 / 45
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.97	.95
B	2.2	2	2.5	.7	.97	.94
C	2.2	2	2.5	.7	.97	.94
D	2	1.6	1.6	.7	.97	.95
E	2	1.6	1.6	.88	.97	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1288
ACTUAL FLOW RATE: 1288

LOS	SERVICE FLOW RATE	V/C
A	72	.04
B	287	.16
C	574	.32
D	1032	.57
E	2276	1

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms26.75
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	47 / 53
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.98	.95
B	2.2	2	2.5	.7	.98	.94
C	2.2	2	2.5	.7	.98	.94
D	2	1.6	1.6	.7	.98	.95
E	2	1.6	1.6	.88	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1420
ACTUAL FLOW RATE: 1420

LOS	SERVICE FLOW RATE	V/C
A	73	.04
B	291	.16
C	581	.32
D	1045	.57
E	2304	1

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms22.25
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	53 / 47
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.98	.95
B	2.2	2	2.5	.7	.98	.94
C	2.2	2	2.5	.7	.98	.94
D	2	1.6	1.6	.7	.98	.95
E	2	1.6	1.6	.88	.98	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1464
ACTUAL FLOW RATE: 1464

LOS	SERVICE FLOW RATE	V/C
A	73	.04
B	291	.16
C	581	.32
D	1045	.57
E	2304	1

LOS FOR GIVEN CONDITIONS: E

1985 HCM:TWO-LANE HIGHWAYS
****

FACILITY LOCATION.... Rte 28 ms27.30
ANALYST..... lam
TIME OF ANALYSIS..... 91 Summ P.M. Peak
DATE OF ANALYSIS..... 08-11-1991
OTHER INFORMATION....

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS.....	5
PERCENTAGE OF BUSES.....	0
PERCENTAGE OF RECREATIONAL VEHICLES.....	0
DESIGN SPEED (MPH).....	50
PEAK HOUR FACTOR.....	1
DIRECTIONAL DISTRIBUTION (UP/DOWN).....	51 / 49
LANE WIDTH (FT).....	12
USABLE SHOULDER WIDTH (AVG. WIDTH IN FT.)...	0
PERCENT NO PASSING ZONES.....	100

B) CORRECTION FACTORS

LEVEL TERRAIN

LOS	E_T	E_B	E_R	f_w	f_d	f_{HV}
A	2	1.8	2.2	.7	.99	.95
B	2.2	2	2.5	.7	.99	.94
C	2.2	2	2.5	.7	.99	.94
D	2	1.6	1.6	.7	.99	.95
E	2	1.6	1.6	.88	.99	.95

C) LEVEL OF SERVICE RESULTS

INPUT VOLUME(vph): 1539
ACTUAL FLOW RATE: 1539

LOS	SERVICE FLOW RATE	V/C
A	74	.04
B	294	.16
C	588	.32
D	1058	.57
E	2333	1

LOS FOR GIVEN CONDITIONS: E

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RT 28/6A/STOP N SHOP DRIVEWAY - ORLEANS
XISTING CONDITIONS
ate:08-09-1991 time:09:34:47
LAST DATA SET NAMES LOADED OR SAVED
OLUME=O6PM91EX GEOMETRICS=O6EX SIGNAL=O6PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	103	730	52	0	2	0	0.0	12.0	0.0	0
WB	8	778	91	0	2	0	0.0	12.0	0.0	0
B	30	5	10	1	1	0	12.0	12.0	0.0	0
B	246	5	153	1	1	0	15.0	15.0	0.0	0

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS		ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.950	0	7.0	3
B	0.0%	0.0%	N	0	0	.950	0	7.0	3
NB	0.0%	0.0%	N	0	0	.950	0	7.0	3
SB	0.0%	0.0%	N	0	0	.950	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*		*	*	*				*				*		35.0	0	A
2			*				*		*	*	*		*	*	*		25.0	0	A

YCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	103	730	52	.950	108	768	55
WB	8	778	91	.950	8	819	96
B	30	5	10	.950	32	5	11
SB	246	5	153	.950	259	5	161

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	932	2	1.05	978	0.12	0.06
B	LT-TH-RT	923	2	1.05	969	0.01	0.10
B	LT	32	1	1.00	32	1.00	0.00
NB	TH-RT	16	1	1.00	16	0.00	0.67
B	LT	259	1	1.00	259	1.00	0.00
B	TH-RT	166	1	1.00	166	0.00	0.97

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

EFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
ASTBOUND	8	819	96	100	100	58	0	2	0	883
ESTBOUND	108	768	55	100	100	58	0	2	0	909
NORTHBOUND	259	5	161	100	100	42	1	1	0	72
OUTHBOUND	32	5	11	100	100	42	1	1	0	10

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	1.000	1.000	1.000	1.000	1.000	0.991	0.759	2710
WB	LT-TH-RT	1800	2	1.000	1.000	1.000	1.000	1.000	1.000	0.984	0.978	3465
NB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.854	1538
NB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.900	1.000	1620
SB	LT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	1.000	0.927	1835
SB	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.855	1.000	1692

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	60	35	2	932	932	108	0.12	2	883	0.01
WB	60	35	2	923	923	8	0.01	2	909	0.12
NB	60	25	1	32	16	32	1.00	1	72	0.00
SB	60	25	1	259	166	259	1.00	1	10	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3505	0.252	26.578	0.323	0.428	8.422	0.572	2.421	3.483	0.519	0.759
WB	2705	0.336	22.349	0.307	0.037	12.651	0.963	11.036	3.664	0.956	0.978
NB	1800	0.040	23.534	0.830	1.000	1.466	0.000	0.000	1.356	0.854	0.854
SB	1800	0.005	24.811	0.869	1.000	0.189	0.000	0.000	1.295	0.927	0.927

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	978	2710	0.36	0.58	1581	0.62	*
WB	LT-TH-RT	969	3465	0.28	0.58	2021	0.48	
NB	LT	32	1538	0.02	0.42	641	0.05	
NB	TH-RT	16	1620	0.01	0.42	675	0.02	
SB	LT	259	1835	0.14	0.42	764	0.34	*
SB	TH-RT	166	1692	0.10	0.42	705	0.24	

CYCLE= 60.0 LOST= 0.0 SUM V/S CRIT= 0.50 TOTAL V/C= 0.50

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.62	0.58	60.0	6.19	1581	0.54	0.85	5.72	B	6.5	
WB	LT-TH-RT	0.48	0.58	60.0	5.50	2021	0.14	0.85	4.79	A	6.4	
NB	LT	0.05	0.42	60.0	7.92	641	0.00	0.85	6.73	B	0.3	
NB	TH-RT	0.02	0.42	60.0	7.83	675	0.00	0.85	6.66	B	0.2	
SB	LT	0.34	0.42	60.0	9.03	764	0.11	0.85	7.77	B	2.5	
SB	TH-RT	0.24	0.42	60.0	8.60	705	0.03	0.85	7.34	B	1.6	

DIR	Delay	LOS
EB	5.72	B
WB	4.79	A
NB	6.71	B
SB	7.60	B

INTERSECTION DELAY = 5.70 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 0.0 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, 0.0 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:17:34:17
TE 28/RTE 6A/RTE 6A/28 - ORLEANS

AST DATASETS LOADED OR SAVED
OLUME=05PM91EX GEOMETRICS=05EX
KEY: A- -B
|
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: YIELD
FROM C RT LANE: YIELD
PREVAILING SPEED: 35 MPH
AIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
PPROACH: C: RTE 28
HARED LEFT AND RIGHT TURN LANE: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: YES
IGHT TURN ACCELERATION LANE ON MAJOR: YES

IGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: RTE 6A	B: RTE 6A/28	C: RTE 28
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
IGHTS	0.00	0.00	0.00

APPROACH	A: RTE 6A			B: RTE 6A/28			C: RTE 28		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	555	11	471	549	0	8	0	517
PHF	0.88			0.97			0.84		
ADJ VOLUME	0	631	13	486	566	0	10	0	615
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			534			10	0	677

STEP 1 RIGHT TURNS FROM C:RTE 28

CONFLICTING FLOWS	637
CRITICAL GAPS	4.1
CAPACITY	815
ACTUAL CAPACITY	815

STEP 2 LEFT TURNS FROM B:RTE 6A/28

CONFLICTING FLOWS	643
CRITICAL GAPS	5.1
CAPACITY	590
CAPACITY USED	91%
IMPEDANCE FACTOR	0.13
ACTUAL CAPACITY	590

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:17:34:17
RTE 28/RTE 6A/RTE 6A/28 - ORLEANS

STEP 3 LEFT TURNS FROM C:RTE 28

CONFLICTING FLOWS	1688
CRITICAL GAPS	6.2
CAPACITY	81
ACTUAL CAPACITY	11

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	534	590	56	E	64.35	9.55
LT FROM C:	10	11	0	E	%13317.04	%1975.82
RT FROM C:	677	815	138	D	26.14	0.08

INCH PROGRAM VERSION DATE 4-29-1988
985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ORLEANS MAIN ST
ROUTE 28
ate:08-11-1991 time:13:49:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=04PM91EX GEOMETRICS=04PM91 SIGNAL=04PM
OCATED IN CBD:N

OLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	93	170	109	1	1	0	12.0	12.0	0.0	0
WB	123	234	58	1	1	0	12.0	12.0	0.0	0
NB	124	217	89	1	1	0	12.0	12.0	0.0	0
B	130	251	101	1	1	0	12.0	12.0	0.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS		ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.820	0	7.0	3
WB	0.0%	0.0%	N	0	0	.890	0	7.0	3
B	0.0%	0.0%	N	0	0	.830	0	7.0	3
B	0.0%	0.0%	N	0	0	.780	0	7.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*						10.0	0	A
2									*	*	*		*	*	*		8.0	3	A
3	*	*	*		*	*	*										10.0	3	A

YCLE= 34.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
B	93	170	109	.820	113	207	133
WB	123	234	58	.890	138	263	65
NB	124	217	89	.830	149	261	107
B	130	251	101	.780	167	322	129

PART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
B	LT	113	1	1.00	113	1.00	0.00
EB	TH-RT	340	1	1.00	340	0.00	0.39
WB	LT	138	1	1.00	138	1.00	0.00
WB	TH-RT	328	1	1.00	328	0.00	0.20
NB	LT	149	1	1.00	149	1.00	0.00
NB	TH-RT	369	1	1.00	369	0.00	0.29
B	LT	167	1	1.00	167	1.00	0.00
B	TH-RT	451	1	1.00	451	0.00	0.29

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	138	263	65	100	100	100	1	1	0	328
WESTBOUND	113	207	133	100	100	100	1	1	0	340
NORTHBOUND	167	322	129	100	100	100	1	1	0	451
SOUTHBOUND	149	261	107	0	44	44	1	1	0	164

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.677	1218
EB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.941	1.000	1695
WB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.659	1187
WB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.970	1.000	1746
NB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1710
NB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.956	1.000	1721
SB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.963	1734
SB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.957	1.000	1723

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	34	10	1	113	340	113	1.00	1	328	0.00
WB	34	10	1	138	328	138	1.00	1	340	0.00
SB	34	8	1	167	451	167	1.00	1	164	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.182	4.650	0.670	1.000	5.350	0.000	0.000	1.679	0.677	0.677
WB	1800	0.189	4.406	0.662	1.000	5.594	0.000	0.000	1.699	0.659	0.659
SB	1800	0.091	5.396	0.773	1.000	2.604	0.000	0.000	1.456	0.963	0.963

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	113	1218	0.09	0.29	358	0.32	
EB	TH-RT	340	1695	0.20	0.29	498	0.68	*
WB	LT	138	1187	0.12	0.29	349	0.40	
WB	TH-RT	328	1746	0.19	0.29	514	0.64	
NB	LT	149	1710	0.06	0.29	715	0.21	*
NB	TH-RT	369	1721	0.21	0.53	911	0.40	
SB	LT	167	1734	0.10	0.24	408	0.41	
SB	TH-RT	451	1723	0.26	0.24	405	1.11	*

CYCLE= 34.0 LOST= 6.0 SUM V/S CRIT= 0.52 TOTAL V/C= 0.64

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 212 LEFT TURNS ON THE CHANGE INTERVAL AND 0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.32	0.29	34.0	7.10	358	0.18	0.85	6.18	B	0.8	
EB	TH-RT	0.68	0.29	34.0	8.06	498	2.65	0.85	9.10	B	2.3	
WB	LT	0.40	0.29	34.0	7.29	349	0.40	0.85	6.54	B	0.9	
WB	TH-RT	0.64	0.29	34.0	7.93	514	1.88	0.85	8.33	B	2.2	
NB	LT	0.21	0.53	34.0	3.22	715	0.02	1.00	3.24	A	1.0	
NB	TH-RT	0.40	0.53	34.0	3.64	911	0.17	0.85	3.24	A	1.6	
SB	LT	0.41	0.24	34.0	8.36	408	0.39	0.85	7.43	B	1.2	
SB	TH-RT	1.11	0.24	34.0	10.24	405	75.46	0.85	72.84	F	10.8	

DIR	Delay	LOS
EB	8.37	B
WB	7.80	B
NB	3.24	A
SB	55.20	E

INTERSECTION DELAY = 21.02 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 34 TO 34 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 34.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 13.4 SECONDS
for chosen cycle length 34.0
suggested timing phase 1 is 3.3 secs green, 0.0 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ROUTE 28/ELDRIDGE PARKWAY/TONSET RD
XISTING CONDITIONS
ate:08-09-1991 time:10:12:26
LAST DATA SET NAMES LOADED OR SAVED
OLUME=03PK89EX GEOMETRICS=03EX SIGNAL=03PK89EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	52	142	52	0	1	0	0.0	15.0	0.0	0
WB	20	141	7	0	1	0	0.0	15.0	0.0	0
B	57	319	31	0	1	0	0.0	12.0	0.0	0
B	5	273	80	0	1	0	0.0	12.0	0.0	0

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS		ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.900	0	7.0	3
B	0.0%	0.0%	N	0	0	.900	0	7.0	3
NB	0.0%	0.0%	N	0	0	.900	0	7.0	3
SB	0.0%	0.0%	N	0	0	.900	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*		*	*	*		35.0	0	A
2	*	*	*		*	*	*										30.0	0	A

YCLE= 75.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	52	142	52	.900	58	158	58
WB	20	141	7	.900	22	157	8
B	57	319	31	.900	63	354	34
SB	5	273	80	.900	6	303	89

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	273	1	1.00	273	0.21	0.21
WB	LT-TH-RT	187	1	1.00	187	0.12	0.04
B	LT-TH-RT	452	1	1.00	452	0.14	0.08
SB	LT-TH-RT	398	1	1.00	398	0.01	0.22

ART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
ASTBOUND	22	157	8	100	100	100	0	1	0	164
WESTBOUND	58	158	58	100	100	100	0	1	0	216
NORTHBOUND	6	303	89	100	100	100	0	1	0	392
SOUTHBOUND	63	354	34	100	100	100	0	1	0	389

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.871	0.954	1647

B	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.894	0.976	1728
B	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.890	0.876	1404
SB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.870	1.000	1566

UPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
B	75	30	1	273	216	58	0.21	1	164	0.12
B	75	30	1	187	164	22	0.12	1	216	0.21
NB	75	35	1	452	389	63	0.14	1	392	0.01
B	75	35	1	398	392	6	0.01	1	389	0.14

ALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1695	0.097	25.166	0.772	0.211	4.834	0.789	3.259	1.457	0.954	0.954
B	1641	0.131	23.197	0.740	0.119	6.803	0.881	5.183	1.520	0.976	0.976
NB	1781	0.220	23.700	0.630	0.140	11.300	0.860	7.045	1.786	0.876	0.876
SB	1621	0.240	22.380	0.632	0.014	12.620	0.986	11.992	1.780	1.000	1.000

APACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	273	1647	0.17	0.40	659	0.41	*
B	LT-TH-RT	187	1728	0.11	0.40	691	0.27	
NB	LT-TH-RT	452	1404	0.32	0.47	655	0.69	*
SB	LT-TH-RT	398	1566	0.25	0.47	731	0.54	

YCLE= 75.0 LOST=10.0 SUM V/S CRIT= 0.49 TOTAL V/C= 0.56

EVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.41	0.40	75.0	12.30	659	0.25	0.85	10.67	B	3.4	
WB	LT-TH-RT	0.27	0.40	75.0	11.50	691	0.05	0.85	9.82	B	2.3	
B	LT-TH-RT	0.69	0.47	75.0	11.96	655	2.16	0.85	12.00	B	5.0	
SB	LT-TH-RT	0.54	0.47	75.0	10.87	731	0.66	0.85	9.80	B	4.4	

IR	Delay	LOS
B	10.67	B
WB	9.82	B
B	12.00	B
B	9.80	B

INTERSECTION DELAY = 10.74 INTERSECTION LOS=B

HE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

OR A V/C RATIO OF .95 THE CYCLE SHOULD BE 20.6 SECONDS
or chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -6.6 secs yellow + red clear
uggested timing phase 2 is 0.0 secs green, -3.4 secs yellow + red clear

TRANSCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:08-09-1991 TIME:00:54:29
RTE 28/RTE 39/QUANSET ROAD - ORLEANS

LAST DATASETS LOADED OR SAVED
VOLUME=01PM91EX GEOMETRICS=01EX
KEY:

```
      D
      |
   A- -B
      |
      C
```

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM C RT LANE: STOP
FROM D: STOP
PREVAILING SPEED: 40 MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
MAIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: YES

MINOR STREET LANES

APPROACH: C: QUANSET RD
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

APPROACH: D: RTE 39
EXCLUSIVE LEFT TURN LANES: YES
EXCLUSIVE RIGHT TURN LANES: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

RIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: RTE 28	B: RTE 28 FROM C: QUANSET RD		D: RTE 39
LEFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00	0.00

APPROACH	A: RTE 28			B: RTE 28 FROM C: QUANSET RD			D: RTE 39					
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	307	6	53	286	242	6	12	40	167	12	3
PHF	0.73			0.88			0.73			0.84		
ADJ VOLUME	0	421	8	60	325	275	8	16	55	199	14	4
PERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	0			66			9	18	60	219	16	4

STEP 1 RIGHT TURNS FROM	C:QUANSET RD	D:RTE 39
CONFLICTING FLOWS	425	163
CRITICAL GAPS	5.9	5.9
CAPACITY	622	861
CAPACITY USED	10%	0%
IMPEDANCE FACTOR	0.94	1.00
ACTUAL CAPACITY	622	861

985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:08-09-1991 TIME:00:54:29
RTE 28/RTE 39/QUANSET ROAD - ORLEANS

STEP 2 LEFT TURNS FROM	B:RTE 28 FROM TH	A:RTE 28
CONFLICTING FLOWS	429	325
RITICAL GAPS	5.2	5.2
APACITY	734	824
CAPACITY USED	9%	0%
MPEDANCE FACTOR	0.95	1.00
CTUAL CAPACITY	734	824

TEP 3 THRU MOVES FROM	C:QUANSET RD	D:RTE 39
ONFLICTING FLOWS	810	814
CRITICAL GAPS	6.6	6.6
APACITY	298	296
APACITY USED	6%	5%
IMPEDANCE FACTOR	0.97	0.97
ACTUAL CAPACITY	282	280

STEP 4 LEFT TURNS FROM	C:QUANSET RD	D:RTE 39
ONFLICTING FLOWS	828	885
RITICAL GAPS	7.1	7.1
CAPACITY	249	226
CTUAL CAPACITY	228	194

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	66	734	668	A	5.39	0.10
LT FROM C:	9	228	219	C	16.42	0.04
TH FROM C:	18	282	264	C	13.63	0.07
RT FROM C:	60	622	562	A	6.41	0.11
LT FROM D:	219	194	-24	F	INFINITE	INFINITE
SHARED TH/RT FROM D:	20	324	305	B	11.82	0.06

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/QUEEN ANNE ROAD/CROWELL RD - CHATHAM
XISTING CONDITIONS
ate:08-09-1991 time:10:35:44
LAST DATA SET NAMES LOADED OR SAVED
OLUME=C4PM91EX GEOMETRICS=C4EX SIGNAL=C4PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	50	618	3	0	1	0	0.0	15.0	0.0	0
WB	7	673	64	0	1	0	0.0	15.0	0.0	0
B	2	3	4	0	1	0	0.0	12.0	0.0	0
B	54	0	51	0	1	0	0.0	12.0	0.0	0

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.890	0	7.0	3
B	0.0%	0.0%	N	0	0	.870	0	7.0	3
NB	0.0%	0.0%	N	0	0	.930	0	7.0	3
SB	0.0%	0.0%	N	0	0	.750	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*		*	*	*										35.0	0	A
2			*				*		*	*	*		*	*	*		25.0	0	A

YCLE= 70.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	50	618	3	.890	56	694	3
WB	7	673	64	.870	8	774	74
B	2	3	4	.930	2	3	4
SB	54	0	51	.750	72	0	68

ART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	754	1	1.00	754	0.07	0.00
WB	LT-TH-RT	855	1	1.00	855	0.01	0.09
B	LT-TH-RT	10	1	1.00	10	0.22	0.44
SB	LT-RT	140	1	1.00	140	0.51	0.49

ART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	8	774	74	100	100	50	0	1	0	810
WESTBOUND	56	694	3	100	100	50	0	1	0	696
NORTHBOUND	72	0	68	100	100	100	0	1	0	68
SOUTHBOUND	2	3	4	100	100	100	0	1	0	8

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.899	0.681	1213

WB	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.888	0.998	1755
NB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.840	1.000	1512
SB	LT-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.834	0.927	1393

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	70	35	1	754	698	56	0.07	1	810	0.01
WB	70	35	1	855	847	8	0.01	1	696	0.07
NB	70	25	1	10	8	2	0.22	1	68	0.51
SB	70	25	1	140	68	72	0.51	1	8	0.22

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1773	0.457	5.530	0.369	0.075	29.470	0.925	16.904	3.053	0.681	0.681
WB	1540	0.452	6.149	0.440	0.009	28.851	0.991	26.843	2.557	0.998	0.998
NB	1565	0.043	22.955	0.833	0.222	2.045	0.778	1.586	1.351	1.000	1.000
SB	1670	0.005	24.796	0.870	1.000	0.204	0.000	0.000	1.293	0.927	0.927

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	754	1213	0.62	0.50	607	1.24	*
WB	LT-TH-RT	855	1755	0.49	0.50	878	0.97	
NB	LT-TH-RT	10	1512	0.01	0.36	540	0.02	
SB	LT-RT	140	1393	0.10	0.36	497	0.28	*

CYCLE= 70.0 LOST=10.0 SUM V/S CRIT= 0.72 TOTAL V/C= 0.84

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	1.24	0.50	70.0	17.56	607	145.67	0.85	138.74	F	32.7	
WB	LT-TH-RT	0.97	0.50	70.0	12.97	878	18.11	0.85	26.42	D	10.4	
NB	LT-TH-RT	0.02	0.36	70.0	11.06	540	0.00	0.85	9.40	B	0.1	
SB	LT-RT	0.28	0.36	70.0	12.22	497	0.09	0.85	10.46	B	1.8	

DIR	Delay	LOS
EB	138.74	F
WB	26.42	D
NB	9.40	B
SB	10.46	B

INTERSECTION DELAY = 73.20 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 41.6 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -8.6 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, -1.4 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:08-09-1991 TIME:13:18:48
OUTE 28/OLD QUEEN ANNE RD/LIME ST - CHATHAM

AST DATASETS LOADED OR SAVED
OLUME=C3PM88EX GEOMETRICS=C3EX

```
KEY:    D
        |
     A- -B
        |
        C
```

ENERAL CHARACTERISTICS
OPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM D: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
AIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

PPROACH: C: LIME ST
EXCLUSIVE LEFT TURN LANES: NO
XCLUSIVE RIGHT TURN LANES: NO
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

PPROACH: D: OLD QUEEN ANNE
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
IGHT TURN ACCELERATION LANE ON MAJOR: NO

IGHT DISTANCE RESTRICTIONS (in seconds)

PPROACH	A: ROUTE 28	B: ROUTE 28	C: LIME ST	D: OLD QUEEN A
LEFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
IGHTS	0.00	0.00	0.00	0.00

PPROACH	A: ROUTE 28			B: ROUTE 28			C: LIME ST			D: OLD QUEEN A		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	50	618	3	7	673	47	1	2	4	62	0	52
PHF	0.89			0.93			0.44			0.75		
ADJ VOLUME	56	694	3	8	724	51	2	5	9	83	0	69
PERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	62			8			3	5	10	91	0	76

STEP 1 RIGHT TURNS FROM	C:LIME ST	D:OLD QUEEN ANNE
CONFLICTING FLOWS	696	749
CRITICAL GAPS	5.7	5.7
CAPACITY	461	430
CAPACITY USED	2%	18%
IMPEDANCE FACTOR	0.99	0.88
ACTUAL CAPACITY	461	430

985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:08-09-1991 TIME:13:18:48
ROUTE 28/OLD QUEEN ANNE RD/LIME ST - CHATHAM

STEP 2 LEFT TURNS FROM	B:ROUTE 28	A:ROUTE 28
CONFLICTING FLOWS	698	774
CRITICAL GAPS	5.1	5.1
CAPACITY	553	505
CAPACITY USED	1%	12%
IMPEDANCE FACTOR	0.99	0.92
ACTUAL CAPACITY	553	505

STEP 3 THRU MOVES FROM	C:LIME ST	D:OLD QUEEN ANNE
CONFLICTING FLOWS	1534	1510
CRITICAL GAPS	6.3	6.3
CAPACITY	101	106
CAPACITY USED	5%	0%
IMPEDANCE FACTOR	0.97	1.00
ACTUAL CAPACITY	93	97

STEP 4 LEFT TURNS FROM	C:LIME ST	D:OLD QUEEN ANNE
CONFLICTING FLOWS	1603	1524
CRITICAL GAPS	6.8	6.8
CAPACITY	70	81
ACTUAL CAPACITY	56	72

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	62	505	443	A	8.12	0.14
LT FROM B:	8	553	545	A	6.60	0.02
ALL MOVES FROM C:	18	146	129	D	28.00	0.14
ALL MOVES FROM D:	167	116	-51	F	INFINITE	INFINITE

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-09-1991 TIME:13:10:10
OUTE 28/BARNHILL RD - CHATHAM

AST DATASETS LOADED OR SAVED
OLUME=CBPM88EX GEOMETRICS=CBEX
KEY: A- -B
|
C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
PPROACH: C: BARNHILL RD
HARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

PPROACH	A: ROUTE 28	B: ROUTE 28	C: BARNHILL RD
EFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: ROUTE 28			B: ROUTE 28			C: BARNHILL RD		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
OLUME	0	489	87	79	618	0	124	0	93
PHF	0.86			0.86			0.75		
DJ VOLUME	0	569	101	92	719	0	165	0	124
ERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			101			182	0	136

TEP 1 RIGHT TURNS FROM C:BARNHILL RD

CONFLICTING FLOWS	619
RITICAL GAPS	5.7
APACITY	510
ACTUAL CAPACITY	510

STEP 2 LEFT TURNS FROM B:ROUTE 28

CONFLICTING FLOWS	670
RITICAL GAPS	5.1
APACITY	572
CAPACITY USED	18%
MPEDANCE FACTOR	0.88
CTUAL CAPACITY	572

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-09-1991 TIME:13:10:10
ROUTE 28/BARNHILL RD - CHATHAM

STEP 3 LEFT TURNS FROM	C:BARNHILL RD
CONFLICTING FLOWS	1430
CRITICAL GAPS	6.8
CAPACITY	97
ACTUAL CAPACITY	85

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	101	572	471	A	7.64	0.21
ALL MOVES FROM C:	318	133	-186	F	INFINITE	INFINITE

CINCH PROGRAM VERSION DATE 4-29-1988
985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-09-1991 TIME:12:59:59
ROUTE 28/ROUTE 137 - CHATHAM

LAST DATASETS LOADED OR SAVED
VOLUME=C1PM88EX GEOMETRICS=C1PM
KEY: A- -B
|
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
PREVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: Y

MINOR STREET LANES
APPROACH: C: ROUTE 137
SHARED LEFT AND RIGHT TURN LANE: YES
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

RIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: ROUTE 28	B: ROUTE 28	C: ROUTE 137
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: ROUTE 28			B: ROUTE 28			C: ROUTE 137		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	475	172	79	384	0	163	0	66
PHF	0.98			0.94			0.79		
ADJ VOLUME	0	485	176	84	409	0	206	0	84
PERCENT GRADE	0.00			0.00			0.00		
MASS CAR/HR	0			92			227	0	92

STEP 1 RIGHT TURNS FROM C:ROUTE 137

CONFLICTING FLOWS	485
CRITICAL GAPS	5.7
CAPACITY	605
ACTUAL CAPACITY	605

STEP 2 LEFT TURNS FROM B:ROUTE 28

CONFLICTING FLOWS	485
CRITICAL GAPS	5.1
CAPACITY	707
CAPACITY USED	13%
IMPEDANCE FACTOR	0.92
ACTUAL CAPACITY	707

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-09-1991 TIME:12:59:59
ROUTE 28/ROUTE 137 - CHATHAM

STEP 3 LEFT TURNS FROM C:ROUTE 137

ONFLICTING FLOWS	1065
RITICAL GAPS	6.8
CAPACITY	185
CTUAL CAPACITY	169

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	92	707	615	A	5.86	0.15
LL MOVES FROM C:	319	213	-106	F	INFINITE	INFINITE

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:17:28:21
TE 28/LOWER COUNTY RD - HARWICH

AST DATASETS LOADED OR SAVED
OLUME=H3PM91EX GEOMETRICS=H3EX

```
KEY: A- -B
       |
       C
```

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: LOWER COUNTY R
HARED LEFT AND RIGHT TURN LANE: YES
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: YES
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: ROUTE 28	B: ROUTE 28	C: LOWER COUNT
EFTS	0.00	0.00	0.00
HRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: ROUTE 28			B: ROUTE 28			C: LOWER COUNT		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
OLUME	0	506	1	229	556	0	1	0	186
PHF	0.91			0.85			0.83		
ADJ VOLUME	0	556	1	269	654	0	1	0	224
ERCENT GRADE	0.00			0.00			0.00		
ASS CAR/HR	0			296			1	0	247

TEP 1 RIGHT TURNS FROM	C:LOWER COUNTY R
CONFLICTING FLOWS	557
RITICAL GAPS	5.2
APACITY	634
ACTUAL CAPACITY	634

TEP 2 LEFT TURNS FROM	B:ROUTE 28
CONFLICTING FLOWS	557
RITICAL GAPS	5.1
APACITY	652
CAPACITY USED	45%
MPEDANCE FACTOR	0.62
CTUAL CAPACITY	652

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:17:28:21
RTE 28/LOWER COUNTY RD - HARWICH

STEP 3 LEFT TURNS FROM	C:LOWER COUNTY R
ONFLICTING FLOWS	1480
RITICAL GAPS	6.8
CAPACITY	88
^CTUAL CAPACITY	55

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	296	652	355	B	10.13	0.83
LL MOVES FROM C:	248	600	352	B	10.22	0.70

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:14:45:40
TE 28/124/39 - HARWICH

AST DATASETS LOADED OR SAVED
OLUME=H2PM91EX GEOMETRICS=H2EX
KEY: A- -B
|
C
GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
FROM C RT LANE: YIELD
PREVAILING SPEED: 35 MPH
AIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
PPROACH: C: RTE 124/39
HARED LEFT AND RIGHT TURN LANE: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: YES
IGHT TURN ACCELERATION LANE ON MAJOR: YES

IGHT DISTANCE RESTRICTIONS (in seconds)

PPROACH	A: RTE 28	B: RTE 28	C: RTE 124/39
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
IGHTS	0.00	0.00	0.00

PPROACH	A: RTE 28			B: RTE 28			C: RTE 124/39		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	334	74	252	392	0	150	0	206
HF	0.90			0.93			0.97		
DJ VOLUME	0	371	82	271	422	0	155	0	212
ERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			298			170	0	234

STEP 1 RIGHT TURNS FROM C:RTE 124/39

ONFLICTING FLOWS	412
RITICAL GAPS	4.1
CAPACITY	1001
CTUAL CAPACITY	1001

STEP 2 LEFT TURNS FROM B:RTE 28

ONFLICTING FLOWS	453
RITICAL GAPS	5.1
CAPACITY	732
APACITY USED	41%
MPEDANCE FACTOR	0.67
ACTUAL CAPACITY	732

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:14:45:40
RTE 28/124/39 - HARWICH

STEP 3 LEFT TURNS FROM C:RTE 124/39

ONFLICTING FLOWS	1105
RITICAL GAPS	6.8
CAPACITY	172
ACTUAL CAPACITY	115

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	298	732	434	A	8.29	0.69
T FROM C:	170	115	-55	F	INFINITE	INFINITE
RT FROM C:	234	1001	767	A	4.69	0.22

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/UPPER COUNTY RD - DENNIS
XISTING CONDITIONS
ate:08-08-1991 time:23:19:50
LAST DATA SET NAMES LOADED OR SAVED
OLUME=D5PM91EX GEOMETRICS=D5EX SIGNAL=D5PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	0	635	0	0	1	0	0.0	15.0	0.0	0
WB	0	379	211	0	1	1	0.0	12.0	12.0	0
B	0	0	0	0	0	0	0.0	0.0	0.0	0
B	290	0	7	1	0	1	12.0	0.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS		ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.950	0	7.0	3
B	0.0%	0.0%	N	0	0	.920	0	7.0	3
B	0.0%	0.0%		0	0	.000	0	7.0	0
SB	0.0%	0.0%	N	0	0	.880	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*				*	*										30.0	0	A
2							*							*		*	20.0	0	A

YCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	635	0	.950	0	668	0
WB	0	379	211	.920	0	412	229
B	0	0	0	.000	0	0	0
B	290	0	7	.880	330	0	8

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	668	1	1.00	668	0.00	0.00
WB	TH	412	1	1.00	412	0.00	0.00
B	RT	229	1	1.00	229	0.00	1.00
SB	LT	330	1	1.00	330	1.00	0.00
SB	RT	8	1	1.00	8	0.00	1.00

ART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

ATURATION FLOW ADJUSTMENT WORKSHEET

IR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1980
WB	TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1800
WB	RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1530

EB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1710
EB	RT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1428

CAPACITY ANALYSIS WORKSHEET

IR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	668	1980	0.34	0.50	990	0.68	*
WB	TH	412	1800	0.23	0.50	900	0.46	
EB	RT	229	1530	0.15	1.00	1530	0.15	
EB	LT	330	1710	0.19	0.33	570	0.58	*
SB	RT	8	1428	0.01	0.33	476	0.02	

CYCLE= 60.0 LOST=10.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.64

LEVEL OF SERVICE WORKSHEET

IR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.68	0.50	60.0	8.60	990	1.29	0.85	8.41	B	5.6	
WB	TH	0.46	0.50	60.0	7.39	900	0.27	0.85	6.51	B	3.4	
EB	RT	0.15	1.00	60.0	0.00	1530	0.00	0.85	0.00	A	0.0	
EB	LT	0.58	0.33	60.0	12.55	570	1.09	1.00	13.64	B	3.7	
SB	RT	0.02	0.33	60.0	10.19	476	0.00	0.85	8.66	B	0.1	

IR	Delay	LOS
EB	8.41	B
WB	4.18	A
EB	13.52	B

INTERSECTION DELAY = 7.81 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 22.6 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -6.4 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, -3.6 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/RTE 134/SWAN RIVER RD - DENNIS
XISTING CONDITIONS
ate:08-09-1991 time:02:04:27
LAST DATA SET NAMES LOADED OR SAVED
OLUME=D3PM91EX GEOMETRICS=D3PM91EX SIGNAL=D3PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	137	432	78	0	1	0	0.0	12.0	0.0	0
WB	49	390	241	0	1	0	0.0	12.0	0.0	0
B	38	160	44	0	1	0	0.0	12.0	0.0	0
B	269	219	148	1	1	1	12.0	12.0	10.0	0

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS		ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.930	0	7.0	3
B	0.0%	0.0%	N	0	0	.930	0	7.0	3
B	0.0%	0.0%	N	0	0	.850	0	7.0	3
SB	0.0%	0.0%	N	0	0	.980	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*		*	*	*										30.0	0	A
2									*	*	*		*	*	*		20.0	0	A

YCLE= 58.0

VOLUME ADJUSTMENT WORKSHEET

ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	137	432	78	.930	147	465	84
WB	49	390	241	.930	53	419	259
B	38	160	44	.850	45	188	52
SB	269	219	148	.980	274	223	151

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	696	1	1.00	696	0.21	0.12
WB	LT-TH-RT	731	1	1.00	731	0.07	0.35
B	LT-TH-RT	285	1	1.00	285	0.16	0.18
SB	LT	274	1	1.00	274	1.00	0.00
SB	TH	223	1	1.00	223	0.00	0.00
SB	RT	151	1	1.00	151	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	53	419	259	100	100	100	0	1	0	678
WESTBOUND	147	465	84	100	100	100	0	1	0	548
NORTHBOUND	274	223	151	100	100	0	1	1	1	223
SOUTHBOUND	45	188	52	100	100	100	0	1	0	240

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.884	0.576	917
WB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.852	0.851	1306
NB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.875	0.988	1557
EB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.630	1134
WB	TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1800
SB	RT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1428

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	58	30	1	696	548	147	0.21	1	678	0.07
WB	58	30	1	731	678	53	0.07	1	548	0.21
NB	58	20	1	285	240	45	0.16	1	223	0.00
SB	58	20	1	274	374	274	1.00	1	240	0.16

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1666	0.407	10.767	0.451	0.212	19.233	0.788	6.690	2.495	0.576	0.576
WB	1367	0.401	11.248	0.532	0.072	18.752	0.928	12.981	2.114	0.851	0.851
NB	1800	0.124	14.614	0.735	0.157	5.386	0.843	3.959	1.530	0.988	0.988
SB	1609	0.149	13.339	0.725	1.000	6.661	0.000	0.000	1.552	0.630	0.630

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	696	917	0.76	0.52	474	1.47	*
WB	LT-TH-RT	731	1306	0.56	0.52	675	1.08	
NB	LT-TH-RT	285	1557	0.18	0.34	537	0.53	
EB	LT	274	1134	0.24	0.34	391	0.70	*
WB	TH	223	1800	0.12	0.34	621	0.36	
SB	RT	151	1428	0.11	0.34	492	0.31	

CYCLE= 58.0 LOST= 8.0 SUM V/S CRIT= 1.00 TOTAL V/C= 1.16

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	1.47	0.52	58.0	21.29	474	366.40	0.85	329.54	F	66.4	
WB	LT-TH-RT	1.08	0.52	58.0	11.67	675	53.30	0.85	55.23	E	14.1	
NB	LT-TH-RT	0.53	0.34	58.0	11.58	537	0.80	0.85	10.52	B	3.0	
EB	LT	0.70	0.34	58.0	12.48	391	3.83	0.85	13.86	B	2.9	
SB	TH	0.36	0.34	58.0	10.80	621	0.16	0.85	9.32	B	2.4	
SB	RT	0.31	0.34	58.0	10.58	492	0.12	0.85	9.09	B	1.6	

DIR	Delay	LOS
EB	329.54	F
WB	55.23	E
NB	10.52	B
SB	11.19	B

INTERSECTION DELAY =118.57 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -6.1 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, -1.9 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 1 OF 2)
DATE:08-08-1991 TIME:16:42:29
TE 28/TROTTING PARK RD - DENNIS

AST DATASETS LOADED OR SAVED
OLUME=D2PM91EX GEOMETRICS=D2EX

```
KEY:    D
        |
     A- -B
        |
        C
```

ENERAL CHARACTERISTICS
OPULATION GREATER THAN 250,000: NO
CONTROLS: FROM C: STOP
FROM D: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: NO
AIN STREET APPROACH B - EXCLUSIVE RIGHT TURN LANE: NO

MINOR STREET LANES

PPROACH: C: TROTTING PARK
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

PPROACH: D: TROTTING PARK
EXCLUSIVE LEFT TURN LANES: NO
EXCLUSIVE RIGHT TURN LANES: NO
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
IGHT TURN ACCELERATION LANE ON MAJOR: NO

IGHT DISTANCE RESTRICTIONS (in seconds)

PPROACH	A: ROUTE 28	B: ROUTE 28	C: TROTTING PA	D: TROTTING PA
EFTS	0.00	0.00	0.00	0.00
THRUS	0.00	0.00	0.00	0.00
IGHTS	0.00	0.00	0.00	0.00

PPROACH	A: ROUTE 28			B: ROUTE 28			C: TROTTING PA			D: TROTTING PA		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	32	568	20	28	493	37	38	38	23	27	35	33
HF	0.94			0.90			0.77			0.82		
DJ VOLUME	34	604	21	31	548	41	49	49	30	33	43	40
ERCENT GRADE	0.00			0.00			0.00					
PASS CAR/HR	37			34			54	54	33	36	47	44

STEP 1 RIGHT TURNS FROM	C:TROTTING PARK	D:TROTTING PARK
ONFLICTING FLOWS	615	568
RITICAL GAPS	5.7	5.7
CAPACITY	513	544
APACITY USED	6%	8%
MPEDANCE FACTOR	0.96	0.95
ACTUAL CAPACITY	513	544

985 HCM - CHAPTER 10: UNSIGNALIZED - 4 APPROACHES (PAGE 2 OF 2)
DATE:08-08-1991 TIME:16:42:29
RTE 28/TROTTING PARK RD - DENNIS

TEP 2 LEFT TURNS FROM	B:ROUTE 28	A:ROUTE 28
CONFLICTING FLOWS	626	589
RITICAL GAPS	5.1	5.1
APACITY	602	628
CAPACITY USED	6%	6%
MPEDANCE FACTOR	0.97	0.97
CTUAL CAPACITY	602	628

TEP 3 THRU MOVES FROM	C:TROTTING PARK	D:TROTTING PARK
ONFLICTING FLOWS	1269	1259
CRITICAL GAPS	6.3	6.3
APACITY	160	162
APACITY USED	34%	29%
MPEDANCE FACTOR	0.73	0.78
ACTUAL CAPACITY	150	152

STEP 4 LEFT TURNS FROM	C:TROTTING PARK	D:TROTTING PARK
ONFLICTING FLOWS	1352	1338
RITICAL GAPS	6.8	6.8
CAPACITY	112	115
ACTUAL CAPACITY	78	76

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM A:	37	628	591	A	6.09	0.06
T FROM B:	34	602	568	A	6.34	0.06
ALL MOVES FROM C:	141	126	-16	F	INFINITE	INFINITE
LL MOVES FROM D:	127	147	20	E	183.31	6.49

NCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:17:43:01
E 28/SCHOOL ST - DENNIS

AST DATASETS LOADED OR SAVED
OLUME=D1PM91EX GEOMETRICS=D1EX
KEY: A- -B
|
C

ENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: SCHOOL ST
HARED LEFT AND RIGHT TURN LANE: YES
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: ROUTE 28	B: ROUTE 28	C: SCHOOL ST
EFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: ROUTE 28			B: ROUTE 28			C: SCHOOL ST		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
OLUME	0	597	126	83	512	0	115	0	125
PHF	0.87			0.96			0.88		
ADJ VOLUME	0	686	145	86	533	0	131	0	142
ERCENT GRADE	0.00			0.00			0.00		
ASS CAR/HR	0			95			144	0	156

TEP 1 RIGHT TURNS FROM C:SCHOOL ST

CONFLICTING FLOWS	416
RITICAL GAPS	4.7
APACITY	847
ACTUAL CAPACITY	847

TEP 2 LEFT TURNS FROM B:ROUTE 28

CONFLICTING FLOWS	831
RITICAL GAPS	5.1
APACITY	472
CAPACITY USED	20%
MPEDANCE FACTOR	0.86
CTUAL CAPACITY	472

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:17:43:01
RTE 28/SCHOOL ST - DENNIS

STEP 3 LEFT TURNS FROM C:SCHOOL ST

ONFLICTING FLOWS	1378
RITICAL GAPS	6.8
CAPACITY	107
ACTUAL CAPACITY	91

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	95	472	377	B	9.56	0.25
LL MOVES FROM C:	300	171	-129	F	INFINITE	INFINITE

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/FOREST RD - YARMOUTH

ate:08-08-1991 time:11:40:33
LAST DATA SET NAMES LOADED OR SAVED
OLUME=Y0PM91EX GEOMETRICS=Y0EX SIGNAL=Y0PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	81	852	26	1	1	0	10.0	15.0	0.0	0
WB	44	823	127	1	1	0	10.0	15.0	0.0	0
B	33	208	44	0	1	0	0.0	12.0	0.0	0
B	120	157	25	1	1	0	11.0	12.0	0.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.780	0		7.0	3
B	0.0%	0.0%	N	0	0	.850	0		7.0	3
B	0.0%	0.0%	N	0	0	.900	0		7.0	3
SB	0.0%	0.0%	N	0	0	.900	0		7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*		*	*	*										55.0	0	A
2									*	*	*		*	*	*		15.0	0	A

YCLE= 70.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	81	852	26	.780	104	1092	33
WB	44	823	127	.850	52	968	149
B	33	208	44	.900	37	231	49
B	120	157	25	.900	133	174	28

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	104	1	1.00	104	1.00	0.00
B	TH-RT	1126	1	1.00	1126	0.00	0.03
WB	LT	52	1	1.00	52	1.00	0.00
WB	TH-RT	1118	1	1.00	1118	0.00	0.13
NB	LT-TH-RT	317	1	1.00	317	0.12	0.15
B	LT	133	1	1.00	133	1.00	0.00
B	TH-RT	202	1	1.00	202	0.00	0.14

ART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH						# LANES			OPPOSING
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN						VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
EASTBOUND	52	968	149	100	100	100	1	1	0	1118
WESTBOUND	104	1092	33	100	100	100	1	1	0	1126
NORTHBOUND	133	174	28	100	100	100	1	1	0	202
SOUTHBOUND	37	231	49	100	100	100	0	1	0	280

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.160	268
EB	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.996	1.000	1971
WB	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.156	262
WB	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.980	1.000	1940
NB	LT-TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.879	1.000	1582
SB	LT	1800	1	0.967	1.000	1.000	1.000	1.000	1.000	1.000	0.439	764
SB	TH-RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.979	1.000	1763

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	70	55	1	104	1126	104	1.00	1	1118	0.00
WB	70	55	1	52	1118	52	1.00	1	1126	0.00
NB	70	15	1	317	280	37	0.12	1	202	0.00
SB	70	15	1	133	202	133	1.00	1	280	0.12

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.621	30.431	0.176	1.000	24.569	0.000	0.000	6.375	0.160	0.160
WB	1800	0.625	29.962	0.171	1.000	25.038	0.000	0.000	6.561	0.156	0.156
NB	1800	0.112	8.039	0.749	0.116	6.961	0.884	5.321	1.503	1.000	1.000
SB	1701	0.165	4.162	0.700	1.000	10.838	0.000	0.000	1.607	0.439	0.439

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	104	268	0.39	0.79	211	0.49	
EB	TH-RT	1126	1971	0.57	0.79	1549	0.73	
WB	LT	52	262	0.20	0.79	206	0.25	
WB	TH-RT	1118	1940	0.58	0.79	1525	0.73	*
NB	LT-TH-RT	317	1582	0.20	0.21	339	0.93	*
SB	LT	133	764	0.17	0.21	164	0.81	
SB	TH-RT	202	1763	0.11	0.21	378	0.54	

CYCLE= 70.0 LOST= 0.0 SUM V/S CRIT= 0.78 TOTAL V/C= 0.78

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.49	0.79	70.0	1.99	211	1.50	0.85	2.97	A	0.4	
EB	TH-RT	0.73	0.79	70.0	2.85	1549	1.23	0.85	3.46	A	4.7	
WB	LT	0.25	0.79	70.0	1.52	206	0.14	0.85	1.42	A	0.2	
WB	TH-RT	0.73	0.79	70.0	2.88	1525	1.31	0.85	3.56	A	4.7	
NB	LT-TH-RT	0.93	0.21	70.0	20.53	339	23.22	0.85	37.19	D	5.7	
SB	LT	0.81	0.21	70.0	19.89	164	17.40	0.85	31.69	D	2.2	
SB	TH-RT	0.54	0.21	70.0	18.55	378	1.18	0.85	16.77	C	3.1	

DIR	Delay	LOS
EB	3.42	A
WB	3.46	A
NB	37.19	D
SB	22.70	C

INTERSECTION DELAY = 9.06 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 0.0 SECONDS
for chosen cycle length 0.0
Suggested timing phase 1 is 0.0 secs green, 0.0 secs yellow + red clear
Suggested timing phase 2 is 0.0 secs green, 0.0 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/LONG POND DRIVE - YARMOUTH
XISTING CONDITIONS
ate:08-08-1991 time:19:58:30
LAST DATA SET NAMES LOADED OR SAVED
OLUME=Y8PM91EX GEOMETRICS=Y8EX SIGNAL=Y8PM91EX
OCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
IR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	114	765	0	1	1	0	10.0	14.0	0.0	0
WB	0	706	11	0	1	0	0.0	14.0	0.0	0
B	0	0	0	0	0	0	0.0	0.0	0.0	0
B	12	0	125	1	0	1	14.0	0.0	14.0	0

RAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.920	0	7.0	3
B	0.0%	0.0%	N	0	0	.920	0	7.0	3
B	0.0%	0.0%		0	0	.000	0	7.0	0
SB	0.0%	0.0%	N	0	0	.840	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*				*	*										53.0	0	A
2	*	*													*		10.0	0	A
3													*		*		13.0	0	A

YCLE= 86.0

OLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	114	765	0	.920	124	832	0
B	0	706	11	.920	0	767	12
WB	0	0	0	.000	0	0	0
SB	12	0	125	.840	14	0	149

ART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
B	LT	124	1	1.00	124	1.00	0.00
B	TH	832	1	1.00	832	0.00	0.00
WB	TH-RT	779	1	1.00	779	0.00	0.02
SB	LT	14	1	1.00	14	1.00	0.00
B	RT	149	1	1.00	149	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

EFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
ASTBOUND	0	767	12	100	100	100	0	1	0	779
OUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

IR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
B	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1596

EB	TH	1800	1	1.067	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1920
B	TH-RT	1800	1	1.067	1.000	1.000	1.000	1.000	1.000	0.898	1.000	1724
B	LT	1800	1	1.067	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1824
SB	RT	1800	1	1.067	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1632

APACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
B	LT	124	1596	0.03	0.12	499	0.25	
B	TH	832	1920	0.43	0.78	1496	0.56	
WB	TH-RT	779	1724	0.45	0.62	1062	0.73	*
SB	LT	14	1824	0.01	0.15	276	0.05	
B	RT	149	1632	0.09	0.30	493	0.30	*

CYCLE= 86.0 LOST= 7.0 SUM V/S CRIT= 0.54 TOTAL V/C= 0.59
OR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
ATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
78 LEFT TURNS ON THE CHANGE INTERVAL AND 235 ON THE PERMISSIVE PHASE

EVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.25	0.78	86.0	1.98	499	0.06	1.00	2.03	A	2.6	
B	TH	0.56	0.78	86.0	2.81	1496	0.36	0.85	2.69	A	4.4	
B	TH-RT	0.73	0.62	86.0	8.78	1062	1.86	0.85	9.04	B	7.1	
SB	LT	0.05	0.15	86.0	23.73	276	0.00	1.00	23.73	C	0.3	
B	RT	0.30	0.30	86.0	17.50	493	0.11	0.85	14.97	B	2.5	

DIR	Delay	LOS
EB	2.61	A
B	9.04	B
SB	15.74	C

INTERSECTION DELAY = 6.38 INTERSECTION LOS=B

HE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

OR A V/C RATIO OF .95 THE CYCLE SHOULD BE 16.3 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -5.8 secs yellow + red clear
uggested timing phase 2 is 0.0 secs green, -3.3 secs yellow + red clear
uggested timing phase 3 is 0.0 secs green, -0.9 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/SOUTH SEA AVE

Date:08-08-1991 time:12:25:02
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=Y6PM91EX GEOMETRICS=Y6EX SIGNAL=Y6PM91EX
LOCATED IN CBD:N

VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	872	112	0	1	1	0.0	15.0	10.0	0
WB	73	833	0	1	1	0	10.0	12.0	0.0	0
NB	208	0	214	1	0	1	12.0	0.0	12.0	0
SB	0	0	0	0	0	0	0.0	0.0	0.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.880	0	7.0	3
WB	0.0%	0.0%	N	0	0	.970	0	7.0	3
NB	0.0%	0.0%	N	0	0	.770	0	7.0	3
SB	0.0%	0.0%		0	0	.000	0	7.0	0

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1		*	*		*	*											56.0	0	A
2					*	*											10.0	0	A
3									*		*						14.0	0	A

CYCLE= 88.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	872	112	.880	0	991	127
WB	73	833	0	.970	75	859	0
NB	208	0	214	.770	270	0	278
SB	0	0	0	.000	0	0	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	991	1	1.00	991	0.00	0.00
EB	RT	127	1	1.00	127	0.00	1.00
WB	LT	75	1	1.00	75	1.00	0.00
WB	TH	859	1	1.00	859	0.00	0.00
NB	LT	270	1	1.00	270	1.00	0.00
NB	RT	278	1	1.00	278	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	991	127	100	100	0	0	1	1	991
NORTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s

EB	TH	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1980
EB	RT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1428
WB	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1596
WB	TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1800
NB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1710
NB	RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1530

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	991	1980	0.50	0.64	1260	0.79	*
EB	RT	127	1428	0.09	0.64	909	0.14	
WB	LT	75	1596	0.02	0.11	369	0.20	*
WB	TH	859	1800	0.48	0.80	1432	0.60	
NB	LT	270	1710	0.16	0.16	272	0.99	
NB	RT	278	1530	0.18	0.16	243	1.14	*

CYCLE= 88.0 LOST= 8.0 SUM V/S CRIT= 0.71 TOTAL V/C= 0.78
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
176 LEFT TURNS ON THE CHANGE INTERVAL AND 112 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.79	0.64	88.0	8.85	1260	2.38	0.85	9.55	B	8.8	
EB	RT	0.14	0.64	88.0	4.85	909	0.00	0.85	4.13	A	1.1	
WB	LT	0.20	0.80	88.0	1.67	369	0.04	1.00	1.71	A	1.6	
WB	TH	0.60	0.80	88.0	2.68	1432	0.52	0.85	2.71	A	4.3	
NB	LT	0.99	0.16	88.0	28.08	272	40.04	1.00	68.12	F	7.9	
NB	RT	1.14	0.16	88.0	28.90	243	101.55	0.85	110.88	F	11.4	

DIR	Delay	LOS
EB	8.93	B
WB	2.63	A
NB	89.80	F

INTERSECTION DELAY = 23.71 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 31.1 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -5.7 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, -0.3 secs yellow + red clear
suggested timing phase 3 is 0.0 secs green, 0.0 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RTE 28/WINSLOW GRAY ROAD - YARMOUTH
EXISTING CONDITIONS
ate:08-08-1991 time:22:24:37
AST DATA SET NAMES LOADED OR SAVED
VOLUME=Y5PM91EX GEOMETRICS=Y5EX SIGNAL=Y5PM91EX
OCATED IN CBD:N
OLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	33	766	0	1	1	0	10.0	15.0	0.0	0
B	0	763	101	1	1	0	10.0	15.0	0.0	0
NB	0	0	0	1	1	0	12.0	13.0	0.0	0
B	116	0	35	1	0	1	12.0	0.0	12.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.900	0	7.0	3
WB	0.0%	0.0%	N	0	0	.950	0	7.0	3
B	0.0%	0.0%	N	0	0	.940	0	7.0	3
B	0.0%	0.0%	N	0	0	.880	0	7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*		*	*	*										58.0	0	A
2					*	*	*										12.0	0	A
3									*	*	*		*	*	*		14.0	0	A

YCLE= 84.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	33	766	0	.900	37	851	0
WB	0	763	101	.950	0	803	106
B	0	0	0	.940	0	0	0
B	116	0	35	.880	132	0	40

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	37	1	1.00	37	1.00	0.00
B	TH	851	1	1.00	851	0.00	0.00
B	TH-RT	909	1	1.00	909	0.00	0.12
SB	LT	132	1	1.00	132	1.00	0.00
SB	RT	40	1	1.00	40	0.00	1.00

ART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	803	106	0	83	83	1	1	0	754
OUTHBOUND	0	0	0	100	100	100	1	1	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
B	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.312	524
B	TH	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1980

WB	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.982	1.000	1945
EB	LT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1710
SB	RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1530

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	84	58	1	37	851	37	1.00	1	754	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.419	39.277	0.404	1.000	18.723	0.000	0.000	2.784	0.312	0.312

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	37	524	0.07	0.69	362	0.10	
EB	TH	851	1980	0.43	0.69	1367	0.62	
WB	TH-RT	909	1945	0.47	0.83	1621	0.56	*
SB	LT	132	1710	0.08	0.17	285	0.46	*
SB	RT	40	1530	0.03	0.17	255	0.16	

CYCLE= 84.0 LOST= 0.0 SUM V/S CRIT= 0.54 TOTAL V/C= 0.54

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.10	0.69	84.0	3.29	362	0.00	0.85	2.80	A	0.3	
EB	TH	0.62	0.69	84.0	5.36	1367	0.64	0.85	5.10	B	6.1	
WB	TH-RT	0.56	0.83	84.0	1.67	1621	0.34	0.85	1.71	A	3.5	
SB	LT	0.46	0.17	84.0	24.02	285	0.87	0.85	21.16	C	2.6	
SB	RT	0.16	0.17	84.0	22.76	255	0.02	0.85	19.37	C	0.8	

DIR	Delay	LOS
EB	5.01	B
WB	1.71	A
SB	20.74	C

INTERSECTION DELAY = 4.85 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 0.0 SECONDS
for chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 3 is 0.0 secs green, 0.0 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:17:11:35
TE 28/WEST YARMOUTH RD - YARMOUTH

AST DATASETS LOADED OR SAVED
OLUME=Y4PM91EX GEOMETRICS=Y4EX
KEY: A- -B
|
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
AIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: WEST YARMOUTH
HARED LEFT AND RIGHT TURN LANE: YES
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: Route 28	B: Route 28	C: WEST YARMOU
EFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: Route 28			B: Route 28			C: WEST YARMOU		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
OLUME	0	775	39	49	886	0	34	0	38
PHF	0.94			0.97			0.82		
DJ VOLUME	0	824	41	51	913	0	41	0	46
ERCENT GRADE	0.00			0.00			0.00		
ASS CAR/HR	0			56			46	0	51

TEP 1 RIGHT TURNS FROM C:WEST YARMOUTH

CONFLICTING FLOWS	845
RITICAL GAPS	5.7
APACITY	378
ACTUAL CAPACITY	378

STEP 2 LEFT TURNS FROM B:Route 28

CONFLICTING FLOWS	866
RITICAL GAPS	5.1
APACITY	452
CAPACITY USED	12%
MPEDANCE FACTOR	0.92
CTUAL CAPACITY	452

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:17:11:35
RTE 28/WEST YARMOUTH RD - YARMOUTH

STEP 3 LEFT TURNS FROM	C:WEST YARMOUTH
CONFLICTING FLOWS	1809
CRITICAL GAPS	6.8
CAPACITY	46
ACTUAL CAPACITY	43

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	56	452	396	B	9.08	0.14
ALL MOVES FROM C:	97	81	-16	F	INFINITE	INFINITE

CINCH PROGRAM VERSION DATE 4-29-1988
985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
ROUTE 28/HIGGINS CROWELL RD/BERRY AVE - YARMOUTH
N
ate:08-08-1991 time:07:26:31
AST DATA SET NAMES LOADED OR SAVED
VOLUME=Y3PM91EX GEOMETRICS=Y3PM91EX SIGNAL=Y3PM91EX
OCATED IN CBD:N
OLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
B	67	771	40	1	1	0	10.0	15.0	0.0	0
WB	13	644	84	1	1	0	10.0	15.0	0.0	0
NB	49	44	21	0	1	0	0.0	15.0	0.0	0
B	71	37	74	0	1	0	0.0	15.0	0.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
IR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.900	0		7.0	3
WB	0.0%	0.0%	N	0	0	.900	0		7.0	3
B	0.0%	0.0%	N	0	0	.710	0		7.0	3
B	0.0%	0.0%	N	0	0	.890	0		7.0	3

HASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*												11.0	0	A
2		*	*			*	*										65.0	0	A
3									*	*	*		*	*	*		18.0	0	A

YCLE= 105.0

VOLUME ADJUSTMENT WORKSHEET
ART 1 (MOVEMENT ADJUSTMENTS)

IR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	67	771	40	.900	74	857	44
WB	13	644	84	.900	14	716	93
B	49	44	21	.710	69	62	30
B	71	37	74	.890	80	42	83

ART 2 (LANE GROUP ADJUSTMENTS)

IR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	74	1	1.00	74	1.00	0.00
B	TH-RT	901	1	1.00	901	0.00	0.05
B	LT	14	1	1.00	14	1.00	0.00
WB	TH-RT	809	1	1.00	809	0.00	0.12
NB	LT-TH-RT	161	1	1.00	161	0.43	0.18
B	LT-TH-RT	204	1	1.00	204	0.39	0.41

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

EFT TURN	OPPOSING APPROACH									
EING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	14	716	93	100	0	0	1	1	0	0
WESTBOUND	74	857	44	100	0	0	1	1	0	0
NORTHBOUND	80	42	83	100	100	100	0	1	0	125
SOUTHBOUND	69	62	30	100	100	100	0	1	0	92

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
B	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1596
B	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.993	1.000	1965
WB	LT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	1.000	0.950	1596
B	TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.983	1.000	1946
B	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.875	0.784	1358
SB	LT-TH-RT	1800	1	1.100	1.000	1.000	1.000	1.000	1.000	0.845	0.888	1486

UPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
B	105	18	1	161	92	69	0.43	1	125	0.39
B	105	18	1	204	125	80	0.39	1	92	0.43

CALCULATIONS

IR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
B	1570	0.079	10.492	0.797	0.430	7.508	0.570	2.331	1.411	0.784	0.784
SB	1530	0.060	12.461	0.818	0.390	5.539	0.610	2.332	1.376	0.888	0.888

APACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	74	1596	0.05	0.10	167	0.45	*
B	TH-RT	901	1965	0.46	0.62	1217	0.74	*
B	LT	14	1596	0.01	0.10	167	0.09	
WB	TH-RT	809	1946	0.42	0.62	1205	0.67	
B	LT-TH-RT	161	1358	0.12	0.17	233	0.69	
B	LT-TH-RT	204	1486	0.14	0.17	255	0.80	*

CYCLE=105.0 LOST=11.0 SUM V/S CRIT= 0.64 TOTAL V/C= 0.72

EVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
B	LT	0.45	0.10	105.0	33.54	167	1.27	1.00	34.82	D	1.9	
B	TH-RT	0.74	0.62	105.0	10.69	1217	1.72	0.85	10.55	B	10.0	
WB	LT	0.09	0.10	105.0	32.27	167	0.01	1.00	32.28	D	0.4	
B	TH-RT	0.67	0.62	105.0	9.91	1205	1.04	0.85	9.31	B	9.0	
B	LT-TH-RT	0.69	0.17	105.0	31.07	233	5.66	0.85	31.22	D	3.9	
SB	LT-TH-RT	0.80	0.17	105.0	31.77	255	11.35	0.85	36.65	D	4.9	

IR	Delay	LOS
B	12.40	B
WB	9.71	B
B	31.22	D
B	36.65	D

INTERSECTION DELAY = 15.07 INTERSECTION LOS=C

HE CYCLE LENGTH WITHIN THE BOUNDS OF 0 TO 0 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 0.0 SECONDS

OR A V/C RATIO OF .95 THE CYCLE SHOULD BE 34.0 SECONDS
or chosen cycle length 0.0
suggested timing phase 1 is 0.0 secs green, -0.8 secs yellow + red clear
uggested timing phase 2 is 0.0 secs green, -7.8 secs yellow + red clear
uggested timing phase 3 is 0.0 secs green, -2.4 secs yellow + red clear

INCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-08-1991 TIME:16:50:03
TE 28/CAMP ST - YARMOUTH

AST DATASETS LOADED OR SAVED
OLUME=Y2PM91EX GEOMETRICS=Y2EX
KEY: A- -B
|
C
ENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: NO
ONTROLS: FROM C: STOP
REVAILING SPEED: 35 MPH
MAIN STREET # OF LANES: 2 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

INOR STREET LANES
APPROACH: C: Camp St
HARED LEFT AND RIGHT TURN LANE: YES
ARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: Route 28	B: Route 28	C: Camp St
EFTS	0.00	0.00	0.00
HRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: Route 28			B: Route 28			C: Camp St		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
OLUME	0	955	16	221	1288	0	24	0	89
PHF	0.90			0.98			0.84		
ADJ VOLUME	0	1061	18	226	1314	0	29	0	106
ERCENT GRADE	0.00			0.00			1.00		
ASS CAR/HR	0			248			36	0	132

TEP 1 RIGHT TURNS FROM C:Camp St

CONFLICTING FLOWS	1070
RITICAL GAPS	5.7
APACITY	276
ACTUAL CAPACITY	276

TEP 2 LEFT TURNS FROM B:Route 28

CONFLICTING FLOWS	1079
RITICAL GAPS	5.1
APACITY	345
CAPACITY USED	72%
MPEDANCE FACTOR	0.34
CTUAL CAPACITY	345

985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-08-1991 TIME:16:50:03
RTE 28/CAMP ST - YARMOUTH

STEP 3 LEFT TURNS FROM C:Camp St

ONFLICTING FLOWS	2610
RITICAL GAPS	6.8
CAPACITY	6
ACTUAL CAPACITY	2

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

OVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
LT FROM B:	248	345	97	E	37.10	2.56
LL MOVES FROM C:	168	10	-158	F	INFINITE	INFINITE