CH2M HILL

August 1980

TRAFFIC AND AIR QUALITY ANALYSES

FOR

GULF BOULEVARD IMPROVEMENTS
(S.R. 699)

TREASURE ISLAND, FLORIDA

REVISED
APR. 81

Table of Contents

TRAFFIC IMPACT ANALYSIS
SR699-Treasure Island, Florida

INTRODUCTION

The purpose of this study was to evaluate traffic impacts of a proposed improvement to SR699 (Gulf Boulevard) in the City of Treasure Island.

The proposed construction project is between 105th and 125th Avenues, a distance of approximately 1.13 miles. The proposed project will basically provide a four lane facility with a center median that will be used to provide left turn lanes at major intersections.

The project will also include improvements to 107th Avenue for a distance of approximately 250 feet east of SR699. This construction will provide for three intersection approach lanes on 107th Avenue.

Modified traffic signals are proposed at the SR699 intersections with 107th, 112th, and 117th Avenues. The modifications will provide for vehicular actuation at all of these locations, and for pedestrian actuation at 107th and 112th Avenues. The three intersection signals will be interconnected to provide coordinated traffic operation.

FIELD STUDIES

Existing available data was furnished by the Florida Department of Transportation (FDOT). This data included: average daily traffic (ADT) projections for 1980, 1983, 1993, and 2000 (including truck, 30th highest hour, and directional split percentages); existing mechanical and manual traffic volume counts; project roadway and traffic signal design plans; and other pertinent data. Field studies were made to supplement the existing data outlined above.

Traffic Volume Counts

Mechanical traffic volume counts were made at four locations on SR699 and on 107th Avenue just east of SR699. The counts recorded volume data by direction and by 15-minute intervals. The count just south of 112th Avenue was taken for seven days and the other counts were made for one or two day periods.

Manual turning movement counts were made at the SR699 intersections with 107th, 112th, and 116th/117th Avenues. Three one-hour counts were made at each location. One of the counts at each location was made between 4:30 and 5:30 p.m., the p.m. peak hour.

FOR DER USE ONLY

APPLICATION NO.

SECTION I – GENERAL INFORMATION

Project Type: [ ] New Construction [X] Modification

Source Name: State Road 699 County: Pinellas

Location Address: Gulf Blvd. (105th to Johns Pass Br.) City: Treasure Island Zip

U.T.M.: Beginning of Project –

Zone 17 East 324.242 KM North 3074.151 KM

End of Project –

Zone 17 East 325.636 KM North 3072.455 KM

Applicant Name & Title:

Address: P.O. Box 1249 City: Bartow Zip: 33830

Telephone: 813-533-8161

Company Name: Florida Department of Transportation

Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

Estimated Date Start of Construction: 1981

Estimated Date End of Construction: 1982

SECTION II – TECHNICAL DATA

(1) Project Description (nature and extent):

It is proposed to make improvements to SR699 (Gulf Boulevard) between 105th and 125th Avenues. A distance of about 1.13 miles. The improvements will provide a four-lane facility with a center median to provide left turn lanes at major intersections. Improvements will also be made to 107th and interconnecting of three intersection signal lights. For further details please refer to the attached report.

(2) Meteorological Data:

a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:
Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	--.-	--.-
b. 1st Year	1982	35.7	11.3
c. Critical Year	1982	35.7	11.3
d. 10th Year	1992	17.7	6.5

e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	---.-	---.-	---.-	---.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
3. 10th Year	26.8	21.8	18.3	16.3	15.5	13.8	12.3	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

* Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
2. Critical Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	--.-
b. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
c. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
d. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
e. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
2. Critical Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
3. 10th Year	5.0	4.2	3.6	3.3	3.2	2.9	2.6	--.-
h. Percent Standard								
1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
2. Critical Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
3. 10th Year	50.-	42.-	36.-	33.-	32.-	29.-	26.-	--.-
i. Current Ambient Air	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

b. Model Used to Predict Carbon Monoxide Concentrations: CALINE-2

(9) Additional Comments by Applicant and Engineer:

STATEMENTS BY APPLICANT AND ENGINEER

APPLICANT:

As the owner or authorized representative of Florida Department of Transportation, I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree that (Project Name) Gulf Blvd. (State Project No. 15100-3510) will be constructed in such a manner as to comply with applicable portions of Chapter 403, Florida Statutes; Section 17-2.05(8), Florida Administrative Code; and Chapter 17-4, Florida Administrative Code.

SIGNATURE OF OWNER OR AUTHORIZED REPRESENTATIVE	COMPANY
BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

Stephen J. Hahn 04/22/81 SIGNATURE	7201 N.W. 11th Place BUSINESS ADDRESS
Stephen J. Hahn NAME (please type)	Gainesville, Florida
CH2M HILL Southeast, Inc. EMPLOYER	April 22, 1981 DATE
26549 FLORIDA REGISTRATION NO.	904/377-2442 PHONE NO.

AFFIX SEAL

FOR DER USE ONLY

APPLICATION NO.

SECTION I – GENERAL INFORMATION

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Location Address: Gulf Blvd. (105th to Johns Pass Br.) City: Treasure Island Zip

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End of Project –

Zone 17 East 325.636 KM North 3072.455 KM

Applicant Name & Title:

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Telephone: 813-533-8161

Company Name: Florida Department of Transportation

Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

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(2) Meteorological Data:

a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:
Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	--.-	--.-
b. 1st Year	1982	35.7	11.3
c. Critical Year	1982	35.7	11.3
d. 10th Year	1992	17.7	6.5

e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	---.-	---.-	---.-	---.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
3. 10th Year	26.8	21.8	18.3	16.3	15.5	13.8	12.3	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

*Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
2. Critical Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	--.-
b. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
c. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
d. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
e. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
2. Critical Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
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h. Percent Standard								
1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
2. Critical Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
3. 10th Year	50.-	42.-	36.-	33.-	32.-	29.-	26.-	--.-
i. Current Ambient Air	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

b. Model Used to Predict Carbon Monoxide Concentrations: CALINE-2

(9) Additional Comments by Applicant and Engineer:

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APPLICANT:

As the owner or authorized representative of Florida Department of Transportation, I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree that (Project Name) Gulf Blvd. (State Project No. 15100-3510) will be constructed in such a manner as to comply with applicable portions of Chapter 403, Florida Statutes; Section 17-2.05(8), Florida Administrative Code; and Chapter 17-4, Florida Administrative Code.

SIGNATURE OF OWNER OR AUTHORIZED REPRESENTATIVE	COMPANY
BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

Stephen J. Hahn 04/22/81 SIGNATURE	7201 N.W. 11th Place BUSINESS ADDRESS
Stephen J. Hahn NAME (please type)	Gainesville, Florida
CH2M HILL Southeast, Inc. EMPLOYER	April 22, 1981 DATE
26549 FLORIDA REGISTRATION NO.	904/377-2442 PHONE NO.

AFFIX SEAL

FOR DER USE ONLY

APPLICATION NO.

SECTION I – GENERAL INFORMATION

Project Type: [ ] New Construction [X] Modification

Source Name: State Road 699 County: Pinellas

Location Address: Gulf Blvd. ()05th to Johns Pass Br.) City: Treasure Island Zip

U.T.M.: Beginning of Project –

Zone 17 East 324.242 KM North 3074.151 KM

End of Project –

Zone 17 East 325.636 KM North 3072.455 KM

Applicant Name & Title:

Address: P.O. Box 1249 City: Bartow Zip: 33830

Telephone: 813-533-8161

Company Name: Florida Department of Transportation

Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

Estimated Date Start of Construction: 1981

Estimated Date End of Construction: 1982

SECTION II – TECHNICAL DATA

(1) Project Description (nature and extent):

It is proposed to make improvements to SR699 (Gulf Boulevard) between 105th and 125th Avenues. A distance of about 1.13 miles. The improvements will provide a four-lane facility with a center median to provide left turn lanes at major intersections. Improvements will also be made to 107th and interconnecting of three intersection signal lights. For further details please refer to the attached report.

(2) Meteorological Data:

a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:
Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	---.-	---.-
b. 1st Year	1982	35.7	11.3
c. Critical Year	1982	35.7	11.3
d. 10th Year	1992	17.7	6.5

e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	---.-	---.-	---.-	---.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----
Road No. _____	--	------	----	--	------	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
3. 10th Year	26.8	21.8	18.3	16.3	15.5	13.8	12.3	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

*Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	---.-
2. Critical Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	---.-
3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	---.-
2. Critical Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	---.-
3. 10th Year	5.0	4.2	3.6	3.3	3.2	2.9	2.6	---.-
h. Percent Standard								
1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	---.-
2. Critical Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	---.-
3. 10th Year	50.-	42.-	36.-	33.-	32.-	29.-	26.-	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

b. Model Used to Predict Carbon Monoxide Concentrations: CALINE-2

(9) Additional Comments by Applicant and Engineer:

STATEMENTS BY APPLICANT AND ENGINEER

APPLICANT:

As the owner or authorized representative of Florida Department of Transportation, I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree that (Project Name) Gulf Blvd. (State Project No. 15100-3510) will be constructed in such a manner as to comply with applicable portions of Chapter 403, Florida Statutes; Section 17-2.05(8), Florida Administrative Code; and Chapter 17-4, Florida Administrative Code.

SIGNATURE OF OWNER OR AUTHORIZED REPRESENTATIVE	COMPANY
BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

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Stephen J. Hahn NAME (please type)	Gainesville, Florida
CH2M HILL Southeast, Inc. EMPLOYER	April 22, 1981 DATE
26549 FLORIDA REGISTRATION NO.	904/377-2442 PHONE NO.

AFFIX SEAL

FOR DER USE ONLY

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Location Address: Gulf Blvd. (105th to Johns Pass Br.) City: Treasure Island Zip

U.T.M.: Beginning of Project –

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Zone 17 East 325.636 KM North 3072.455 KM

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Telephone: 813-533-8161

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Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

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a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:

Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	--.-	--.-
b. 1st Year	1982	35.7	11.3
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e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	---.-	---.-	---.-	---.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
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i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

* Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	---.-
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3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	---.-
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1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	---.-
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i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

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(9) Additional Comments by Applicant and Engineer:

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BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

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Stephen J. Hahn NAME (please type)	Gainesville, Florida
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End of Project –

Zone 17 East 325.636 KM North 3072.455 KM

Applicant Name & Title:

Address: P.O. Box 1249 City: Bartow Zip: 33830

Telephone: 813-533-8161

Company Name: Florida Department of Transportation

Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

Estimated Date Start of Construction: 1981

Estimated Date End of Construction: 1982

SECTION II – TECHNICAL DATA

(1) Project Description (nature and extent):

It is proposed to make improvements to SR699 (Gulf Boulevard) between 105th and 125th Avenues. A distance of about 1.13 miles. The improvements will provide a four-lane facility with a center median to provide left turn lanes at major intersections. Improvements will also be made to 107th and interconnecting of three intersection signal lights. For further details please refer to the attached report.

(2) Meteorological Data:

a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:
Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	--.-	--.-
b. 1st Year	1982	35.7	11.3
c. Critical Year	1982	35.7	11.3
d. 10th Year	1992	17.7	6.5

e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	---.-	---.-	---.-	---.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
3. 10th Year	26.8	21.8	18.3	16.3	15.5	13.8	12.3	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

*Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
2. Critical Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	--.-
b. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
c. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
d. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
e. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
2. Critical Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
3. 10th Year	5.0	4.2	3.6	3.3	3.2	2.9	2.6	--.-
h. Percent Standard								
1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
2. Critical Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
3. 10th Year	50.-	42.-	36.-	33.-	32.-	29.-	26.-	--.-
i. Current Ambient Air	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

b. Model Used to Predict Carbon Monoxide Concentrations: CALINE-2

(9) Additional Comments by Applicant and Engineer:

STATEMENTS BY APPLICANT AND ENGINEER

APPLICANT:

As the owner or authorized representative of Florida Department of Transportation, I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree that (Project Name) Gulf Blvd. (State Project No. 15100-3510) will be constructed in such a manner as to comply with applicable portions of Chapter 403, Florida Statutes; Section 17-2.05(8), Florida Administrative Code; and Chapter 17-4, Florida Administrative Code.

SIGNATURE OF OWNER OR AUTHORIZED REPRESENTATIVE	COMPANY
BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

Stephen J. Hahn 04/22/81 SIGNATURE	7201 N.W. 11th Place BUSINESS ADDRESS
Stephen J. Hahn NAME (please type)	Gainesville, Florida
CH2M HILL Southeast, Inc. EMPLOYER	April 22, 1981 DATE
26549 FLORIDA REGISTRATION NO.	904/377-2442 PHONE NO.

AFFIX SEAL

FOR DER USE ONLY

APPLICATION NO.

SECTION I – GENERAL INFORMATION

Project Type: [ ] New Construction [X] Modification

Source Name: State Road 699 County: Pinellas

Location Address: Gulf Blvd. ()05th to Johns Pass Br.) City: Treasure Island Zip

U.T.M.: Beginning of Project –

Zone 17 East 324.242 KM North 3074.151 KM

End of Project –

Zone 17 East 325.636 KM North 3072.455 KM

Applicant Name & Title:

Address: P.O. Box 1249 City: Bartow Zip: 33830

Telephone: 813-533-8161

Company Name: Florida Department of Transportation

Consultant Name & Title: Douglas Ober, Engineer

Company Name: CH2M HILL

Address: 200 S.W. Market, 12th Floor City: Portland

State: Oregon Zip: 97201 Telephone: 503-224-9190

Estimated Date Start of Construction: 1981

Estimated Date End of Construction: 1982

SECTION II – TECHNICAL DATA

(1) Project Description (nature and extent):

It is proposed to make improvements to SR699 (Gulf Boulevard) between 105th and 125th Avenues. A distance of about 1.13 miles. The improvements will provide a four-lane facility with a center median to provide left turn lanes at major intersections. Improvements will also be made to 107th and interconnecting of three intersection signal lights. For further details please refer to the attached report.

(2) Meteorological Data:

a. Stability Class: D Worst Condition (one hour) D Worst Condition (eight hour)

b. Wind Direction (Degrees): 22. Worst Condition (one hour)

22. Worst Condition (eight hour)

c. Wind Speed (Meters/Sec.): 0.9 Worst Condition (one hour)

0.9 Worst Condition (eight hour)

d. Source of Data:
Permit instructions

e. Dates of Collection*:

(3) Ambient Air Quality Data (Projections Are To Be Made Assuming The Roadway Will Not Be Constructed)

CARBON MONOXIDE CONCENTRATION (mg/m^3)

TIME	YEAR	ONE HOUR	8 HOUR
a. Current	----	--.-	--.-
b. 1st Year	1982	35.7	11.3
c. Critical Year	1982	35.7	11.3
d. 10th Year	1992	17.7	6.5

e. Source of Data:

(4) Physical Data:

PARAMETER	PROPOSED HIGHWAY	ROAD NO.	ADJACENT ROADWAYS ROAD NO.	ROAD NO.	ROAD NO.
Width (Feet)	94	---	---	---	---
Elevation with Respect to Adjacent Terrain (Feet)	± 0	± ---	± ---	± ---	± ---
Posted Speed Limit (MPH)	35	--	--	--	--
Wind Angle with Respect to Road (Degrees)	22	----.-	----.-	----.-	----.-

(5) Receptor Distances

Normal Distance From Road to Receptor (Feet)	RECEPTOR							
	1	2	3	4	5	6	7	8
Proposed Highway	0	10	20	30	40	70	100	
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								
Adjacent Road No.								

* If Applicable

(6) Traffic Data

	ONE HOUR CONDITIONS CO			8 HOUR CONDITIONS CO			24 HOUR CONDITIONS
	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AVERAGE SPEED (MPH)	EMISSION FACTOR (gm/mi)	PEAK VOLUME (veh/hr)	AADT
1. Current Year*							
Proposed Highway	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
2. First Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
3. Critical Year							
Proposed Highway	13	81.0	2170	15	72.0	1359	19700
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
4. Tenth Year							
Proposed Highway	12	34.0	2510	13	32.0	1744	24900
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----
Road No. ____	--	---.--	----	--	---.--	----	-----

*(Complete if modification to an existing highway)

Source of Data:

(7) Results

A. One-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
2. Critical Year	19.8	15.8	13.1	11.5	10.6	9.3	8.0	---.-
3. 10th Year	9.7	7.7	6.3	5.5	5.2	4.5	3.9	---.-
b. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
c. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
d. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
e. Road No. _____								
1. 1st Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
2. Critical Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
3. 10th Year	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	---.-
g. Total Concentration*								
1. 1st Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
2. Critical Year	20.8	16.8	14.1	12.5	11.6	10.3	9.0	---.-
3. 10th Year	10.7	8.7	7.3	6.5	6.2	5.5	4.9	---.-
h. Percent of Standard**								
1. 1st Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
2. Critical Year	52.0	42.0	35.3	31.3	29.0	25.8	22.5	---.-
3. 10th Year	26.8	21.8	18.3	16.3	15.5	13.8	12.3	---.-
i. Current Ambient Air	---.-	---.-	---.-	---.-	---.-	---.-	---.-	---.-

* Sum of items a. through e. for that particular time category.

** $\frac{\text{Item f total}}{\text{Area Standard}}$ = % of standard

B. 8-Hour Carbon Monoxide Concentrations (mg/m^3)

	Receptor Number							
	1	2	3	4	5	6	7	8
a. Proposed Highway								
1. 1st Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
2. Critical Year	7.3	5.8	4.8	4.3	3.8	3.4	2.9	--.-
3. 10th Year	4.0	3.2	2.6	2.3	2.2	1.9	1.6	--.-
b. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
c. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
d. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
e. Road No. _____								
1. 1st Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
2. Critical Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
3. 10th Year	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-
f. Ambient Air								
1. 1st Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
2. Critical Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
3. 10th Year	1.0	1.0	1.0	1.0	1.0	1.0	1.0	--.-
g. Total Concentration								
1. 1st Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
2. Critical Year	8.3	6.8	5.8	5.3	4.8	4.3	3.9	--.-
3. 10th Year	5.0	4.2	3.6	3.3	3.2	2.9	2.6	--.-
h. Percent Standard								
1. 1st Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
2. Critical Year	83.-	68.-	58.-	53.-	48.-	43.-	39.-	--.-
3. 10th Year	50.-	42.-	36.-	33.-	32.-	29.-	26.-	--.-
i. Current Ambient Air	--.-	--.-	--.-	--.-	--.-	--.-	--.-	--.-

(8) a. Brief Discussion of Results:

The traffic and modeling results are below ambient air standards for both build or no-build at the critical approach to the 107th Avenue intersection. However, there is a beneficial decrease in ambient concentration projected from the improvements proposed for SR699.

b. Model Used to Predict Carbon Monoxide Concentrations: CALINE-2

(9) Additional Comments by Applicant and Engineer:

STATEMENTS BY APPLICANT AND ENGINEER

APPLICANT:

As the owner or authorized representative of Florida Department of Transportation, I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge and belief. Further, I agree that (Project Name) Gulf Blvd. (State Project No. 15100-3510) will be constructed in such a manner as to comply with applicable portions of Chapter 403, Florida Statutes; Section 17-2.05(8), Florida Administrative Code; and Chapter 17-4, Florida Administrative Code.

SIGNATURE OF OWNER OR AUTHORIZED REPRESENTATIVE	COMPANY
BUSINESS ADDRESS	NAME AND TITLE (please type)
	DATE
	PHONE NO.

PROFESSIONAL ENGINEER, REGISTERED IN FLORIDA

This is to certify that the pollution control and engineering features of this complex source project have been examined by me and found to be in conformity with modern engineering principles applicable to the construction of the above named project as they relate to the control of the emissions as authorized in the permit application. There is reasonable assurance, in my professional judgment, that the construction and use of the proposed project is not expected to result in violations of the Florida Ambient Air Quality Standards.

Stephen Hahn 04/22/81 SIGNATURE	7201 N.W. 11th Place BUSINESS ADDRESS
Stephen J. Hahn NAME (please type)	Gainesville, Florida
CH2M HILL Southeast, Inc. EMPLOYER	April 22, 1981 DATE
26549 FLORIDA REGISTRATION NO.	904/377-2442 PHONE NO.

AFFIX SEAL

Two vehicle classification counts were made on SR699, one south of 112th Avenue and the second south of 106th Avenue. These counts were made for three one-hour periods throughout the day.

Speed and Delay Studies

Speed and delay studies were made on both SR699 and 107th Avenue. These studies were made by driving a survey vehicle at the average speed of other traffic using the facility. A two-person team was utilized, one for driving and one for recording data.

The speed and delay runs were made at various times over a three day period. Listed below are the number of runs made in each direction during selected time periods.

Time	Runs
8:00 to 11:00 a.m.	9
11:00 a.m. to 4:30 p.m.	9
4:30 to 5:30 p.m.	11
5:30 to 7:30 p.m.	5
TOTAL	34

The data was treated separately by time of day until after statistical analysis showed that there was no significant difference in the travel time by time of day[1]. The data was then combined for further use in the study.

At the intersection of SR699 and 107th Avenue, speed and delay runs were made for turning movements as well as for straight through movements. This provided data to compute average travel speed for individual movements.

The study methods allowed for separation of running time and delay time for each roadway segment. Therefore, overall travel time, running time, and delay time were available for each street segment and for each run.

EXISTING CONDITIONS

The data outlined above was used to establish existing speed and volume conditions for SR699 and 107th Avenue within the project limits.

---

(1) Institute of Transportation and Traffic Engineering, University of California, Fundamentals of Traffic Engineering (8th Edition), 1973.

LEGEND

○	TRAFFIC SIGNAL
←	ONE - WAY
400'	DISTANCE IN FEET (NOT TO SCALE)
18400	ADT
(1450)	PM PEAK HOUR
[9910]	PEAK 8 HOURS

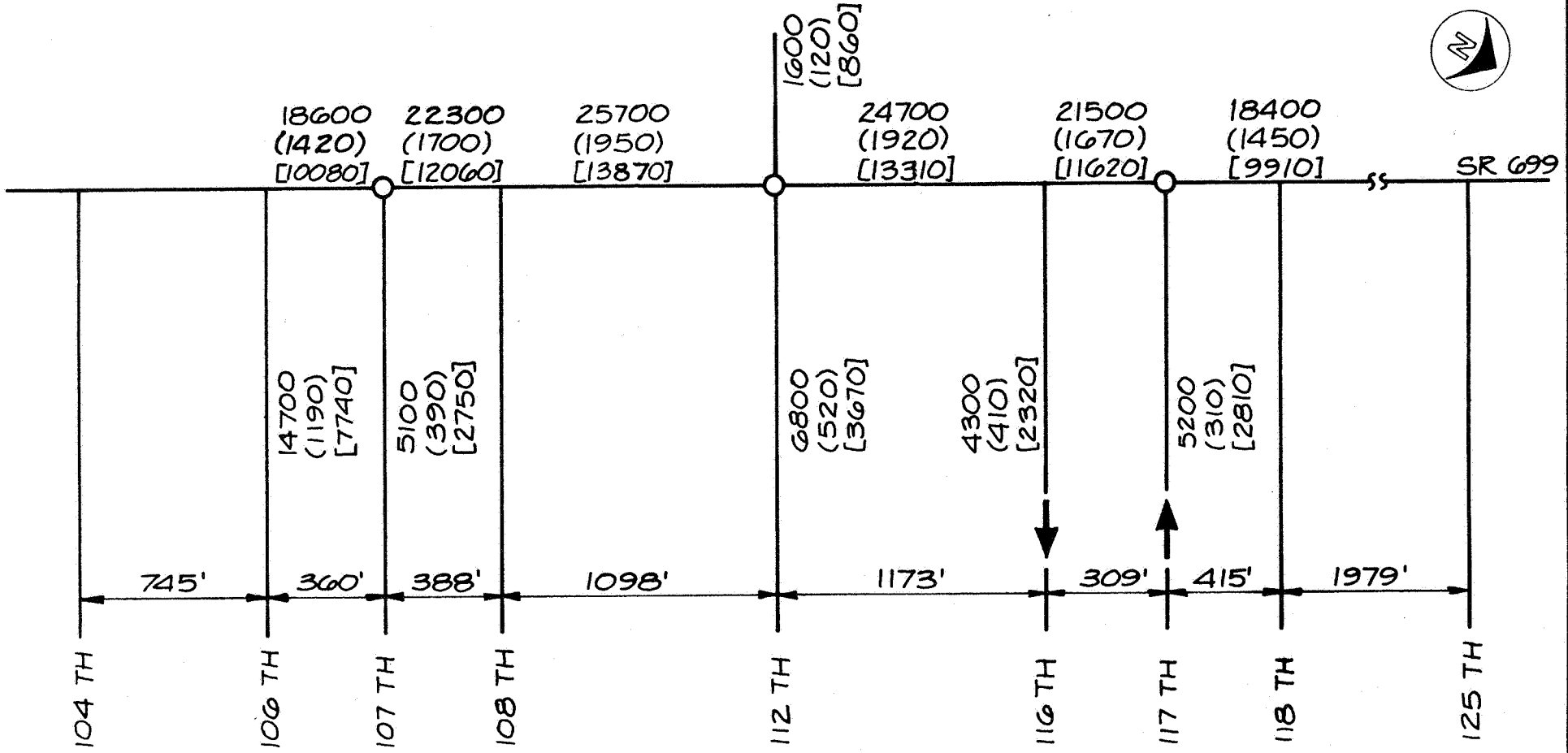

FIGURE 1
1979 VOLUMES
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

Existing Volumes

Figure 1 illustrates 1979 traffic volumes for an average day, the p.m. peak hour, and for the peak 8-hour period during the day. The volumes obtained during field studies were adjusted to reflect ADT, based on monthly traffic variations recorded at a FDOT permanent station traffic counter station in Redington Shores. The Redington Shores traffic station was utilized because it is the nearest continuous traffic count recording facility available.

The p.m. peak hour traffic volume was found to be 8.0 percent of daily traffic and the peak 8-hours of the day averaged about 54 percent of the daily volumes.

The turning movement counts were taken primarily to determine the existing proportion of turns and to establish an estimate of the peak hour factor.[2]

Existing Speeds

The speed and delay study data was used to calculate average speed for various segments of SR699 and 107th Avenue. The average calculated speeds are shown on Figure 2. Approach speeds at the intersection of SR699 and 107th Avenue were calculated using average speeds for the various vehicle movements involved (i.e. left turns, right turns, straight through), since there are large percentages of turning vehicles affected by varying lengths of green signal time at this location. The speeds were weighted according to the proportion of vehicles making each movement to develop average approach speeds. Appendix 1 gives an example of the weighting technique used.

Vehicle Classification

The two vehicle classification counts indicated that 96 to 98 percent of the vehicles using SR699 are light vehicles, consisting of passenger cars, pickups, vans, and panel trucks. Two to three percent of the vehicles were classified as light trucks (single unit vehicles with dual rear wheels or more than two axles) and less than one percent of the vehicles were classified as heavy trucks (tractor trailers).

Intersection Capacity

The capacity of an urban arterial street is normally determined by the capacity of the signalized intersections. Therefore, intersection capacity calculations were prepared for the SR699 intersections with 107th, 112th, and 117th

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(2) Peak hour factor = hourly volume divided by four times the peak fifteen minute volume.

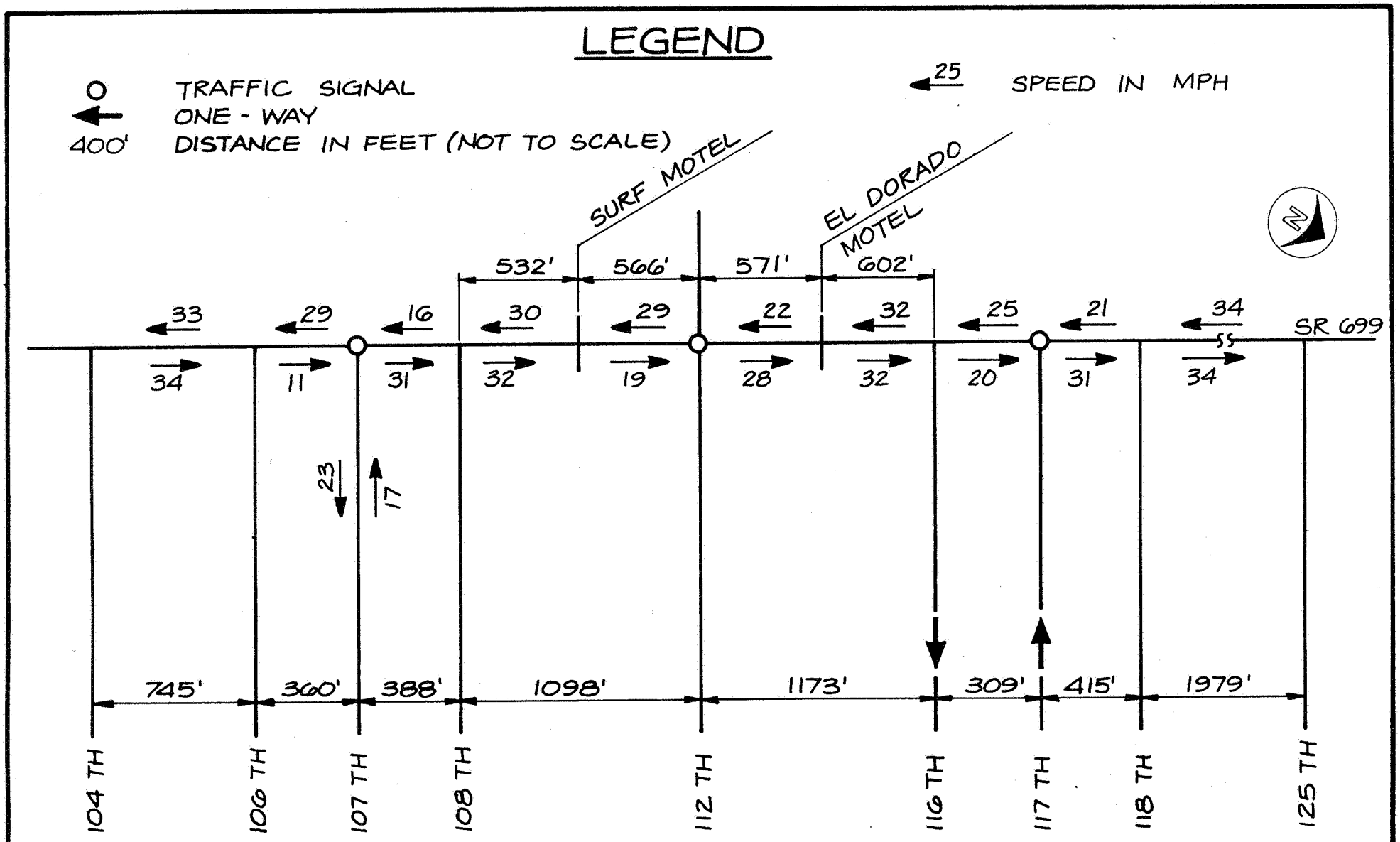

FIGURE 2
1979 AVERAGE SPEEDS
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

Avenues. The resulting capacities were compared with 1979 volumes in the form of a volume to capacity (V/C) ratio. If the ratio exceeds 1.0, a capacity deficiency is identified. The Highway Capacity Manual[3] defines several levels of service (LOS) to utilize for capacity analyses. These are listed and briefly described in Table 1. Level of service "D" is generally used throughout the United States for planning and design. However, since FDOT has requested that the 30th highest hour of the year be used for analysis purposes, LOS E has been chosen for this project. V/C ratios for the 30th highest hour and for an average hour of the peak 8-hours of the peak day of the week are listed below for existing conditions.[4]

SR699 Intersection	V/C Ratio (LOS E) 30th Highest Hour	Average of Peak 8-hours
107th Avenue	0.90	0.60
112th Avenue	0.75	0.50
117th Avenue	0.55	0.40

In determining the design hour volumes, a "K" factor was used which represents the thirtieth highest hour recorded during the year at the permanent recording station in Redington Shores. The thirtieth highest hour should occur during the peak tourist season. Therefore, the design hourly volumes (peak hour traffic) used in the traffic calculations automatically considers the seasonal fluctuations in ADT.

FUTURE CONDITIONS

Projected Volumes

Traffic volumes were projected for various years (1980, 1983, 1993, 2000) by the Florida Department of Transportation (FDOT). For this project, the year of probable completion of project construction (1982) and a period of 10 years after project completion (1992) were selected for analysis purposes. Volumes for 1982 and 1992 were interpolated from FDOT projections for other years. FDOT estimates of May 6, 1980 were used for analyses described in this report. Preliminary analyses were based on FDOT estimates of June 26, 1979.

The resulting 1982 volume data is shown on Figure 3. These volumes were used for analysis of both the build and no-build alternatives since they will not be sufficiently high to

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(3) Highway Research Board, Special Report 87, Highway Capacity Manual, 1965.

(4) The 30th highest hour was estimated, based on data provided by FDOT (i.e. 11% of ADT). The peak 8 hours of the peak day of the week is estimated to be ten percent higher than the peak 8 hours of an average day. The peak 8 hours includes the afternoon peak hour.

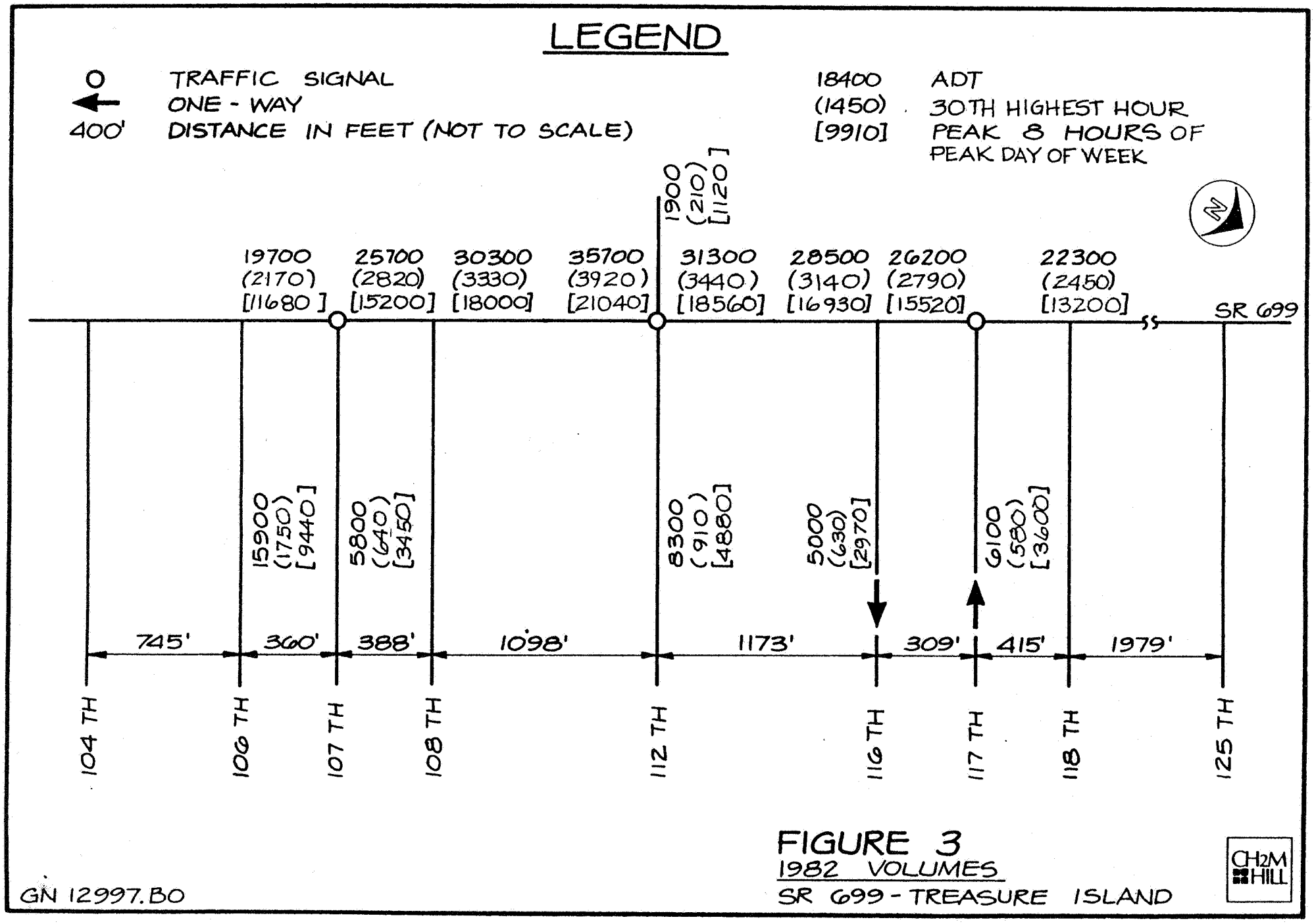


FIGURE 3
1982 VOLUMES
SR 699 - TREASURE ISLAND

GN 12997.BO

CH2M HILL

Table 1
DESCRIPTION OF LEVELS OF SERVICE[1]

Level of Service	Description
A	No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Typically the approach appears quite open, turning movements are easily made, and nearly all drivers find freedom of operation, their only concern being the chance that the light will be red, or turn red, when they approach.
B	Level of Service B represents stable operation. An occasional approach phase is fully utilized and a substantial number are approaching full use. Many drivers begin to feel somewhat restricted within platoons of vehicles.
C	In level of Service C, stable operation continues. Occasionally drivers may have to wait through more than one red signal indication, and back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.
D	Level of Service D encompasses a zone of increasing restriction, approaching instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive back-ups.
E	Capacity occurs at level of Service E. It represents the most vehicles that any particular intersection approach can accommodate. At capacity there may be long queues of vehicles waiting upstream of the intersection and delays may be great (up to several signal cycles).
F	Level of Service F represents jammed conditions. Back-ups from locations downstream or on the cross street may restrict or prevent movement of vehicles out of the approach under consideration.

(1) Highway Research Board, Specal Report 87, Highway Capacity Manual, 1965, p. 130.

cause significant traffic diversion, even with the no-build alternative. There will be some congestion when volumes reach the 30th highest hour level; however, this is not likely to be frequent enough to cause motorists to divert to other routes.

By 1992, significant capacity problems were identified by using the projected 1992 volumes from FDOT. These projections were made "on the assumption that facilities having capacities equal to or greater than these estimates will be provided". The following 1992 V/C ratios, at level of service E, were calculated using FDOT projections.

SR699 Intersection	V/C Ratios (LOS E) 30th Highest Hour No-Build	30th Highest Hour Build	Avg. of Peak 8-Hours No-Build	Avg. of Peak 8-Hours Build
107th Avenue	1.35	0.95	0.95	0.70
112th Avenue	1.10	1.10	0.80	0.80
117th Avenue	0.85	0.85	0.60	0.60

The no-build V/C ratios for the 30th highest hour represents level of service F at both 107th and 112th Avenues. Los F will continue at 112th Avenue even after the project is built, since no basic change in number of lanes or traffic signal operation is proposed. Because of the projected LOS F operation, 1992 volumes for the no-build alternative were reduced to represent LOS E operation during the 30th highest hour. These reduced volumes were also used for the 1992 "build" alternative.

Selected critical approach volumes at these two intersections were reduced in an attempt to introduce a "capacity restraint" to the volume projections. It was assumed that some of the vehicles included in the 1992 FDOT projections for SR699 will be diverted to other routes during high-demand hours. Figure 4 illustrates 1992 volumes as adjusted to reflect capacity constraints.

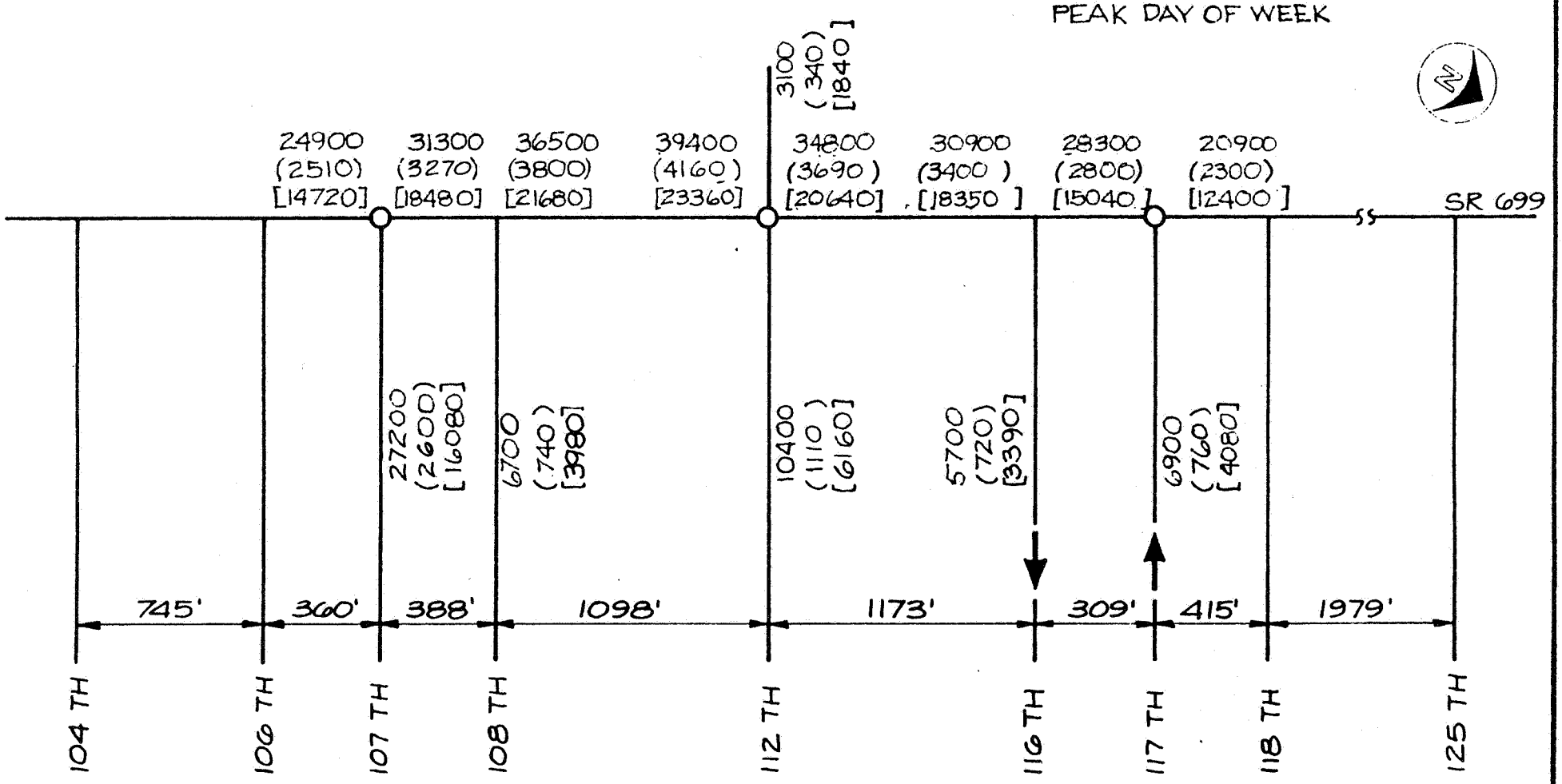
Estimated Speeds

As traffic volumes increase on a facility, speeds can be expected to be reduced due to increased congestion. For this project, speeds were estimated for various conditions (build and no-build, 1982 and 1992, 30th highest hour and average of peak 8-hours, etc.) by estimating, separately, the amount of delay at signalized intersections and the amount of running time.

An analysis of vehicle queuing was used to estimate the average delay for an intersection approach. The analysis can be best explained by graphical display and is illustrated in Figure 5, which shows the rate of flow at capacity

LEGEND

O	TRAFFIC SIGNAL	18400	ADT
←	ONE - WAY	(1450)	30TH HIGHEST HOUR(1)
400'	DISTANCE IN FEET (NOT TO SCALE)	[9910]	PEAK 8 HOURS OF PEAK DAY OF WEEK

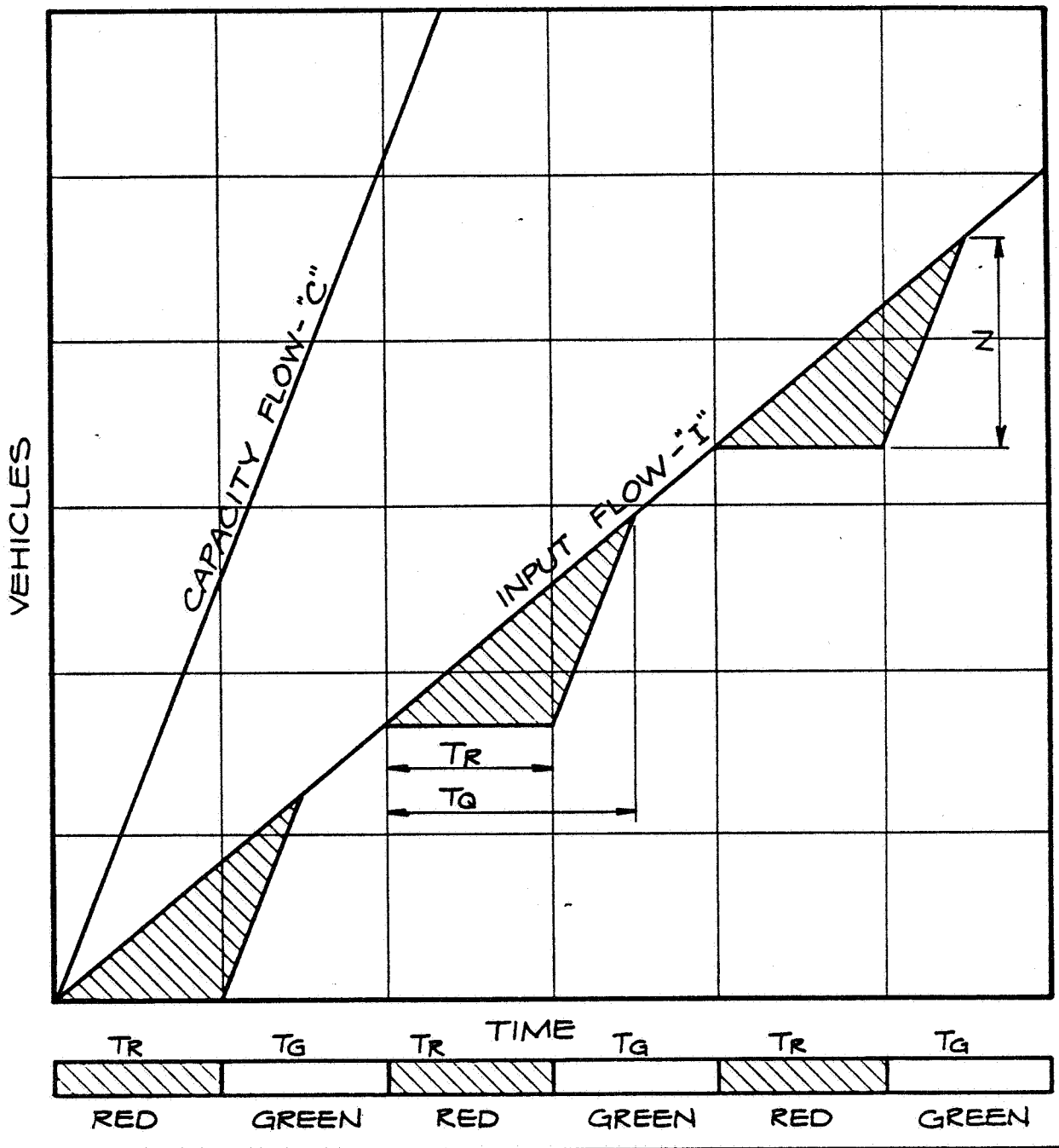


NOTE: (1) 30TH HIGHEST HOUR WAS MODIFIED TO BE COMMENSURATE WITH CAPACITY AVAILABLE UNDER THE NO-BUILD ALTERNATIVE.

GN 12997.BO

FIGURE 4
1992 VOLUMES
SR 699 - TREASURE ISLAND

CH2M HILL



T_Q = DURATION OF QUEUE
N = DELAYED VEHICLES
Q = MAX VEHICLES IN QUEUE
D = TOTAL DELAY (FOR DELAYED VEHICLES)

$$T_Q = \frac{C(T_R)}{C-I}$$

$$N = I(T_Q)$$

$$D = \frac{T_R(N)}{2}$$

$$Q = I(T_R)$$

GN 12997.B0

FIGURE 5
QUEUE ANALYSIS
SR 699 - TREASURE ISLAND

CH2M HILL

and the average hourly input (demand) flow for a particular intersection approach in terms of vehicles per unit of time. The base of the shaded triangles represent a flow rate of zero during the time when a red signal indication is displayed. When the green indication appears, vehicles waiting in the queue will depart from the intersection at a rate of flow equal to capacity. Therefore, the sloping line that forms the right side of the shaded triangles on Figure 5 is parallel to the capacity rate of flow until it intersects the input flow rate line. The shaded triangular area represents delay time for delayed vehicles, and the vertical dimension of the triangle represents the number of delayed vehicles (N). A sample calculation for one intersection approach is shown in Table 2.

The amount of total delay was divided by the total number of vehicles (delayed and not delayed) to arrive at the average vehicle delay for each approach. The maximum queue length was also calculated to determine the length of roadway over which the average delay should be spread.

The running time also is increased as traffic volumes increase. The amount of the increase is based on the relationship between volume and capacity. As volume approaches capacity, travel time increases significantly even with small increases in volume. Speed-volume curves from the Highway Capacity Manual[5] show this relationship and were used to estimate average running time.

The sum of running time and delay time was used to estimate average speed for the project. Appendix 1 includes a sample speed calculation for one traffic signal approach. Estimated speeds for 1982 30th highest hour (no-build and build) and 1982 average of peak 8-hour conditions are depicted on Figures 6, 7 and 8. Figures 9 through 12 show estimated 1992 speeds for: 30th highest hour no-build; 30th highest hour build; average of peak 8-hours no-build; and average of peak 8-hours build conditions, respectively.

Estimated travel speeds on a daily basis were calculated by taking a weighted average of peak hour, peak 8-hours, and off-peak speeds.[6] Figures 13 through 16 show the resulting estimated speeds for: 1982 no-build; 1982 build; 1992 no-build, and 1992 build, respectively.

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(5) Ibid, Figure 10.3, Page 320.

(6) Weighted based on estimated volumes for each period--peak hour--10 percent; peak 8-hours (excluding peak hour--44 percent); off-peak--46 percent.

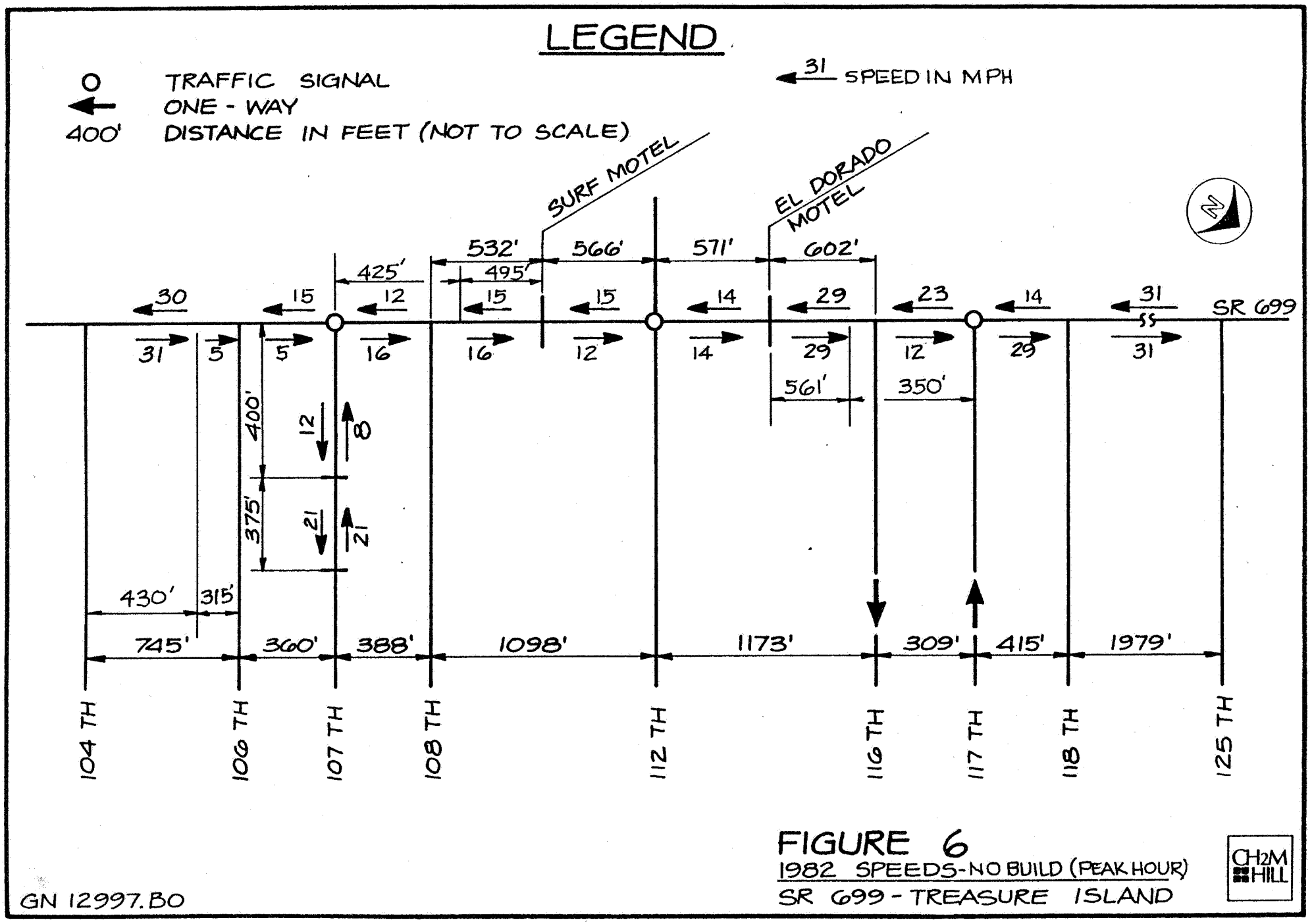


FIGURE 6
1982 SPEEDS-NO BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

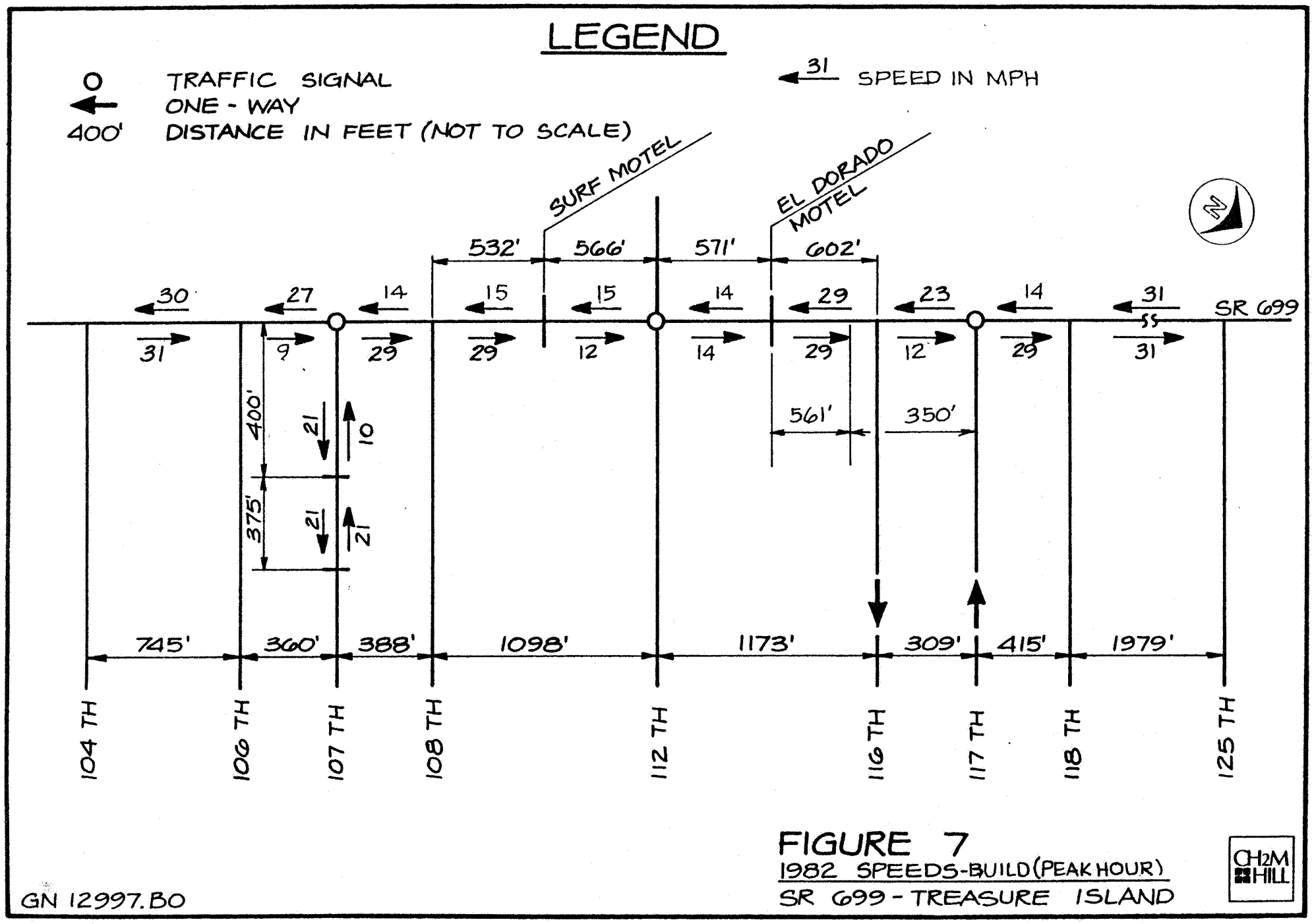


FIGURE 7
1982 SPEEDS-BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

GN 12997.BO

CH2M HILL

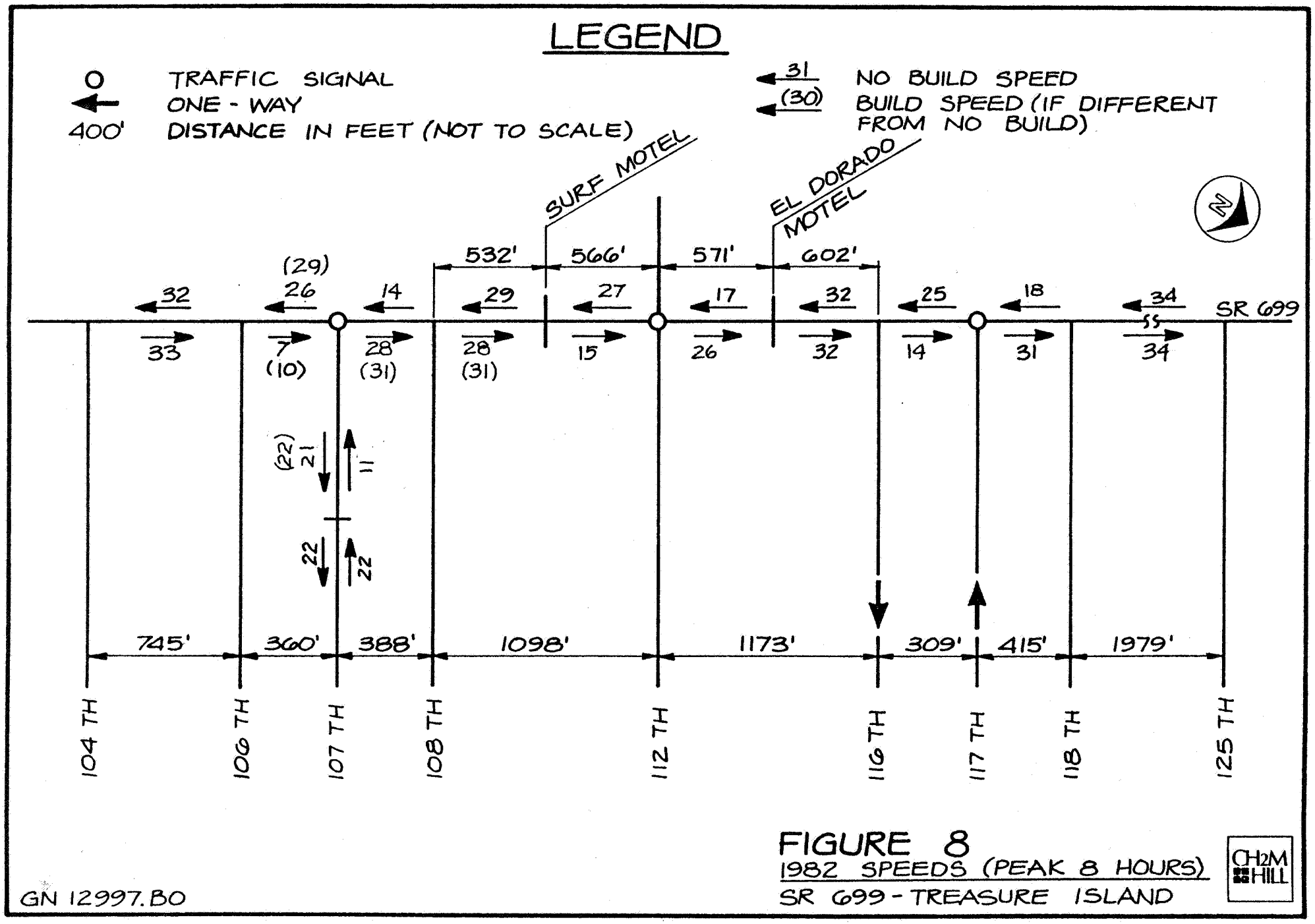


FIGURE 8
1982 SPEEDS (PEAK 8 HOURS)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

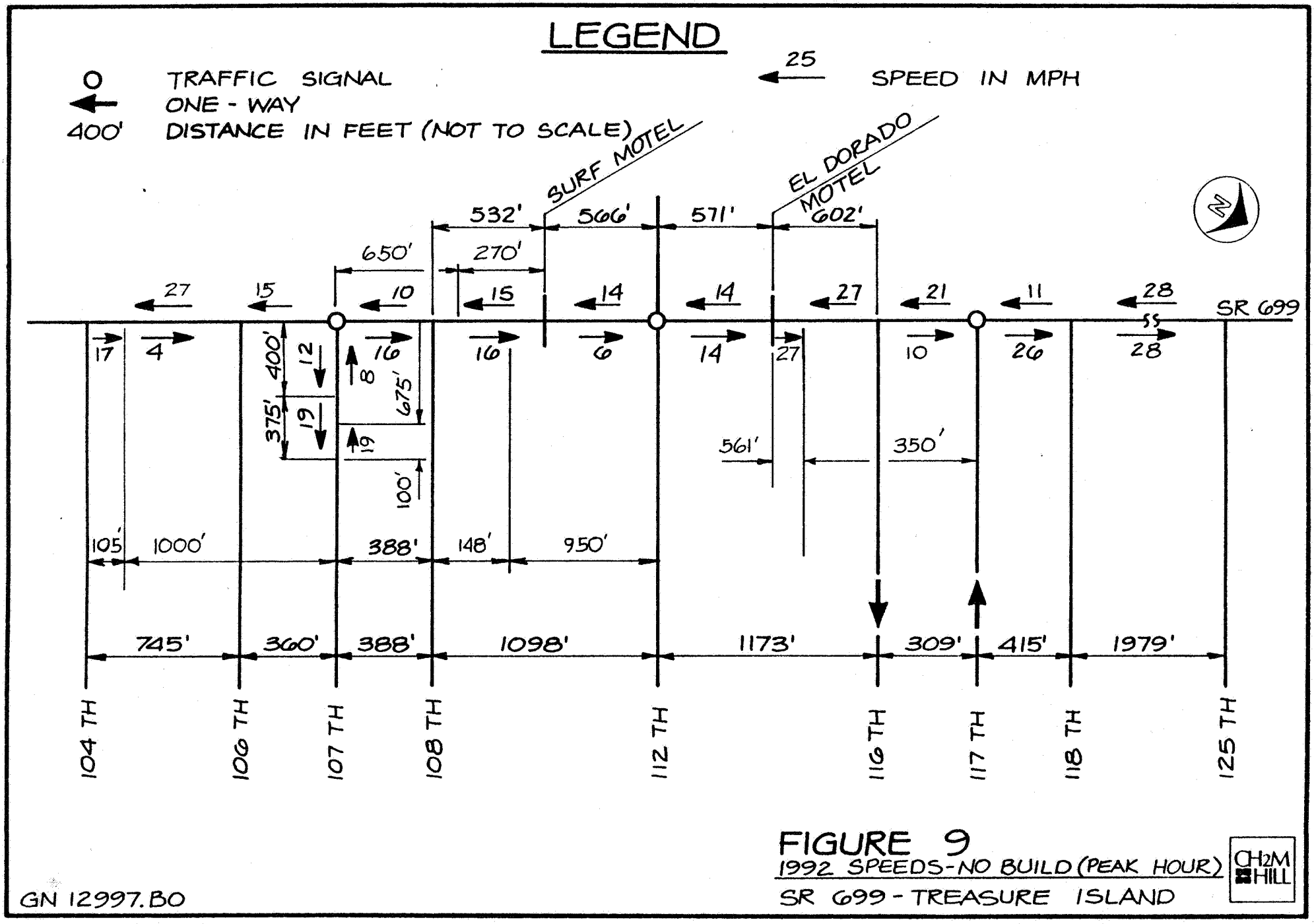


FIGURE 9
1992 SPEEDS-NO BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

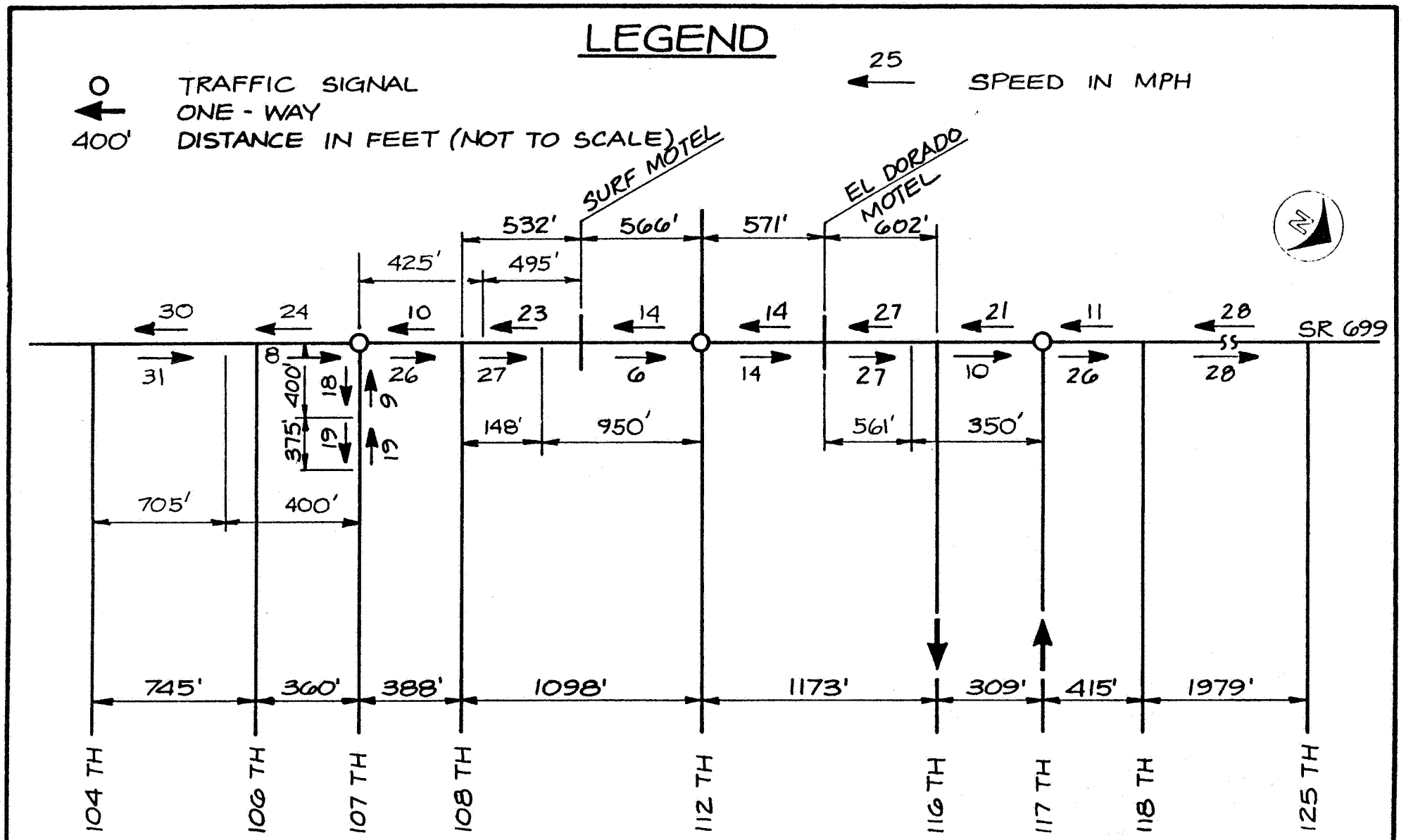


FIGURE 10
1992 SPEEDS - BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

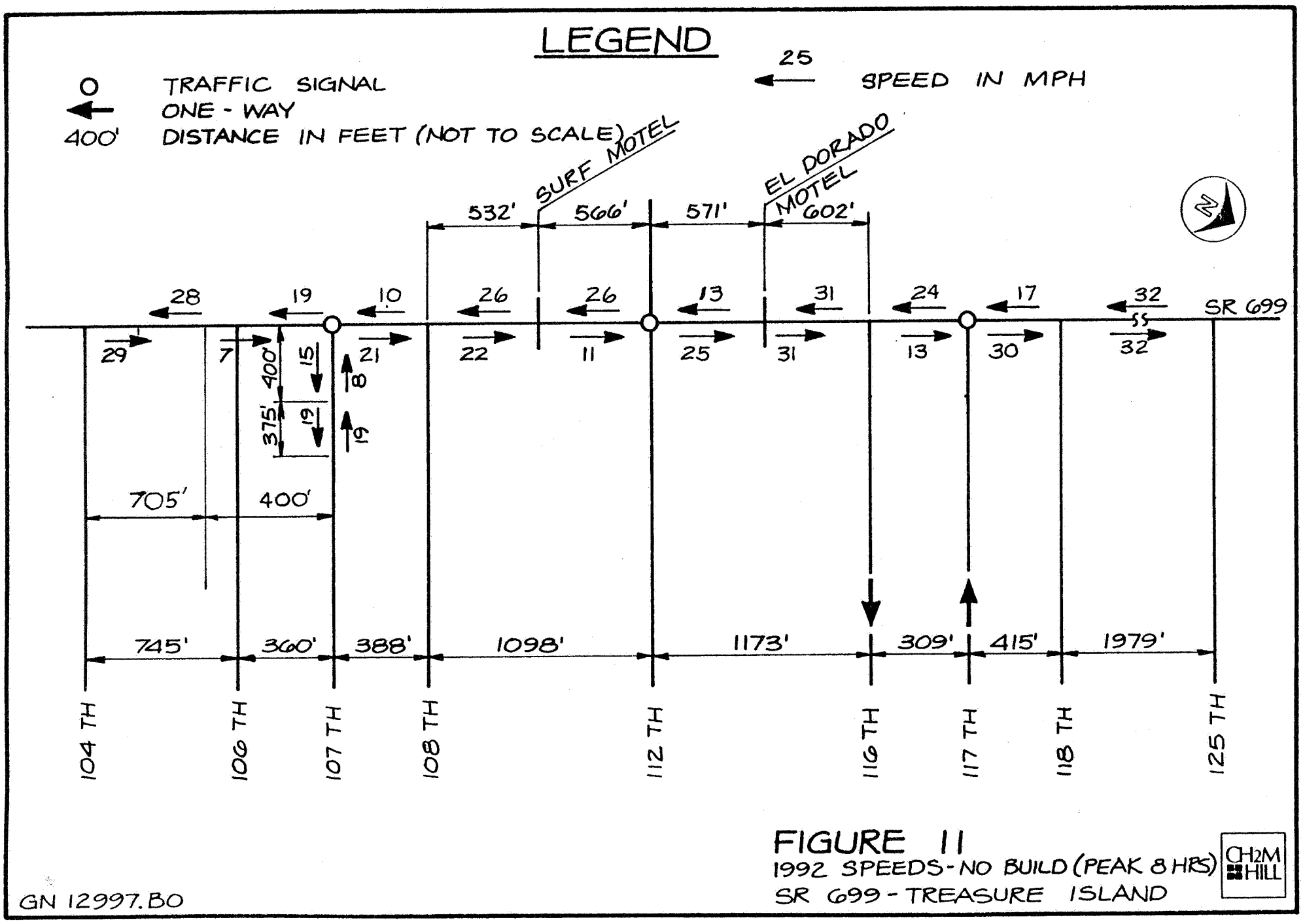


FIGURE 11
1992 SPEEDS - NO BUILD (PEAK 8 HRS)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

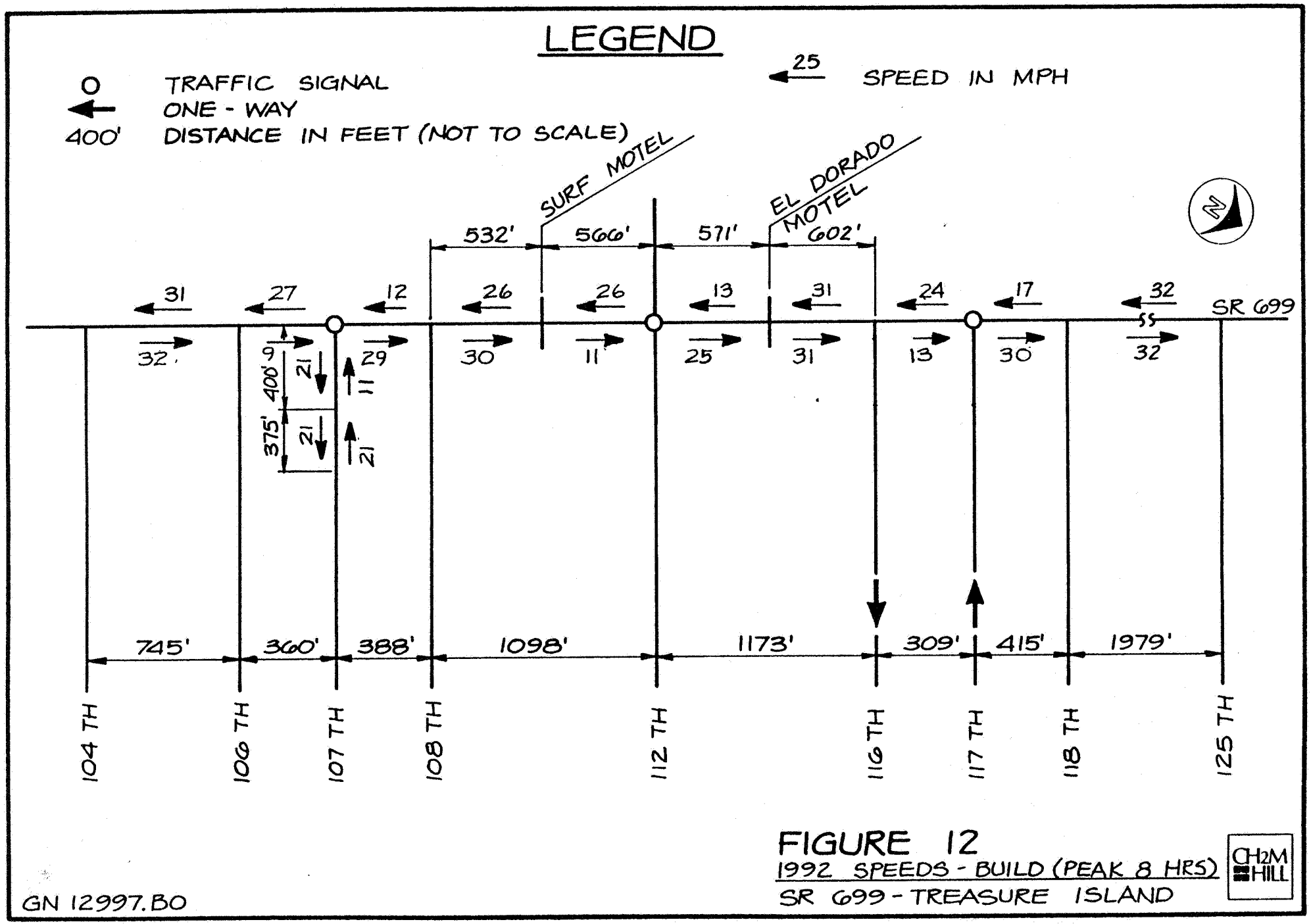


FIGURE 12
1992 SPEEDS - BUILD (PEAK 8 HRS)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

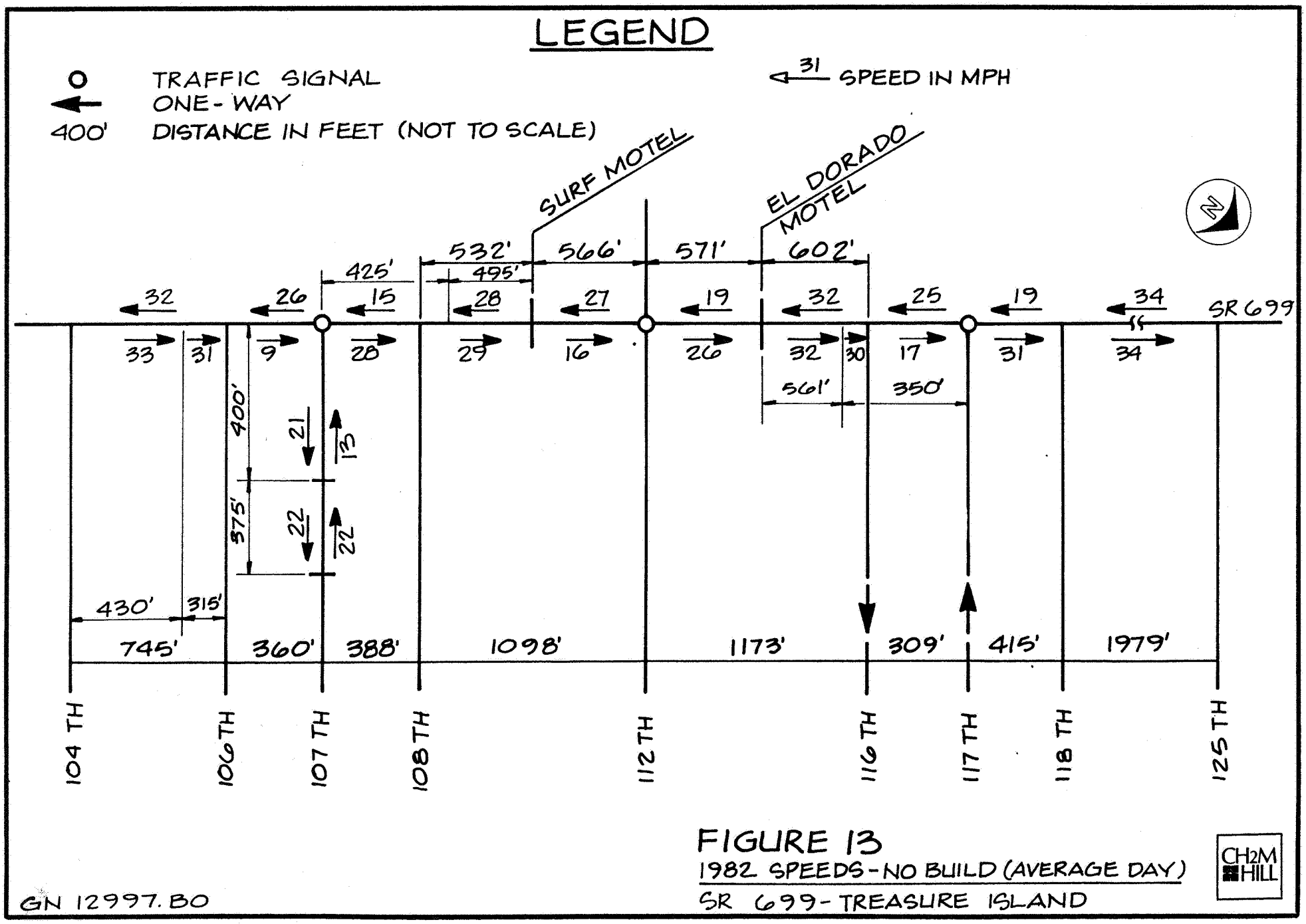


FIGURE 13
1982 SPEEDS - NO BUILD (AVERAGE DAY)
SR 699 - TREASURE ISLAND

GN 12997.BO

CH2M HILL

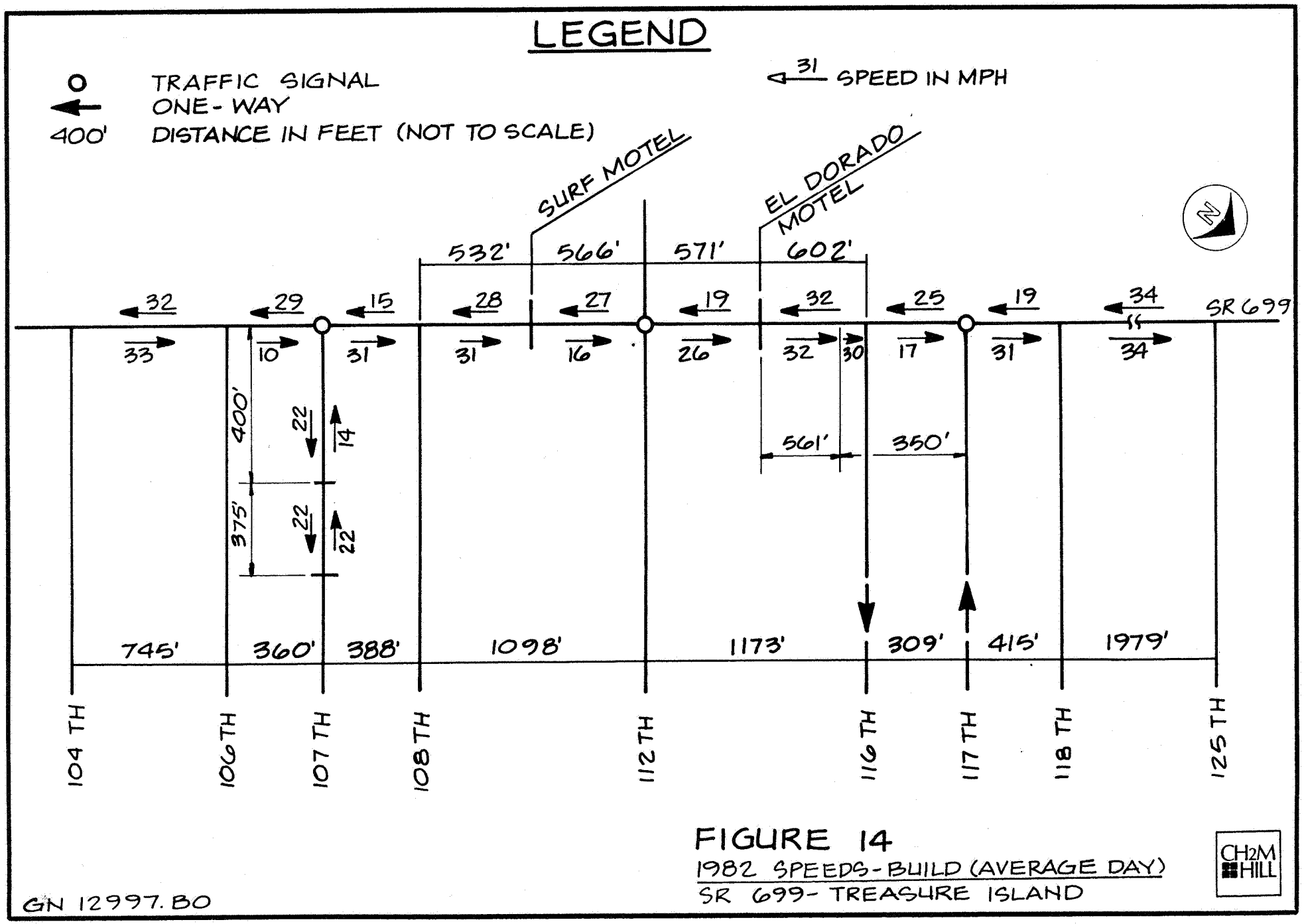


FIGURE 14
1982 SPEEDS-BUILD (AVERAGE DAY)
SR 699- TREASURE ISLAND

GN 12997.BO

CH2M HILL

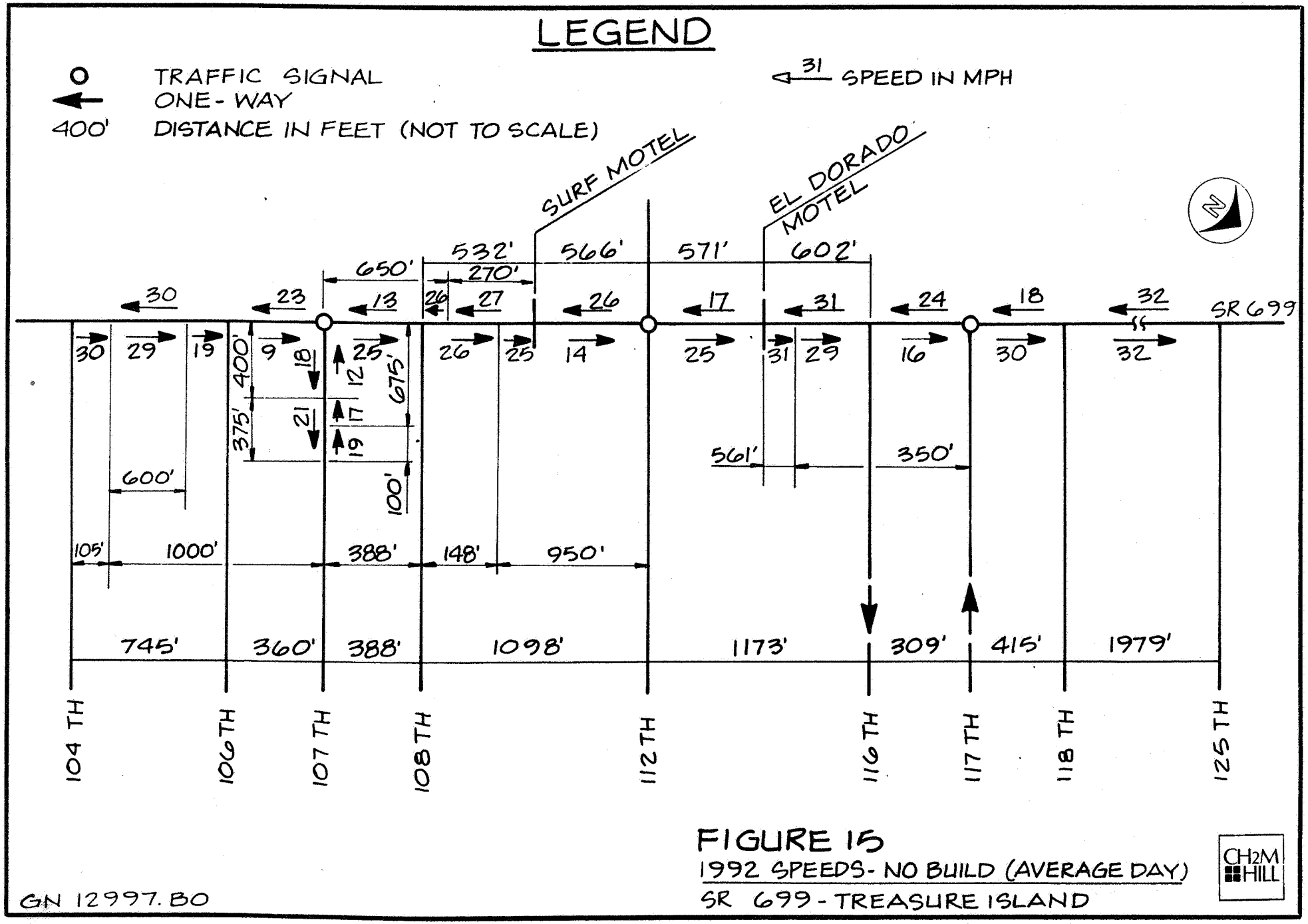


FIGURE 15
1992 SPEEDS- NO BUILD (AVERAGE DAY)
SR 699 - TREASURE ISLAND

GN 12997.BO

CH2M HILL

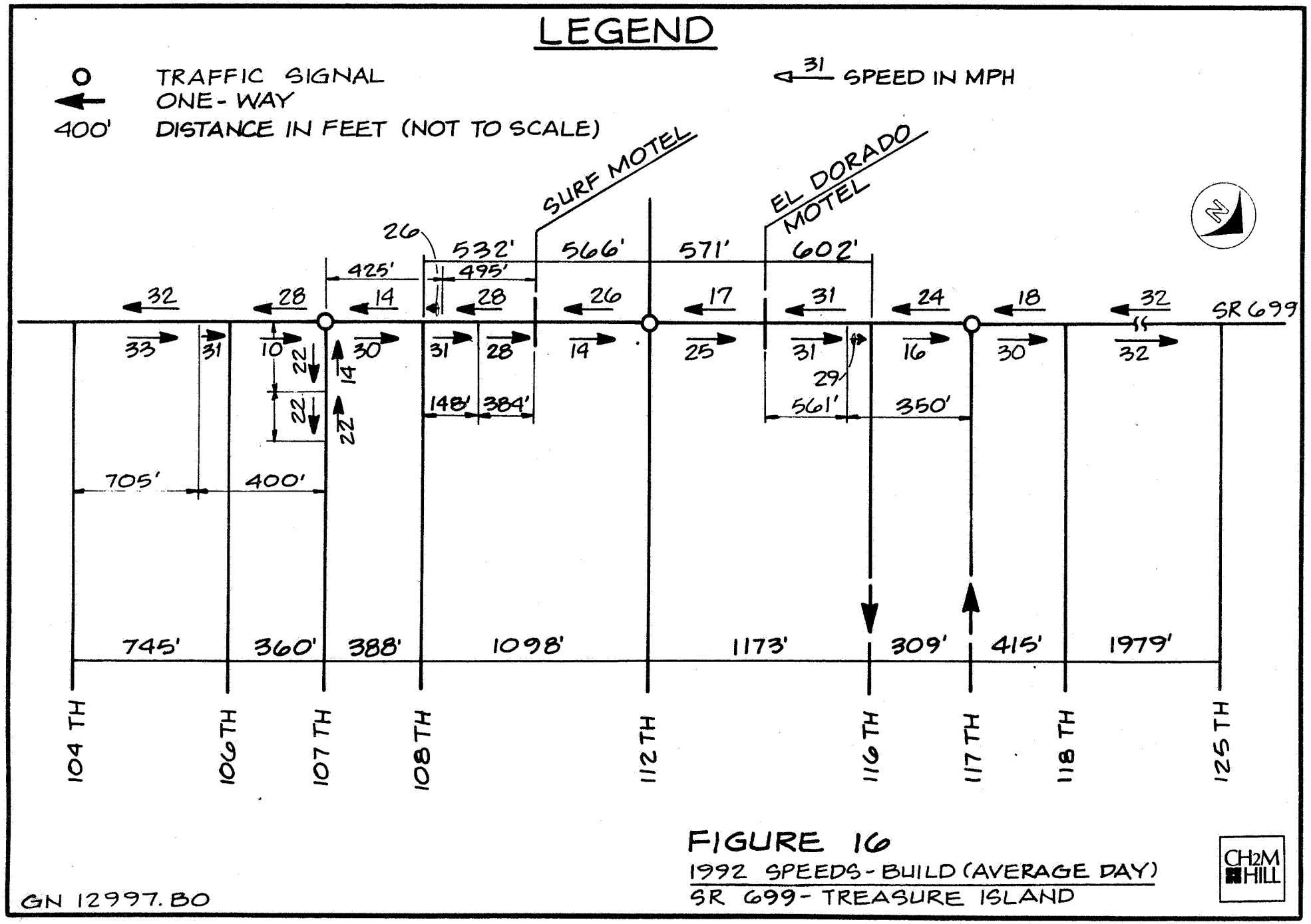


FIGURE 16
1992 SPEEDS - BUILD (AVERAGE DAY)
SR 699 - TREASURE ISLAND

GN 12997.80

CH2M HILL

Table 2
SAMPLE CALCULATION
ESTIMATED SPEED

Input Flow: (I) = 670/hr. = 0.186/sec.

Capacity Flow: (C) = 3070/hr. = 0.853/sec.

Stop Time: (T_R) = 42 sec.

Input Flow/Cycle: (I_c) = 670/60 = 11.2 (60 sec. cycle)

$$T_q = \frac{C\ (T_R)}{C - I} = \frac{0.853(42)}{0.853-0.186} = 53.7 \text{ sec.}$$

$$N = T_q(I) = 53.7\ (0.186) = 10.0 \text{ vehicles}$$

$$D = \frac{N(T_R)}{2} = \frac{10.0(42)}{2} = 210 \text{ seconds}$$

$$D_{average} = \frac{D}{I_c} = \frac{210}{11.2} = 18.8 \text{ sec/veh}$$

$$Q = I(T_R) = 0.186(42) = 7.8 \text{ vehicles}$$

Running Time: (RT) = 10.2 sec (from speed study)

Total Time = $D_{average}$ + RT = 18.8 + 10.2 = 29 sec.

Distance = 360'

$$\text{Speed} = \frac{360}{29} \times \frac{60}{88} = 8.5 \text{ mph}$$

T_q	=	Time of queuing
N	=	Number of delayed vehicles
D	=	Delay time of delayed vehicles
$D_{average}$	=	Average delay of all vehicles
Q	=	Maximum queue length

Appendix 2 provides information used for estimating speed on street segments not directly influenced by signals. Procedures outlined in Appendix 1 were also used to weight estimated speeds at the intersection of SR699 and 107th Avenue.

Intersection Capacity

Volume/capacity ratios were calculated for the 30th highest hour and average of peak 8-hours for 1982 and 1992 for both the build and no-build alternatives, using the 1982 and 1992 volumes shown on Figures 3 and 4. The resulting V/C ratios are shown in Table 3.

The 1982 V/C ratios shown in Table 3 indicate that congestion will occur at both 107th and 112th Avenues when volumes reach the 30th highest hour level and the project is not implemented. Some congestion will likely remain at 112th Avenue in 1982, even with the build alternative, since no basic increase in number of travel lanes will be provided by construction. The V/C ratios for 112th and 117th Avenues are equal for build and no-build, since the proposed project does not provide additional lanes at these two locations.

By 1992, projected traffic volumes are expected to increase sufficiently to cause significant capacity problems both during peak and non-peak periods, particularly with the no-build alternative. A V/C ratio of 1.10 (at LOS E) represents LOS F conditions for 107th Avenue under the no-build alternative (30th highest hour). The traffic congestion for this condition is illustrated by an estimated northbound average speed of only 4 mph over a distance of of about 1000 feet (see Figure 9).

Under the build alternative, the intersection of SR699 and 112th Avenue appears to be most critical with a 1992 30th highest hour V/C ratio of 1.05, representing level of service E conditions. A possible mitigation measure at this location would be to provide a separate northbound to eastbound right-turn lane to handle an estimated 360 peak hour and 250 average of peak 8-hour turning vehicles by 1992.

Table 3
COMPARISON OF VOLUME/CAPACITY RATIOS[1]

SR699 Intersection	30th Highest Hour			
	1982		1992	
	No-Build	Build	No-Build	Build
107th Avenue	1.05	0.70	1.10	0.85
112th Avenue	1.00	1.00	1.05	1.05
117th Avenue	0.75	0.75	0.85	0.85

SR699 Intersection	Average of Peak 8-Hours			
	1982		1992	
	No-Build	Build	No-Build	Build
107th Avenue	0.80	0.55	0.95	0.70
112th Avenue	0.70	0.70	0.80	0.80
117th Avenue	0.60	0.60	0.60	0.60

[1] LOS E

/RPT27A

Appendix 1
CALCULATION OF WEIGHTED AVERAGE SPEEDS

Example: 107th Westbound
Turns at SR699: 40 percent left -- 60 percent right
Average speeds: left--12 mph/right--20 mph
Weighted Average Speed:
= 12 (.4) + 20 (.6)
= 4.8 + 12.0 = 16.8 mph

CALCULATION OF ESTIMATED SIGNAL APPROACH SPEED

Example:	107th Westbound - 1982 Build
Turns at SR699:	28 percent left--72 percent right
Queue Length:	150 feet--Use 400 feet as the influence area
Running Time:	12 seconds (from speed/delay studies)
Delay Times:	Left turns--29 seconds Right turns--13 seconds
Total Times:	Left turns--41 seconds Right turns--25 seconds
Speeds (over 400 feet)	Left turns--7 mph Right turns--11 mph

Weighted Average Speed:
=7 (.28) + 11 (.72)
=2.0 + 7.9 = 9.9 mph

/RPT27A

Appendix 2
USE OF SPEED VS
V/C RATIO CURVES

1. This method was used for estimating speeds on street segments that are not directly affected by traffic signal delay.

   The resulting speeds were inspected and manually adjusted in some cases to be reasonable when compared with speeds on adjacent street segments.

2. Estimated speeds were based on the V/C ratio of the nearest signalized intersection. Speeds were selected from Curve I of Figure 10.3 (page 320) of the Highway Capacity Manual. For example, in 1979 a V/C ratio of 0.50 was calculated at 112th Avenue. This corresponds to a speed of 30 mph from Curve I. The calculated V/C ratio at this location (112th Avenue) under the 1992 no-build alternative, during average hour of the peak 8 hours was 0.8, corresponding to a speed of 27 mph from Curve I. The estimated speed reduction from 1979 to 1992 no-build was assumed to be 10 percent (27 vs 30 mph). The 1979 speed on the segment of SR699 just north of 112th Avenue was 28 mph; therefore, the estimated 1992 no-build speed, during the average hour of the peak 8 hours, was estimated to be 10 percent less, or 25 mph.

/RPT27A

APPENDIX 3

ESTIMATED TURNING MOVEMENTS

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST
~~ACTUAL~~ COUNT(VEHICLES) 30TH HIGH- HRS.

HOURS COUNTED EST HOUR -1982

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

INTERSECTION OF SR 699

AND 107 AVE

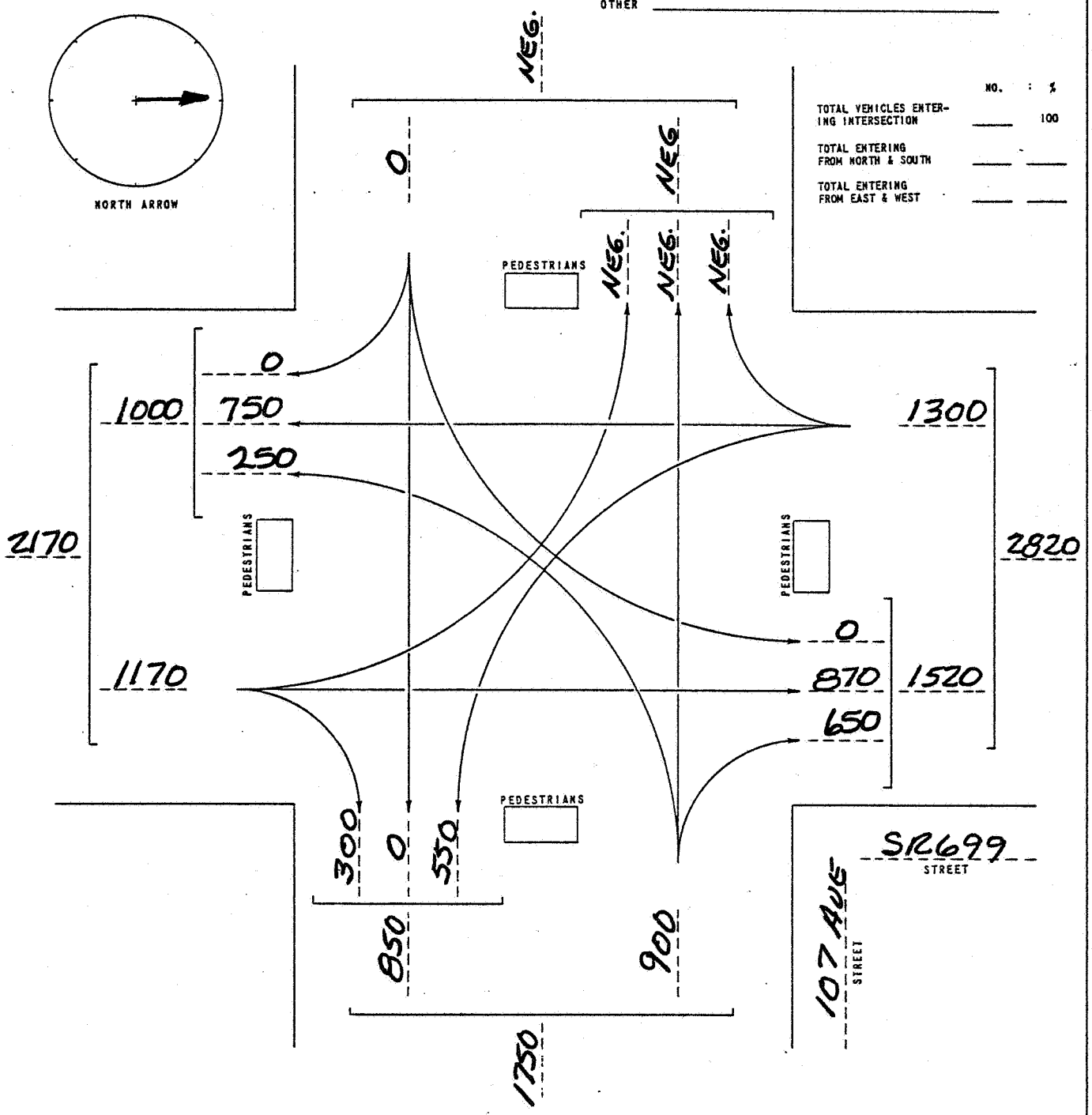
VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☒ ~~ALL~~ ALL

OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST ~~ACTUAL~~ COUNT(VEHICLES) 30 TH HIGH- HRS.

HOURS COUNTED EST HOUR - 1982

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

INTERSECTION OF SR 699

AND 112 AVE.

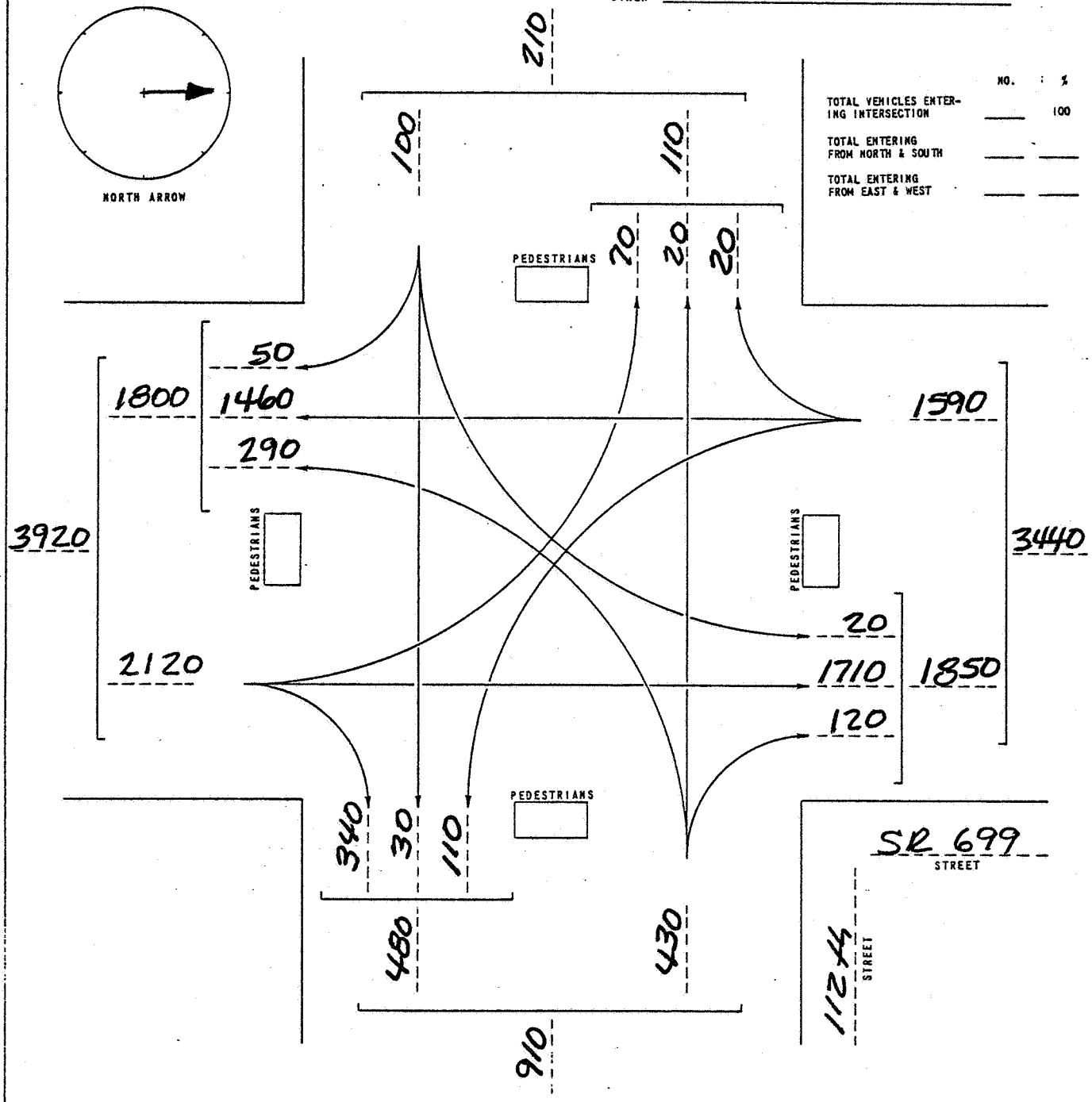
VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ~~ALL~~

OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST ACTUAL COUNT(VEHICLES) 30 TH HIGH- HRS.

HOURS COUNTED EST HOUR - 1982

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

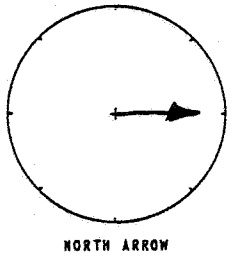
INTERSECTION OF SR 699

AND 117 th AVE

VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ~~ALL~~

OTHER _____



NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		

REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST ~~ACTUAL~~ COUNT(VEHICLES) 30TH HIGH- HRS.

HOURS COUNTED EST HOUR - 1992*

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

INTERSECTION OF SR699

AND 107th Ave.

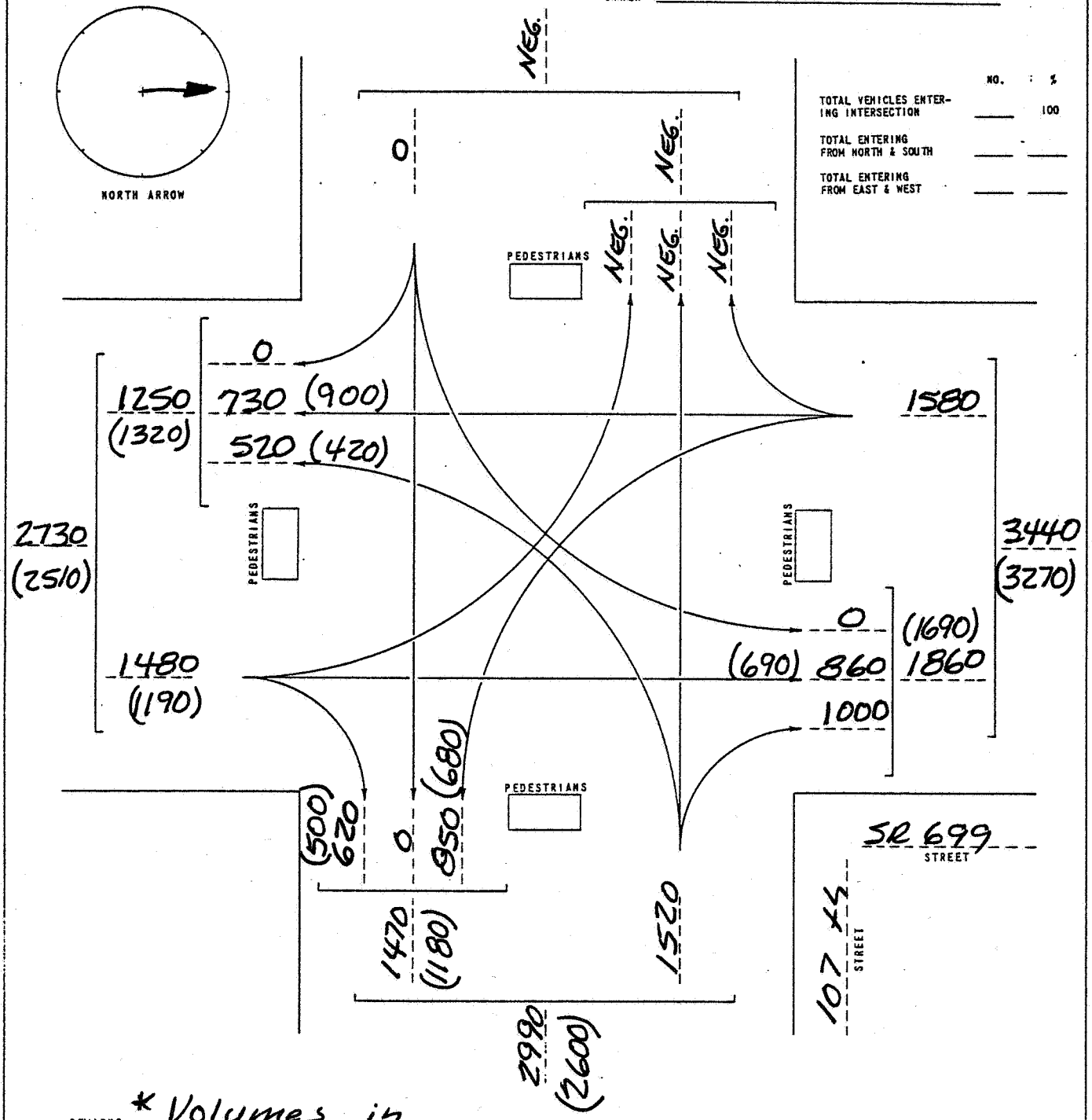
VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ALL

OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



REMARKS * Volumes in parentheses indicate revisions due to capacity constraints.

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

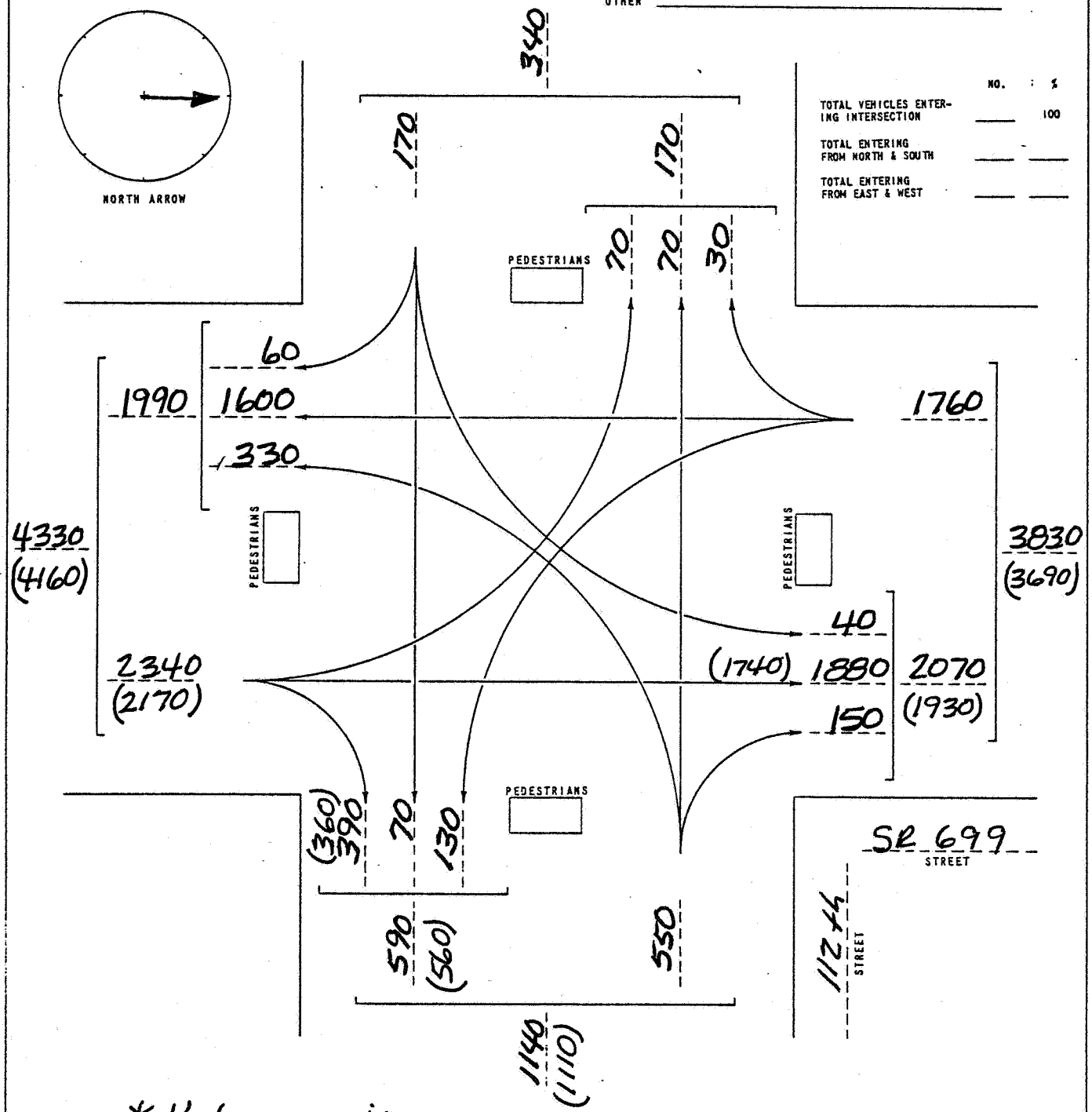
FORM A

EST ~~ACTUAL~~ COUNT(VEHICLES) 30TH HIGH- HRS.
HOURS COUNTED EST HOUR - 1992*
ACTUAL COUNT(PEDESTRIANS) _____ HRS.
HOURS COUNTED _____
WEATHER _____

DATE 7-1-80
DAY OF WEEK _____
INTERSECTION OF SR699
AND 112 th AVE
VEHICLE CLASSIFICATION:
☐ TRUCKS ☐ PASSENGER VEHICLES ☒ ALL
OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



REMARKS * Volumes in parentheses indicate revisions due to capacity constraints

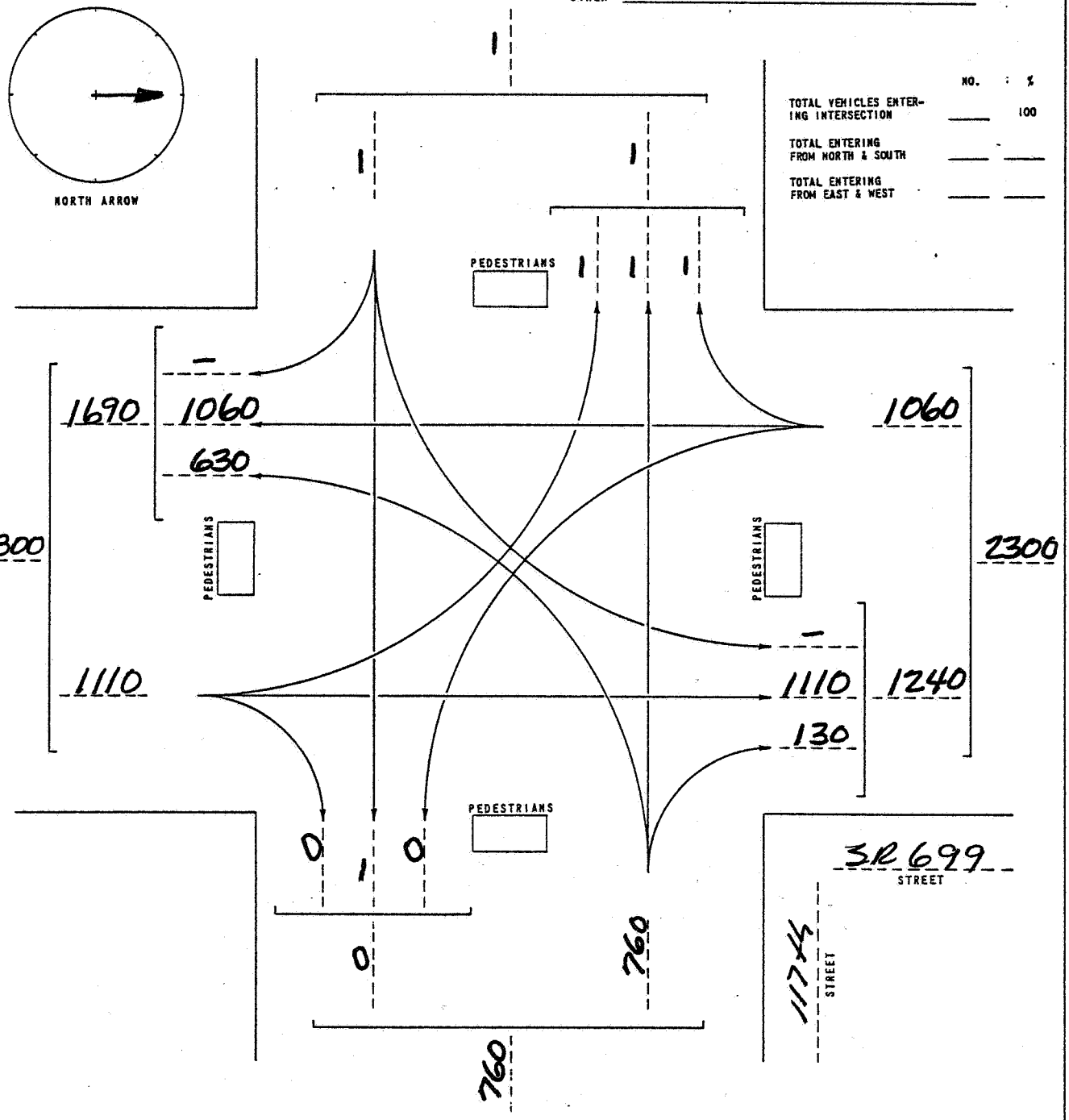
VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

ACTUAL COUNT(VEHICLES) 30TH HIGH- HRS. *
HOURS COUNTED EST HOUR - 1992
ACTUAL COUNT(PEDESTRIANS) _____ HRS.
HOURS COUNTED _____
WEATHER _____

DATE 7-1-80
DAY OF WEEK _____
INTERSECTION OF SR 699
AND 117th AVE

VEHICLE CLASSIFICATION:
☐ TRUCKS ☐ PASSENGER VEHICLES ☒ ALL
OTHER _____



	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		

REMARKS * Volumes in parentheses indicate reduction due to capacity constraints

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

~~ACTUAL~~ EST COUNT(VEHICLES) AVG. OF PEAK HRS.

HOURS COUNTED 8- HOURS - 1982

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

INTERSECTION OF SR 699

AND 107 th AVE

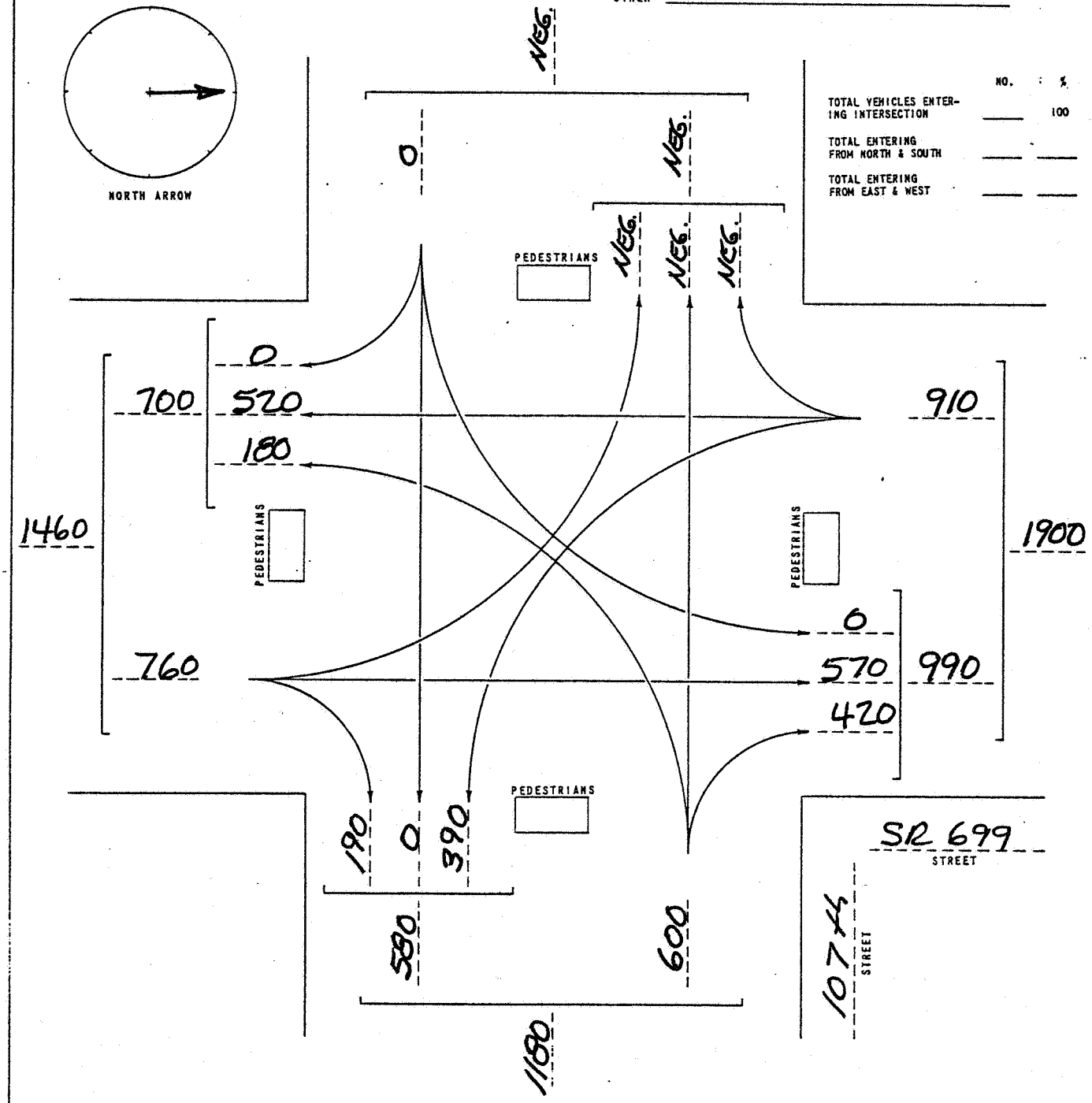
VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ~~HCL~~

OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST
~~ACTUAL~~ COUNT(VEHICLES) AVG OF ____ HRS.

HOURS COUNTED PEAK 8-HOURS - 1982

ACTUAL COUNT(PEDESTRIANS) ____ HRS.

HOURS COUNTED ____

WEATHER ____

DATE 7-1-80

DAY OF WEEK ____

INTERSECTION OF SR699

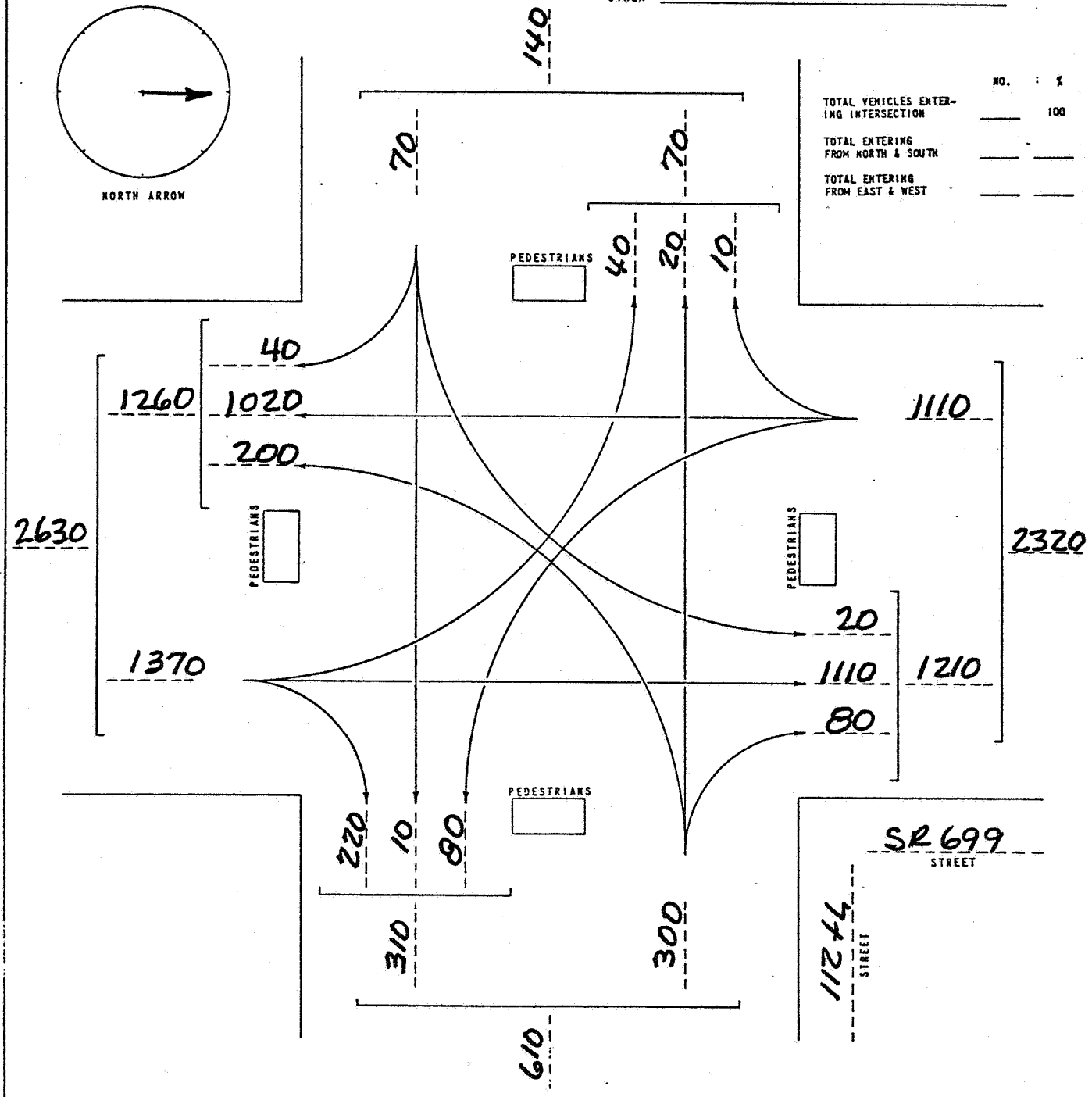
AND 112th AVE

VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ALL

OTHER ____

NORTH ARROW



	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION	____	100
TOTAL ENTERING FROM NORTH & SOUTH	____	____
TOTAL ENTERING FROM EAST & WEST	____	____

REMARKS ____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST
~~ACTUAL~~ COUNT(VEHICLES) AVG. OF PEAK HRS.

HOURS COUNTED 8-HOURS - 1982

ACTUAL COUNT(PEDESTRIANS) _____ HRS.

HOURS COUNTED _____

WEATHER _____

DATE 7-1-80

DAY OF WEEK _____

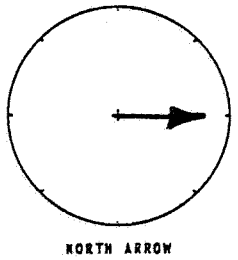
INTERSECTION OF SR 699

AND 117th AVE

VEHICLE CLASSIFICATION:

☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ALL

OTHER _____



	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION	____	100
TOTAL ENTERING FROM NORTH & SOUTH	____	____
TOTAL ENTERING FROM EAST & WEST	____	____

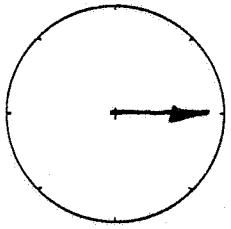
REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

~~ACTUAL~~ COUNT(VEHICLES) AVG. OF PEAK HRS.
HOURS COUNTED 8-HOURS - 1992
ACTUAL COUNT(PEDESTRIANS) _____ HRS.
HOURS COUNTED _____
WEATHER _____

DATE 7-1-80
DAY OF WEEK _____
INTERSECTION OF SR 699
AND 107 th AVE
VEHICLE CLASSIFICATION:
☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ~~MCL~~
OTHER _____



	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		

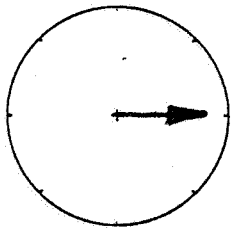
REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

FORM A

EST ACTUAL COUNT(VEHICLES) AVG OF PEAK HRS.
HOURS COUNTED 8-HOURS - 1992
ACTUAL COUNT(PEDESTRIANS) _____ HRS.
HOURS COUNTED _____
WEATHER _____

DATE 7-1-80
DAY OF WEEK _____
INTERSECTION OF SR 699
AND 112th AVE.
VEHICLE CLASSIFICATION:
☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ALL
OTHER _____



	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		

REMARKS _____

VEHICLE TURNING MOVEMENT COUNT
SUMMARY

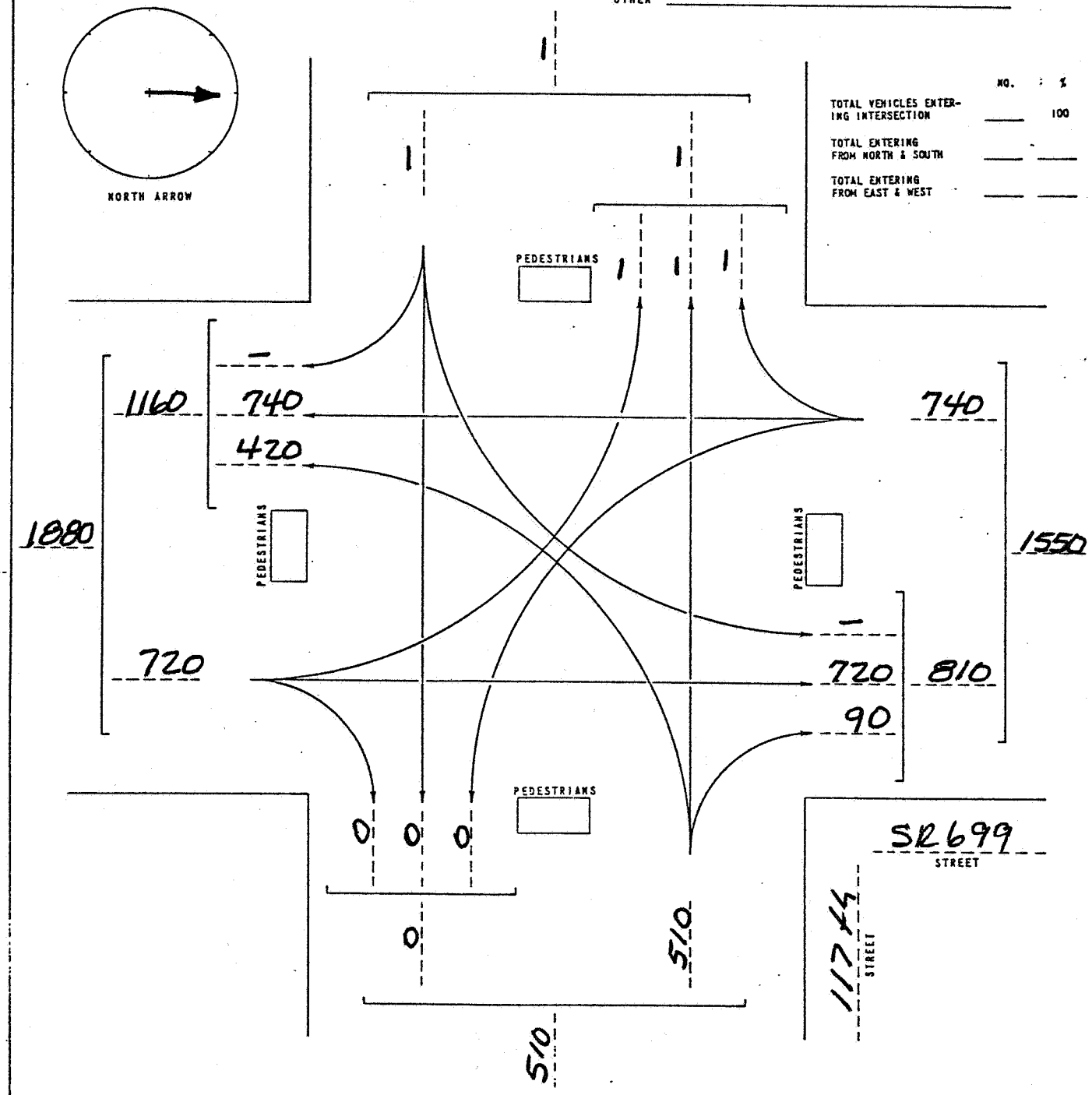
FORM A

EST
~~ACTUAL~~ COUNT(VEHICLES) AVG. OF PEAK HRS.
HOURS COUNTED 8- HOURS - 1992
ACTUAL COUNT(PEDESTRIANS) _____ HRS.
HOURS COUNTED _____
WEATHER _____

DATE 7-1-80
DAY OF WEEK _____
INTERSECTION OF SR 699
AND 117th AVE
VEHICLE CLASSIFICATION:
☐ TRUCKS ☐ PASSENGER VEHICLES ☑ ~~ALL~~
OTHER _____

NORTH ARROW

	NO.	%
TOTAL VEHICLES ENTERING INTERSECTION		100
TOTAL ENTERING FROM NORTH & SOUTH		
TOTAL ENTERING FROM EAST & WEST		



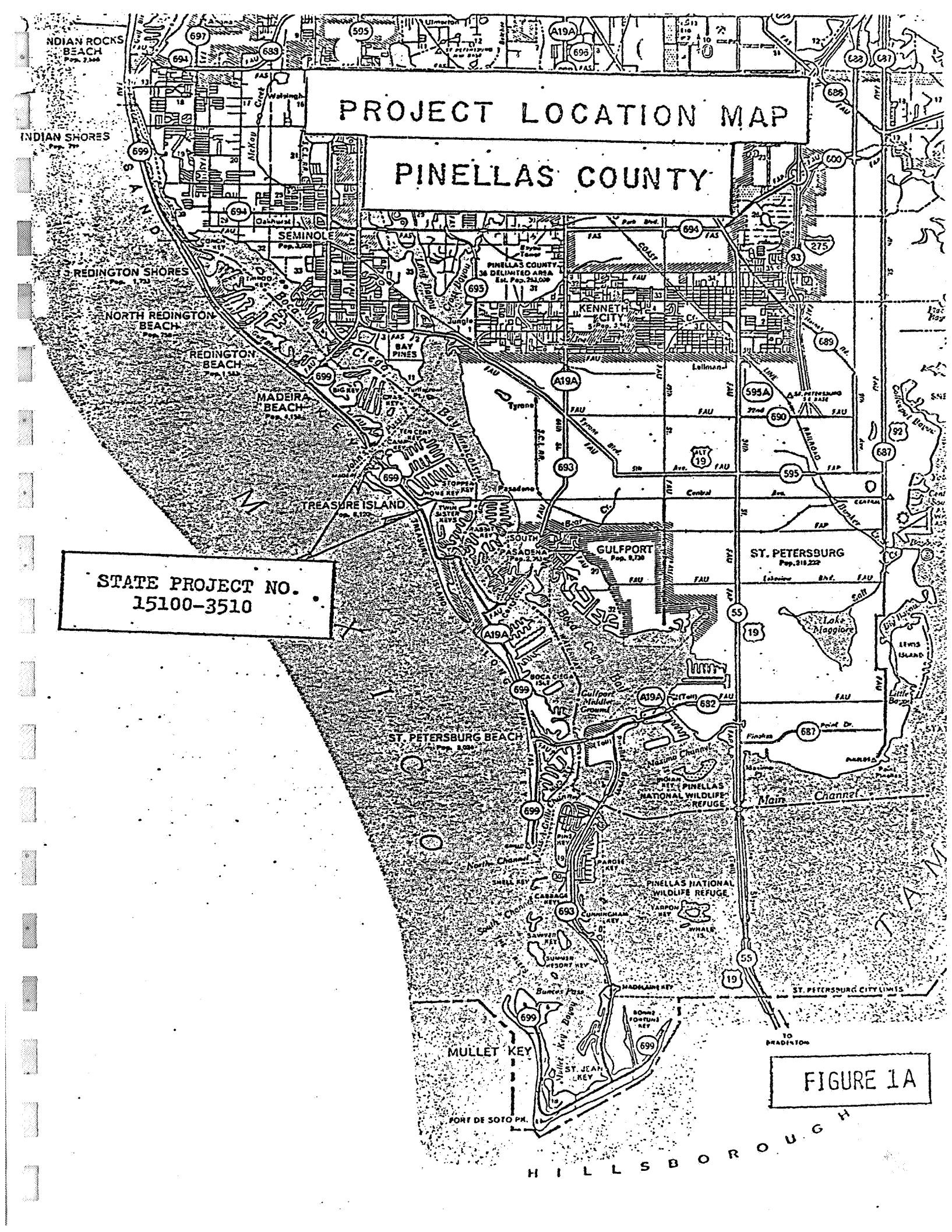
REMARKS _____

AIR QUALITY IMPACT ANALYSIS
SR699 - TREASURE ISLAND, FLORIDA

INTRODUCTION

Based on the above traffic analysis, carbon monoxide emissions are estimated so that the air quality impact can be determined. The following information is in support of an application for approval from the Florida Department of Environmental Regulations (DER). The Gulf Boulevard Project has previously applied for a DER permit, but it was denied by an Administrative Hearing (Case 76-832, January 15, 1979). Specifically noted was the lack of reasonable vehicle speed information near the signalized intersections.

A map of the project and vicinity is included as Figure 1A. A project description is included in the foregoing traffic section. The project is intended to alleviate present traffic congestion and provide a safer, more efficient roadway. The land uses along Gulf Boulevard are primarily commercial with some residential toward the northern part of the project area. Maps of present and future land uses are included as Figures 2A and 3A.


PROJECT LOCATION MAP
PINELLAS COUNTY
STATE PROJECT NO.
15100-3510
INDIAN ROCKS BEACH
INDIAN SHORES
SEMINOLE
REDINGTON SHORES
NORTH REDINGTON BEACH
REDINGTON BEACH
MADEIRA BEACH
TREASURE ISLAND
ST. PETERSBURG BEACH
SOUTH PASADENA
GULFPORT
ST. PETERSBURG
KENNETH CITY
PINELLAS COUNTY 38 DELIMITED AREA
PINELLAS NATIONAL WILDLIFE REFUGE
MULLET KEY
ST. PETERSBURG CITY LIMITS
TO BRADENTON
FIGURE 1A
GULF OF MEXICO
HILLSBOROUGH

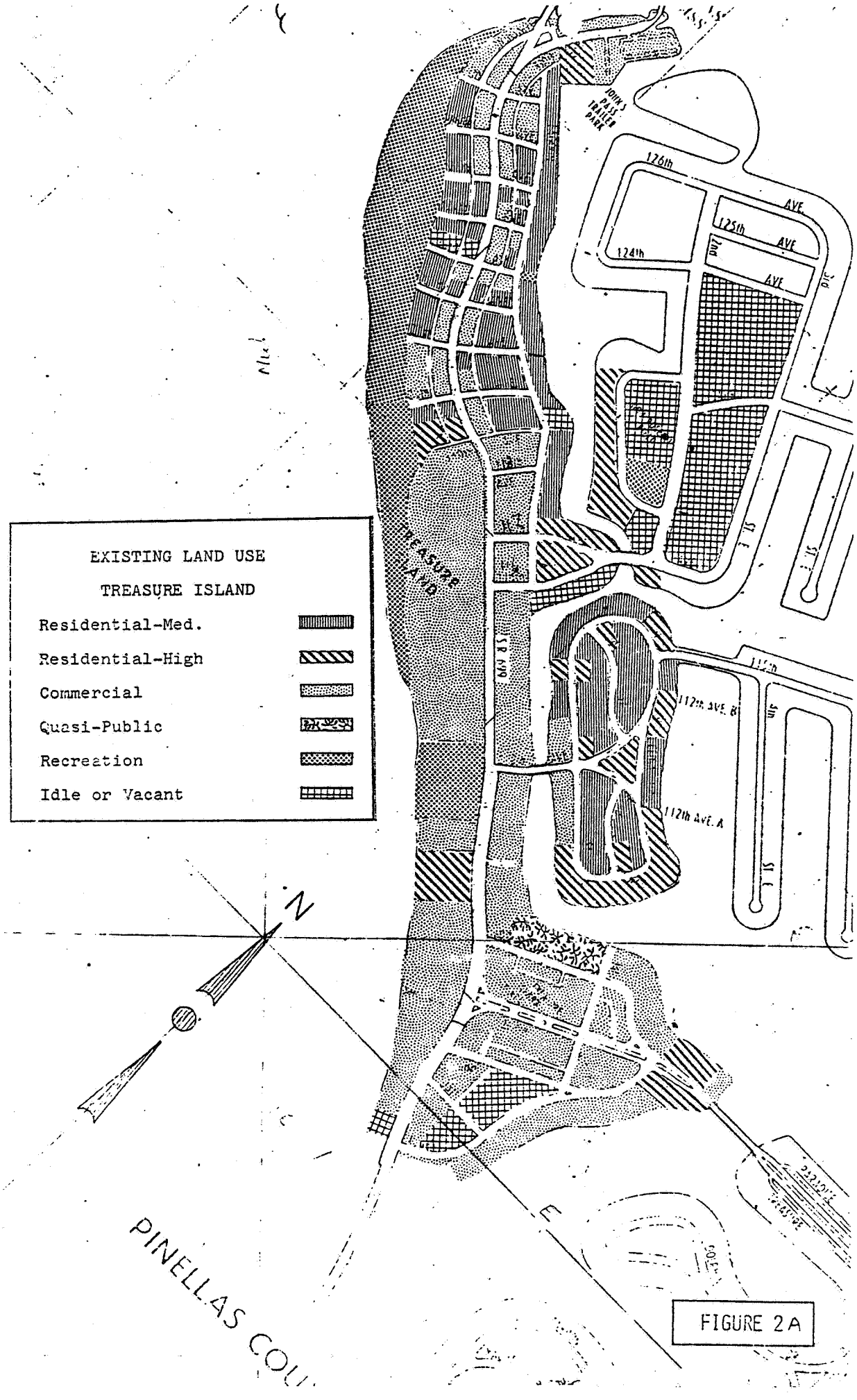

EXISTING LAND USE
TREASURE ISLAND
Residential-Med.
Residential-High
Commercial
Quasi-Public
Recreation
Idle or Vacant
JOHN'S PASS TRAILER PARK
126th AVE
125th AVE
124th
AVE
TREASURE ISLAND
MUNICIPAL
112th AVE. A
N
PINELLAS COU

FIGURE 2A

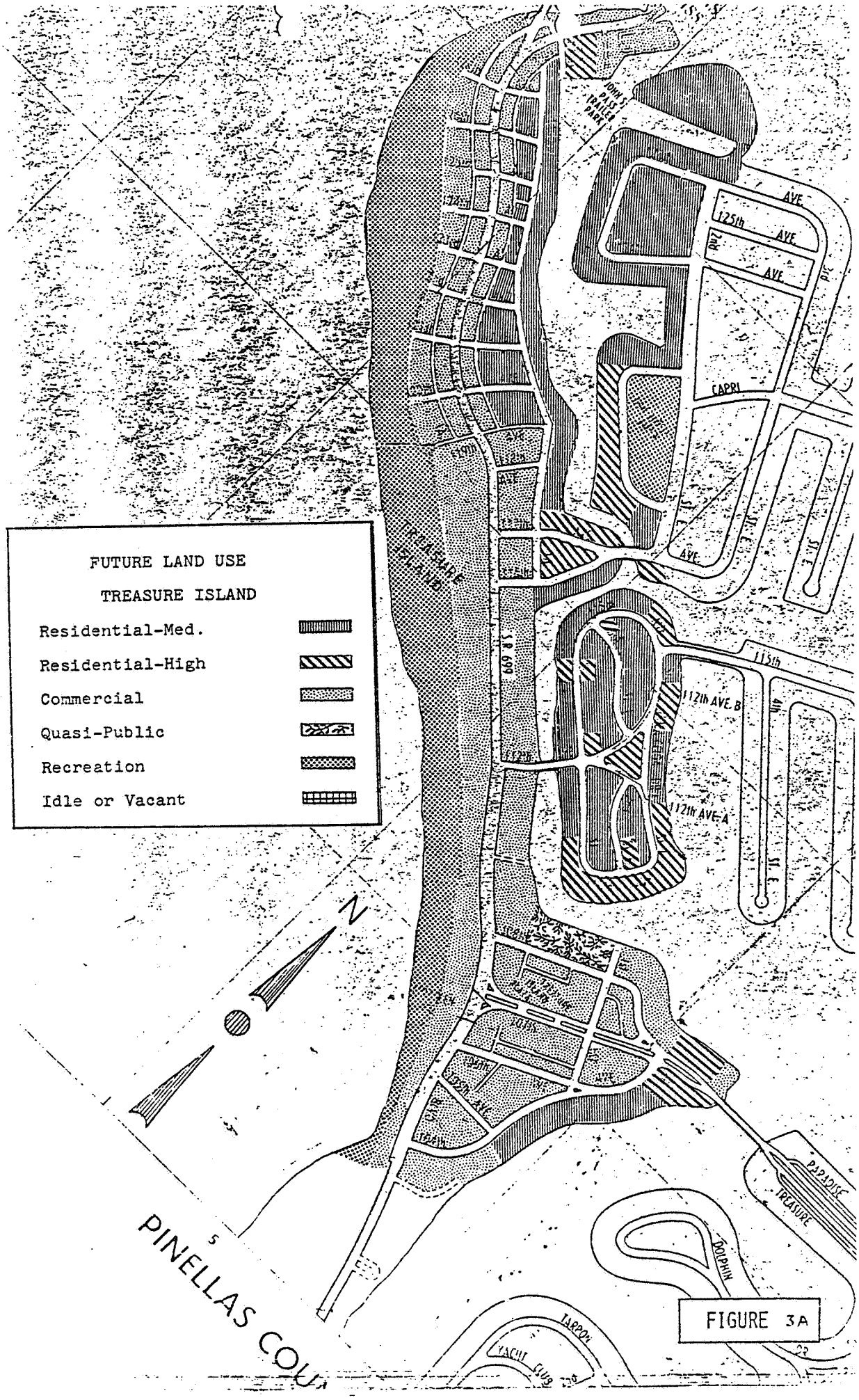

FUTURE LAND USE
TREASURE ISLAND
Residential-Med.
Residential-High
Commercial
Quasi-Public
Recreation
Idle or Vacant
JOHN'S PASS TRAILER PARK
125th AVE
CAPRI
TREASURE ISLAND
S.R. 699
115th
112th AVE. B
112th AVE. A
PARADISE
TREASURE
DOLPHIN
TARPON
YACHT CLUB
N
PINELLAS COU

FIGURE 3A

METHODOLOGY

The Florida Department of Transportation retained CH2M HILL to perform the necessary analyses so that they could reapply for the DER permit. The air quality analysis began by calculating carbon monoxide (CO) emissions for the following situations:

1. Existing (1979)
2. 1982-No Build
3. 1982-Build
4. 1992-No Build
5. 1992-Build

The emission factors were obtained according to EPA procedures.[1] They are based on 80 percent auto and 20 percent light trucks (the small percent of heavy duty trucks would have a negligible effect). CO emission factors by vehicle speed and calendar year are presented in Table 1A. Computer printouts are attached in the Appendix. Also in the Appendix are Tables 2A-6A detailing the calculations of vehicle CO emissions.

Traffic conditions are the most significant aspect in reviewing highway CO emissions. Most unfavorable are congestion conditions, where vehicles are idling or creeping along at a very slow speed. CH2M HILL traffic engineers carefully analyzed conditions along Gulf Boulevard, specifying vehicle speeds over representative roadway lengths.

Dispersion modeling was done using the same computer program referenced in the original permit application (CALINE-2). A new version, CALINE-3, is out and is said to predict lower concentrations than CALINE-2, but is not yet on the CH2M HILL computer system. Meteorological conditions used were:

1. Stability class 4 (D)
2. Wind angle of 22 degrees to the roadway
3. Wind speed of 2 mph
4. Meteorological persistence factor of 0.6 for peak 8 hours.

The Appendix includes modeling results of a parallel wind (zero degrees to the roadway). The model is believed to overpredict, especially at that wind angle. Concentrations were calculated for distances out to 100 feet from the curb at a receptor height of 5 feet.

1Mobile Source Emission Factors, Final Document; EPA, March 1978.

Table 1A

COMPOSITE CO EMISSION FACTORS

(grams/mile)

Speed (mph)	1979	1982	1992
4	325.1	237.8	92.3
5	275.2	201.5	78.5
6	225.2	165.2	64.7
7	193.4	142.2	56.0
8	169.1	124.7	49.3
9	150.2	111.2	44.2
10	135.3	100.4	40.2
11	123.3	91.9	36.9
12	113.6	85.0	34.3
13	105.5	79.2	32.2
14	98.8	74.5	30.4
15	93.1	70.4	28.8
16	88.3	66.9	27.5
17	84.0	63.9	26.4
18	80.2	61.2	25.3
19	76.9	58.7	24.4
20	73.6	56.2	23.4
21	70.8	54.2	22.6
22	68.2	52.2	21.8
23	65.8	50.4	21.1
24	63.5	48.7	20.4
25	61.3	47.0	19.7
26	59.2	45.4	19.0
27	57.2	43.9	18.4
28	55.3	42.4	17.8
29	53.5	41.0	17.2
30	51.8	39.7	16.7
31	50.2	38.4	16.2
32	48.6	37.2	15.7
33	47.2	36.1	15.2
34	45.8	35.1	14.8

With regard to concentrations of hydrocarbons (HC), nitrogen oxides (NO_x), particulates and ozone (O_3), it is very difficult to predict because of chemical reactivity and/or variability in emission rates. The emissions of HC and NO_x as well as O_3 concentrations, are generally of concern on an area-wide basis where significant increases in emissions are caused by major new motor vehicle facilities. The relatively small changes in traffic caused by this improvement project would have no significant effect on concentrations of those pollutants. Particulate emissions are quite variable depending on the cleanliness of the road, vehicle speeds, and meteorological conditions. Due to the variability of those factors, particulate concentrations are especially difficult to predict, and again would not be significantly affected by this project. For CO emissions the critical year would be 1982 because of the relatively little increase in traffic volumes over the years when vehicle controls are expected to decrease exhaust emissions significantly.

The background concentrations have been a necessary consideration in the prediction of ambient pollutant concentrations. It is given a single value as a minimum concentration applicable over a wide area. However, when predicting concentrations from a specific source the background concentration depends on upwind sources and the atmospheric dispersion conditions, thus background can vary. Short-term monitoring at Lyons Field (Treasure Island) with winds from north to east generally resulted in concentrations from 0.75 to 1.5 ppm, thus agreeing well with a widely-used value of 1 ppm. This same value was used for 1982 and 1992 and is considered conservative because of expected decreases in CO emissions.

Caline-2 modeling was performed on the highest volume road segment just south of 112th Avenue, and is included in Appendix 3. The traffic volumes and speeds are identical in the build and no-build situation. Therefore, the modeling results would be the same regardless of the fate of this project. The critical air quality test for this project is the effect it would have on CO emissions in the vicinity of the 107th Avenue intersection. This test is based on the vehicle volumes and speeds developed in the preceeding traffic analyses.

RESULTS

The emission calculations included the entire length of the Gulf Boulevard project (104th to 125th) and about 800 feet of 107th, just east of the Gulf Boulevard intersection. The total CO emissions, in kilograms per hour (kg/hr), for specific time periods are as follows:

Condition	Peak Hour	Peak 8 Hours	Average Day
Existing	129.9	108.9	67.3
1982-No Build	238.4 (30th highest)	127.4	68.9
1982-Build	203.7 "	120.2	66.1
1992-No Build	132.5 "	70.3	37.1
1992-Build	110.1 "	63.2	34.1

The area does show an overall air quality benefit from the Gulf Boulevard improvement project. This is caused by the reduction in congestion in the area of 107th. There is no significant traffic or air quality effects north of about 110th.

In 1982 (No-Build) the highest emissions per length of roadway occur just south of the 107th intersection. Those emissions were utilized in the CALINE-2 program, which calculated the following CO concentrations, in milligrams per cubic meter (mg/m^3):

Conditions	Distance from Roadway, feet						
	0	10	20	30	40	70	100
Peak Hour							
1982-No Build	34.7	27.8	22.9	20.1	18.6	16.3	14.2
1982-Build	19.8	15.8	13.1	11.5	10.6	9.3	8.0
1992-No Build	16.7	13.3	11.0	9.7	9.0	7.8	6.8
1992-Build	9.7	7.7	6.3	5.5	5.2	4.5	3.9
Peak 8 Hours							
1982-No Build	10.3	8.2	6.8	6.0	5.6	4.9	4.2
1982-Build	7.3	5.8	4.8	4.3	3.8	3.4	2.9
1992-No Build	5.5	4.4	3.6	2.6	3.0	2.6	2.3
1992-Build	4.0	3.2	2.6	2.3	2.2	1.9	1.6

Even with a parallel wind, the peak 8-hour concentration at the curb (0 feet) is 8.0 mg/m^3 for the 1982 build condition (11.4 mg/m^3 for 1982 No Build).

In 1992 the highest CO concentrations would occur just south of 112th. However, the improvement project would have no effect on traffic or emissions in that area. The above concentrations do not include background, which is usually estimated at 0.5 to 1 mg/m^3. The modeling shows this project to be in compliance with the ambient air quality standards for CO. Some short-term CO measurements are included in the Appendix.

In Pinellas County, extensive air quality monitoring data is available from several locations. This information is summarized in the 1979 Transportation Emissions Control Plan, State Implementation Plan Revision. Concentrations of ozone were measured at five sites during 1977. The maximum one-hour concentration of 155 parts per billion (ppb) was observed at the Koger Center near Fourth Street and Gandy Boulevard. The second highest concentration was 154 ppb in the Oakhurst area of the County. Both these measurements represent violations of the current ozone standard of 120 ppb. In general, the violations occur in the central areas of the county. Monitoring stations in Tarpon Springs and Clearwater did not record violations during 1977. A possible reason for this pattern is the east-west interchange of air masses, due to land and sea breeze effects, between Hillsborough and Pinellas Counties. The occurrence of these violations has lead to the designation of Pinellas County as a non-attainment area of ozone. The State Implementation Plan (SIP) represents the mechanism for cealing with the local non-attainment designation. Upgrading of Gulf Boulevard was specifically recommended by this plan as a step toward reducing emissions. According to Section 17-2.17(3)(a)2.C of D.E.R.'s Rules on Air Pollution Complex Source Rule Exemption, the provisions of 17-2.05(8) do not apply to VOL emissions in ozone non-attainment areas.

Fugitive dust is of primary concern during the construction phase of project. It consists of relatively larger particles, however, which settle out of the atmosphere rapidly. This problem will be further controlled by employment of Section 102 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction concerning approved dust control measures. Particulates from tire wear of vehicles using the facility are anticipated to not be a problem because relative to freeway facilities (150,000 ADT) traffic volumes should be low (31,300 ADT - 1992). In addition, rubber particulates produced from tire wear are rapidly removed from the ambient air downwind of the facility through settling. Emission of particulate is no concern with gasoline automobiles. However, diesel engine equipped vehicles do emit particulate, but their fraction of total highway traffic is small. As the number of diesel engine vehicles on the road increases nationwide, the U.S. Environmental Protection Agency will address control of these particulate emissions through the Federal Motor Vehicle Control Program (FMVCP).

Thus, diesel produced particulate as well as particulate in general should not be a significant problem with the proposed facility. Generally, particulate emissions will be of short-term and of limited significance after construction is completed.

CONCLUSIONS

This Gulf Boulevard improvement project has been found to reduce CO emissions (near 107th). North of about 110th the project has no effect on traffic or air pollutant emissions. These conclusions find this highway project consistent with the state clean air implementation plan. Based on this more detailed information, the project now warrants DER approval.

Appendix 1

Emission Factor Computer Printouts

***   *** -- AUTO EMISSION FACTORS/NATIONAL AVERAGE   ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1979

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR   HUMIDITY 75.0 GRAINS H2O/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1979	.075	5963.	.81/ .50	.25	.01
1978	.107	15563.	.81/ .50	.25	.01
1977	.107	14625.	.81/ .50	.25	.01
1976	.106	13663.	.81/ .50	.25	.01
1975	.100	12763.	.81/ .50	.25	.01
1974	.092	11863.	.81/ .50	.25	.01
1973	.085	10925.	.81/ .50	.25	.01
1972	.077	9963.	.75/ .50	.25	.01
1971	.066	9063.	.75/ .50	.25	.01
1970	.052	8163.	.75/ .50	.25	.01
1969	.039	7263.	.75/ .50	.25	.01
1968	.027	6663.	.66/ .50	.25	.01
1967	.018	6450.	.66/ .50	.25	.01
1966	.014	6088.	.66/ .50	.25	.01
1965	.009	5750.	.54/ .50	.25	.01
1964	.006	5350.	.54/ .50	.25	.01
1963	.005	5063.	.54/ .50	.25	.01
1962	.005	4888.	.54/ .50	.25	.01
1961	.005	4588.	.54/ .50	.25	.01
1960	.004	4400.	.54/ .50	.25	.01

EMISSION FACTORS

CO	313.37	GRAM/MILE	22.32 IDLE-GRAM/MINUTE
HC	21.91		1.46
NOX	3.08		0.31

CRANK-EVAP HYDROCARBONS 1.67 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 23.58 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.17GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.37GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS

CO	216.86	GRAM/MILE	44.63 IDLE-GRAM/MINUTE
HC	15.49		2.91
NOX	2.92		0.63

CRANK-EVAP HYDROCARBONS 1.67 GRAM/MILE

```
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 17.16 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

   AVE SPEED=      7.0MPH

     ***EMISSION FACTORS***
        CO           186.16 GRAM/MILE     66.95 IDLE-GRAM/MINUTE
        HC            13.41                4.37
        NOX            2.87                0.94
        CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 15.08 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

   AVE SPEED=      8.0MPH

     ***EMISSION FACTORS***
        CO           162.68 GRAM/MILE     89.27 IDLE-GRAM/MINUTE
        HC            11.80                5.83
        NOX            2.83                1.26
        CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 13.47 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

   AVE SPEED=      9.0MPH

     ***EMISSION FACTORS***
        CO           144.42 GRAM/MILE    111.58 IDLE-GRAM/MINUTE
        HC            10.53                7.29
        NOX            2.81                1.57
        CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 12.21 GRAM/MILE
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   AVE SPEED=     10.0MPH

     ***EMISSION FACTORS***
        CO           130.00 GRAM/MILE    133.90 IDLE-GRAM/MINUTE
        HC             9.53                8.74
        NOX            2.80                1.89
        CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 11.20 GRAM/MILE
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   AVE SPEED=     11.0MPH

     ***EMISSION FACTORS***
        CO           118.43 GRAM/MILE    156.22 IDLE-GRAM/MINUTE
        HC             8.71               10.20
        NOX            2.79                2.20
        CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS ...
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AVE SPEED=    12.0MPH

   ***EMISSION FACTORS***
      CO            109.03 GRAM/MILE     178.53 IDLE-GRAM/MINUTE
      HC              8.05                11.66
      NOX             2.80                 2.52
      CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.72 GRAM/MILE
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AVE SPEED=    13.0MPH

   ***EMISSION FACTORS***
      CO            101.28 GRAM/MILE     200.85 IDLE-GRAM/MINUTE
      HC              7.50                13.12
      NOX             2.82                 2.83
      CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.17 GRAM/MILE
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AVE SPEED=    14.0MPH

   ***EMISSION FACTORS***
      CO             94.81 GRAM/MILE     223.17 IDLE-GRAM/MINUTE
      HC              7.04                14.57
      NOX             2.84                 3.15
      CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.71 GRAM/MILE
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AVE SPEED=    15.0MPH

   ***EMISSION FACTORS***
      CO             89.32 GRAM/MILE     245.48 IDLE-GRAM/MINUTE
      HC              6.64                16.03
      NOX             2.87                 3.46
      CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.32 GRAM/MILE
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AVE SPEED=    16.0MPH

   ***EMISSION FACTORS***
      CO             84.61 GRAM/MILE     267.80 IDLE-GRAM/MINUTE
      HC              6.30                17.49
      NOX             2.91                 3.78
      CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.98 GRAM/MILE
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AVE SPEED=     17.0MPH

    ***EMISSION FACTORS***
         CO             80.50 GRAM/MILE     290.11 IDLE-GRAM/MINUTE
         HC              6.01                18.95
         NOX             2.94                 4.09
         CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.68 GRAM/MILE
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AVE SPEED=     18.0MPH

    ***EMISSION FACTORS***
         CO             76.87 GRAM/MILE     312.43 IDLE-GRAM/MINUTE
         HC              5.75                20.40
         NOX             2.99                 4.41
         CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.42 GRAM/MILE
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AVE SPEED=     19.0MPH

    ***EMISSION FACTORS***
         CO             73.62 GRAM/MILE     334.75 IDLE-GRAM/MINUTE
         HC              5.51                21.86
         NOX             3.03                 4.72
         CRANK-EVAP HYDROCARBONS       1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.19 GRAM/MILE
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***   *** -- AUTO EMISSION FACTORS/NATIONAL AVERAGE   ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1979

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 20.0 MILES PER HOUR   HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1979	.075	5963.	.81/ .50	.25	.01
1978	.107	15563.	.81/ .50	.25	.01
1977	.107	14625.	.81/ .50	.25	.01
1976	.106	13663.	.81/ .50	.25	.01
1975	.100	12763.	.81/ .50	.25	.01
1974	.092	11863.	.81/ .50	.25	.01
1973	.085	10925.	.81/ .50	.25	.01
1972	.077	9963.	.75/ .50	.25	.01
1971	.066	9063.	.75/ .50	.25	.01
1970	.052	8163.	.75/ .50	.25	.01
1969	.039	7263.	.75/ .50	.25	.01
1968	.027	6663.	.66/ .50	.25	.01
1967	.018	6450.	.66/ .50	.25	.01
1966	.014	6088.	.66/ .50	.25	.01
1965	.009	5750.	.54/ .50	.25	.01
1964	.006	5350.	.54/ .50	.25	.01
1963	.005	5063.	.54/ .50	.25	.01
1962	.005	4888.	.54/ .50	.25	.01
1961	.005	4588.	.54/ .50	.25	.01
1960	.004	4400.	.54/ .50	.25	.01

EMISSION FACTORS

CO	70.50	GRAM/MILE	22.32 IDLE-GRAM/MINUTE
HC	5.30		1.46
NOX	3.08		-0.31

CRANK-EVAP HYDROCARBONS 1.67 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 6.97 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.17GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.37GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS

CO	67.79	GRAM/MILE	44.63 IDLE-GRAM/MINUTE
HC	5.11		2.91
NOX	3.13		0.63

CRANK-EVAP HYDROCARBONS 1.67 GRAM/MILE

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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.78 GRAM/MILE
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  AVE SPEED=     22.0MPH

     ***EMISSION FACTORS***
          CO            65.28 GRAM/MILE     66.95 IDLE-GRAM/MINUTE
          HC             4.93                4.37
          NOX            3.18                0.94
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.60 GRAM/MILE
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  AVE SPEED=     23.0MPH

     ***EMISSION FACTORS***
          CO            62.92 GRAM/MILE     89.27 IDLE-GRAM/MINUTE
          HC             4.76                5.83
          NOX            3.23                1.26
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.43 GRAM/MILE
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  AVE SPEED=     24.0MPH

     ***EMISSION FACTORS***
          CO            60.70 GRAM/MILE    111.58 IDLE-GRAM/MINUTE
          HC             4.60                7.29
          NOX            3.28                1.57
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.27 GRAM/MILE
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  AVE SPEED=     25.0MPH

     ***EMISSION FACTORS***
          CO            58.60 GRAM/MILE    133.90 IDLE-GRAM/MINUTE
          HC             4.45                8.74
          NOX            3.34                1.89
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.12 GRAM/MILE
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  AVE SPEED=     26.0MPH

     ***EMISSION FACTORS***
          CO            56.59 GRAM/MILE    156.22 IDLE-GRAM/MINUTE
          HC             4.31               10.20
          NOX            3.38                2.20
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.98 GRAM/MILE
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    AVE SPEED=     27.0MPH

      ***EMISSION FACTORS***
         CO            54.68 GRAM/MILE    178.53 IDLE-GRAM/MINUTE
         HC             4.17               11.66
         NOX            3.43                2.52
         CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.85 GRAM/MILE
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    AVE SPEED=     28.0MPH

      ***EMISSION FACTORS***
         CO            52.86 GRAM/MILE    200.85 IDLE-GRAM/MINUTE
         HC             4.05               13.12
         NOX            3.48                2.83
         CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.72 GRAM/MILE
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    AVE SPEED=     29.0MPH

      ***EMISSION FACTORS***
         CO            51.13 GRAM/MILE    223.17 IDLE-GRAM/MINUTE
         HC             3.92               14.57
         NOX            3.52                3.15
         CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.60 GRAM/MILE
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    AVE SPEED=     30.0MPH

      ***EMISSION FACTORS***
         CO            49.49 GRAM/MILE    245.48 IDLE-GRAM/MINUTE
         HC             3.81               16.03
         NOX            3.57                3.46
         CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.48 GRAM/MILE
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    AVE SPEED=     31.0MPH

      ***EMISSION FACTORS***
         CO            47.93 GRAM/MILE    267.80 IDLE-GRAM/MINUTE
         HC             3.70               17.49
         NOX            3.61                3.78
         CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.37 GRAM/MILE
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AVE SPEED=     32.0MPH

     ***EMISSION FACTORS***
          CO             46.45 GRAM/MILE    290.11 IDLE-GRAM/MINUTE
          HC              3.59               18.95
          NOX             3.64                4.09
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.26 GRAM/MILE
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AVE SPEED=     33.0MPH

     ***EMISSION FACTORS***
          CO             45.07 GRAM/MILE    312.43 IDLE-GRAM/MINUTE
          HC              3.49               20.40
          NOX             3.68                4.41
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.16 GRAM/MILE
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AVE SPEED=     34.0MPH

     ***EMISSION FACTORS***
          CO             43.78 GRAM/MILE    334.75 IDLE-GRAM/MINUTE
          HC              3.40               21.86
          NOX             3.71                4.72
          CRANK-EVAP HYDROCARBONS      1.67 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.07 GRAM/MILE
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***   *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE   ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1979

EMISSION FACTORS FOR ALL LOW ALTITUDE.
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR   HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1979	.061	5963.	.81/ .50	.25	.01
1978	.096	15563.	.81/ .50	.25	.01
1977	.095	14625.	.81/ .50	.25	.01
1976	.104	13663.	.81/ .50	.25	.01
1975	.084	12763.	.81/ .50	.25	.01
1974	.077	11863.	.81/ .50	.25	.01
1973	.077	10925.	.81/ .50	.25	.01
1972	.064	9963.	.75/ .50	.25	.01
1971	.054	9063.	.75/ .50	.25	.01
1970	.043	8163.	.75/ .50	.25	.01
1969	.036	7263.	.75/ .50	.25	.01
1968	.024	6663.	.66/ .50	.25	.01
1967	.030	6450.	.66/ .50	.25	.01
1966	.028	6088.	.66/ .50	.25	.01
1965	.026	5750.	.54/ .50	.25	.01
1964	.024	5350.	.54/ .50	.25	.01
1963	.022	5063.	.54/ .50	.25	.01
1962	.020	4888.	.54/ .50	.25	.01
1961	.018	4588.	.54/ .50	.25	.01
1960	.016	4400.	.54/ .50	.25	.01

EMISSION FACTORS
CO 372.13GRAM/MILE
HC 29.02GRAM/MILE
NOX 4.04GRAM/MILE
CRANK-EVAP HYDROCARBONS 2.05 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 31.07 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.18GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.38GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS
CO 258.63GRAM/MILE
HC 20.56GRAM/MILE
NOX 3.83GRAM/MILE
CRANK-EVAP HYDROCARBONS 2.05 GRAM/MILE

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   THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 22.81 GRAM/MILE
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  AVE SPEED=      7.0MPH

    ***EMISSION FACTORS***
         CO          222.50GRAM/MILE
         HC           17.82GRAM/MILE
         NOX           3.75GRAM/MILE
         CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 19.87 GRAM/MILE
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  AVE SPEED=      8.0MPH

    ***EMISSION FACTORS***
         CO          194.86GRAM/MILE
         HC           15.69GRAM/MILE
         NOX           3.70GRAM/MILE
         CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 17.75 GRAM/MILE
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  AVE SPEED=      9.0MPH

    ***EMISSION FACTORS***
         CO          173.35GRAM/MILE
         HC           14.03GRAM/MILE
         NOX           3.66GRAM/MILE
         CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 16.08 GRAM/MILE
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  AVE SPEED=     10.0MPH

    ***EMISSION FACTORS***
         CO          156.36GRAM/MILE
         HC           12.70GRAM/MILE
         NOX           3.64GRAM/MILE
         CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 14.75 GRAM/MILE
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  AVE SPEED=     11.0MPH

    ***EMISSION FACTORS***
         CO          142.74GRAM/MILE
         HC           11.62GRAM/MILE
         NOX           3.63GRAM/MILE
         CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 13.68 GRAM/MILE
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AVE SPEED=     12.0MPH

    ***EMISSION FACTORS***
         CO          131.66GRAM/MILE
         HC           10.74GRAM/MILE
         NOX           3.64GRAM/MILE
         CRANK-EVAP HYDROCARBONS       2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 12.80 GRAM/MILE
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AVE SPEED=     13.0MPH

    ***EMISSION FACTORS***
         CO          122.53GRAM/MILE
         HC           10.02GRAM/MILE
         NOX           3.66GRAM/MILE
         CRANK-EVAP HYDROCARBONS       2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 12.07 GRAM/MILE
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AVE SPEED=     14.0MPH

    ***EMISSION FACTORS***
         CO          114.90GRAM/MILE
         HC            9.40GRAM/MILE
         NOX           3.69GRAM/MILE
         CRANK-EVAP HYDROCARBONS       2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 11.46 GRAM/MILE
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AVE SPEED=     15.0MPH

    ***EMISSION FACTORS***
         CO          108.44GRAM/MILE
         HC            8.88GRAM/MILE
         NOX           3.72GRAM/MILE
         CRANK-EVAP HYDROCARBONS       2.05 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 10.94 GRAM/MILE
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AVE SPEED=     16.0MPH

    ***EMISSION FACTORS***
         CO          102.88GRAM/MILE
         HC            8.44GRAM/MILE
         NOX           3.77GRAM/MILE
         CRANK-EVAP HYDROCARBONS       2.05 GRAM/MILE
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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 10.47 GRAM/MILE
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  AVE SPEED=     17.0MPH

    ***EMISSION FACTORS***
     CO            98.03GRAM/MILE
     HC             8.04GRAM/MILE
     NOX            3.82GRAM/MILE
     CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 10.10 GRAM/MILE
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  AVE SPEED=     18.0MPH

    ***EMISSION FACTORS***
     CO            93.75GRAM/MILE
     HC             7.70GRAM/MILE
     NOX            3.88GRAM/MILE
     CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.75 GRAM/MILE
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  AVE SPEED=     19.0MPH

    ***EMISSION FACTORS***
     CO            89.90GRAM/MILE
     HC             7.39GRAM/MILE
     NOX            3.94GRAM/MILE
     CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.44 GRAM/MILE
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*** *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1979

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 20.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H2O/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1979	.061	5963.	.81/ .50	.25	.01
1978	.096	15563.	.81/ .50	.25	.01
1977	.095	14625.	.81/ .50	.25	.01
1976	.104	13663.	.81/ .50	.25	.01
1975	.084	12763.	.81/ .50	.25	.01
1974	.077	11863.	.81/ .50	.25	.01
1973	.077	10925.	.81/ .50	.25	.01
1972	.064	9963.	.75/ .50	.25	.01
1971	.054	9063.	.75/ .50	.25	.01
1970	.043	8163.	.75/ .50	.25	.01
1969	.036	7263.	.75/ .50	.25	.01
1968	.024	6663.	.66/ .50	.25	.01
1967	.030	6450.	.66/ .50	.25	.01
1966	.028	6088.	.66/ .50	.25	.01
1965	.026	5750.	.54/ .50	.25	.01
1964	.024	5350.	.54/ .50	.25	.01
1963	.022	5063.	.54/ .50	.25	.01
1962	.020	4888.	.54/ .50	.25	.01
1961	.018	4588.	.54/ .50	.25	.01
1960	.016	4400.	.54/ .50	.25	.01

EMISSION FACTORS
CO 86.15GRAM/MILE
HC 7.10GRAM/MILE
NOX 4.00GRAM/MILE
CRANK-EVAP HYDROCARBONS 2.05 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 9.15 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.18GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.38GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS
CO 82.93GRAM/MILE
HC 6.84GRAM/MILE
NOX 4.07GRAM/MILE
CRANK-EVAP HYDROCARBONS 2.05 GRAM/MILE

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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.90 GRAM/MILE
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  AVE SPEED=     22.0MPH

     ***EMISSION FACTORS***
          CO             79.94GRAM/MILE
          HC              6.60GRAM/MILE
          NOX             4.13GRAM/MILE
          CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.66 GRAM/MILE
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  AVE SPEED=     23.0MPH

     ***EMISSION FACTORS***
          CO             77.12GRAM/MILE
          HC              6.38GRAM/MILE
          NOX             4.20GRAM/MILE
          CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.43 GRAM/MILE
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  AVE SPEED=     24.0MPH

     ***EMISSION FACTORS***
          CO             74.47GRAM/MILE
          HC              6.17GRAM/MILE
          NOX             4.27GRAM/MILE
          CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.22 GRAM/MILE
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  AVE SPEED=     25.0MPH

     ***EMISSION FACTORS***
          CO             71.94GRAM/MILE
          HC              5.97GRAM/MILE
          NOX             4.34GRAM/MILE
          CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.02 GRAM/MILE
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  AVE SPEED=     26.0MPH

     ***EMISSION FACTORS***
          CO             69.53GRAM/MILE
          HC              5.78GRAM/MILE
          NOX             4.40GRAM/MILE
          CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.83 GRAM/MILE
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  AVE SPEED=     27.0MPH

    ***EMISSION FACTORS***
        CO             67.23GRAM/MILE
        HC              5.60GRAM/MILE
        NOX             4.46GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.65 GRAM/MILE
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  AVE SPEED=     28.0MPH

    ***EMISSION FACTORS***
        CO             65.03GRAM/MILE
        HC              5.43GRAM/MILE
        NOX             4.53GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.48 GRAM/MILE
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  AVE SPEED=     29.0MPH

    ***EMISSION FACTORS***
        CO             62.94GRAM/MILE
        HC              5.27GRAM/MILE
        NOX             4.59GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.32 GRAM/MILE
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  AVE SPEED=     30.0MPH

    ***EMISSION FACTORS***
        CO             60.95GRAM/MILE
        HC              5.11GRAM/MILE
        NOX             4.64GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.16 GRAM/MILE
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  AVE SPEED=     31.0MPH

    ***EMISSION FACTORS***
        CO             59.06GRAM/MILE
        HC              4.96GRAM/MILE
        NOX             4.69GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
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        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.01 GRAM/MILE
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  AVE SPEED=     32.0MPH

     ***EMISSION FACTORS***
        CO            57.27GRAM/MILE
        HC             4.82GRAM/MILE
        NOX            4.74GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.87 GRAM/MILE
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  AVE SPEED=     33.0MPH

     ***EMISSION FACTORS***
        CO            55.60GRAM/MILE
        HC             4.69GRAM/MILE
        NOX            4.79GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.74 GRAM/MILE
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  AVE SPEED=     34.0MPH

     ***EMISSION FACTORS***
        CO            54.04GRAM/MILE
        HC             4.57GRAM/MILE
        NOX            4.83GRAM/MILE
        CRANK-EVAP HYDROCARBONS      2.05 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.62 GRAM/MILE
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*** *** -- AUTO EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1982

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1982	.075	5963.	.81/ .50	.25	.01
1981	.107	15563.	.81/ .50	.25	.01
1980	.107	14625.	.81/ .50	.25	.01
1979	.106	13663.	.81/ .50	.25	.01
1978	.100	12763.	.81/ .50	.25	.01
1977	.092	11863.	.81/ .50	.25	.01
1976	.085	10925.	.81/ .50	.25	.01
1975	.077	9963.	.81/ .50	.25	.01
1974	.066	9063.	.81/ .50	.25	.01
1973	.052	8163.	.81/ .50	.25	.01
1972	.039	7263.	.75/ .50	.25	.01
1971	.027	6663.	.75/ .50	.25	.01
1970	.018	6450.	.75/ .50	.25	.01
1969	.014	6088.	.75/ .50	.25	.01
1968	.009	5750.	.66/ .50	.25	.01
1967	.006	5350.	.66/ .50	.25	.01
1966	.005	5063.	.66/ .50	.25	.01
1965	.005	4888.	.54/ .50	.25	.01
1964	.005	4588.	.54/ .50	.25	.01
1963	.004	4400.	.54/ .50	.25	.01

EMISSION FACTORS

CO	214.98	GRAM/MILE	14.43 IDLE-GRAM/MINUTE
HC	15.42		0.95
NOX	2.44		0.34

CRANK-EVAP HYDROCARBONS 0.97 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 16.40 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.10GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.30GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS

CO	149.17	GRAM/MILE	28.86 IDLE-GRAM/MINUTE
HC	10.90		1.89
NOX	2.32		0.68

CRANK-EVAP HYDROCARBONS 0.97 GRAM/MILE

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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 11.87 GRAM/MILE
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AVE SPEED=      7.0MPH

    ***EMISSION FACTORS***
     CO            128.37 GRAM/MILE      43.28 IDLE-GRAM/MINUTE
     HC              9.44                 2.84
     NOX             2.28                 1.02
     CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 10.41 GRAM/MILE
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AVE SPEED=      8.0MPH

    ***EMISSION FACTORS***
     CO            112.51 GRAM/MILE      57.71 IDLE-GRAM/MINUTE
     HC              8.31                 3.78
     NOX             2.25                 1.36
     CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.28 GRAM/MILE
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AVE SPEED=      9.0MPH

    ***EMISSION FACTORS***
     CO            100.22 GRAM/MILE      72.14 IDLE-GRAM/MINUTE
     HC              7.42                 4.73
     NOX             2.23                 1.71
     CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.40 GRAM/MILE
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AVE SPEED=     10.0MPH

    ***EMISSION FACTORS***
     CO             90.53 GRAM/MILE      86.57 IDLE-GRAM/MINUTE
     HC              6.72                 5.67
     NOX             2.23                 2.05
     CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.70 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * *  * * * * * * * * * * * * * * * * * * * * * * * * * * * *

AVE SPEED=     11.0MPH

    ***EMISSION FACTORS***
     CO             82.78 GRAM/MILE     100.99 IDLE-GRAM/MINUTE
     HC              6.16                 6.62
     NOX             2.23                 2.39
     CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.13 GRAM/MILE
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  AVE SPEED=     12.0MPH

    ***EMISSION FACTORS***
         CO              76.50 GRAM/MILE     115.42 IDLE-GRAM/MINUTE
         HC               5.69                 7.56
         NOX              2.24                 2.73
         CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.66 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * *  * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     13.0MPH

    ***EMISSION FACTORS***
         CO              71.32 GRAM/MILE     129.85 IDLE-GRAM/MINUTE
         HC               5.31                 8.51
         NOX              2.26                 3.07
         CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.28 GRAM/MILE
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  AVE SPEED=     14.0MPH

    ***EMISSION FACTORS***
         CO              67.00 GRAM/MILE     144.28 IDLE-GRAM/MINUTE
         HC               4.98                 9.45
         NOX              2.28                 3.41
         CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.96 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * *  * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     15.0MPH

    ***EMISSION FACTORS***
         CO              63.34 GRAM/MILE     158.71 IDLE-GRAM/MINUTE
         HC               4.71                10.40
         NOX              2.31                 3.75
         CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.68 GRAM/MILE
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  AVE SPEED=     16.0MPH

    ***EMISSION FACTORS***
         CO              60.18 GRAM/MILE     173.13 IDLE-GRAM/MINUTE
         HC               4.47                11.34
         NOX              2.35                 4.09
         CRANK-EVAP HYDROCARBONS       0.97 GRAM/MILE
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          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.44 GRAM/MILE
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    AVE SPEED=     17.0MPH


      ***EMISSION FACTORS***
          CO             57.42 GRAM/MILE    187.56 IDLE-GRAM/MINUTE
          HC              4.26               12.29
          NOX             2.39                4.43
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.23 GRAM/MILE
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    AVE SPEED=     18.0MPH


      ***EMISSION FACTORS***
          CO             54.97 GRAM/MILE    201.99 IDLE-GRAM/MINUTE
          HC              4.08               13.24
          NOX             2.43                4.78
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.05 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * *  * * * * * * * * * * * * * * * * * * * * * * * * * * * *


    AVE SPEED=     19.0MPH


      ***EMISSION FACTORS***
          CO             52.76 GRAM/MILE    216.42 IDLE-GRAM/MINUTE
          HC              3.91               14.18
          NOX             2.47                5.12
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.88 GRAM/MILE
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EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1982

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 20.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1982	.075	5963.	.81/ .50	.25	.01
1981	.107	15563.	.81/ .50	.25	.01
1980	.107	14625.	.81/ .50	.25	.01
1979	.106	13663.	.81/ .50	.25	.01
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1977	.092	11863.	.81/ .50	.25	.01
1976	.085	10925.	.81/ .50	.25	.01
1975	.077	9963.	.81/ .50	.25	.01
1974	.066	9063.	.81/ .50	.25	.01
1973	.052	8163.	.81/ .50	.25	.01
1972	.039	7263.	.75/ .50	.25	.01
1971	.027	6663.	.75/ .50	.25	.01
1970	.018	6450.	.75/ .50	.25	.01
1969	.014	6088.	.75/ .50	.25	.01
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1967	.006	5350.	.66/ .50	.25	.01
1966	.005	5063.	.66/ .50	.25	.01
1965	.005	4888.	.54/ .50	.25	.01
1964	.005	4588.	.54/ .50	.25	.01
1963	.004	4400.	.54/ .50	.25	.01

EMISSION FACTORS

CO	50.53 GRAM/MILE	14.43 IDLE-GRAM/MINUTE
HC	3.75	0.95
NOX	2.51	0.34

CRANK-EVAP HYDROCARBONS 0.97 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 4.73 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.10GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.30GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS

CO	48.66 GRAM/MILE	28.86 IDLE-GRAM/MINUTE
HC	3.61	1.89
NOX	2.56	0.68

CRANK-EVAP HYDROCARBONS 0.97 GRAM/MILE

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        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.59 GRAM/MILE
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  AVE SPEED=     22.0MPH


    ***EMISSION FACTORS***
        CO             46.91 GRAM/MILE     43.28 IDLE-GRAM/MINUTE
        HC              3.48                2.84
        NOX             2.61                1.02
        CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.46 GRAM/MILE
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  AVE SPEED=     23.0MPH


    ***EMISSION FACTORS***
        CO             45.26 GRAM/MILE     57.71 IDLE-GRAM/MINUTE
        HC              3.36                3.78
        NOX             2.65                1.36
        CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.33 GRAM/MILE
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  AVE SPEED=     24.0MPH


    ***EMISSION FACTORS***
        CO             43.68 GRAM/MILE     72.14 IDLE-GRAM/MINUTE
        HC              3.25                4.73
        NOX             2.70                1.71
        CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.22 GRAM/MILE
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  AVE SPEED=     25.0MPH


    ***EMISSION FACTORS***
        CO             42.18 GRAM/MILE     86.57 IDLE-GRAM/MINUTE
        HC              3.14                5.67
        NOX             2.75                2.05
        CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.11 GRAM/MILE
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  AVE SPEED=     26.0MPH


    ***EMISSION FACTORS***
        CO             40.74 GRAM/MILE    100.99 IDLE-GRAM/MINUTE
        HC              3.03                6.62
        NOX             2.79                2.39
        CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
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       THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.00 GRAM/MILE
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   AVE SPEED=     27.0MPH


     ***EMISSION FACTORS***
          CO             39.36 GRAM/MILE    115.42 IDLE-GRAM/MINUTE
          HC              2.93                7.56
          NOX             2.83                2.73
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.90 GRAM/MILE
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   AVE SPEED=     28.0MPH


     ***EMISSION FACTORS***
          CO             38.04 GRAM/MILE    129.85 IDLE-GRAM/MINUTE
          HC              2.83                8.51
          NOX             2.88                3.07
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.81 GRAM/MILE
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   AVE SPEED=     29.0MPH


     ***EMISSION FACTORS***
          CO             36.78 GRAM/MILE    144.28 IDLE-GRAM/MINUTE
          HC              2.74                9.45
          NOX             2.92                3.41
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.72 GRAM/MILE
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   AVE SPEED=     30.0MPH


     ***EMISSION FACTORS***
          CO             35.58 GRAM/MILE    158.71 IDLE-GRAM/MINUTE
          HC              2.66               10.40
          NOX             2.95                3.75
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.63 GRAM/MILE
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   AVE SPEED=     31.0MPH


     ***EMISSION FACTORS***
          CO             34.44 GRAM/MILE    173.13 IDLE-GRAM/MINUTE
          HC              2.57               11.34
          NOX             2.99                4.09
          CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
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            THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.55 GRAM/MILE
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    AVE SPEED=     32.0MPH

        ***EMISSION FACTORS***
            CO             33.37 GRAM/MILE     187.56 IDLE-GRAM/MINUTE
            HC              2.50                12.29
            NOX             3.02                 4.43
            CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
            THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.47 GRAM/MILE
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    AVE SPEED=     33.0MPH

        ***EMISSION FACTORS***
            CO             32.36 GRAM/MILE     201.99 IDLE-GRAM/MINUTE
            HC              2.42                13.24
            NOX             3.05                 4.78
            CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
            THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.40 GRAM/MILE
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    AVE SPEED=     34.0MPH

        ***EMISSION FACTORS***
            CO             31.43 GRAM/MILE     216.42 IDLE-GRAM/MINUTE
            HC              2.35                14.18
            NOX             3.08                 5.12
            CRANK-EVAP HYDROCARBONS      0.97 GRAM/MILE
            THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.33 GRAM/MILE
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*** *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1982

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H2O/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1982	.061	5963.	.81/ .50	.25	.01
1981	.096	15563.	.81/ .50	.25	.01
1980	.095	14625.	.81/ .50	.25	.01
1979	.104	13663.	.81/ .50	.25	.01
1978	.084	12763.	.81/ .50	.25	.01
1977	.077	11863.	.81/ .50	.25	.01
1976	.077	10925.	.81/ .50	.25	.01
1975	.064	9963.	.81/ .50	.25	.01
1974	.054	9063.	.81/ .50	.25	.01
1973	.043	8163.	.81/ .50	.25	.01
1972	.036	7263.	.75/ .50	.25	.01
1971	.024	6663.	.75/ .50	.25	.01
1970	.030	6450.	.75/ .50	.25	.01
1969	.028	6088.	.75/ .50	.25	.01
1968	.026	5750.	.66/ .50	.25	.01
1967	.024	5350.	.66/ .50	.25	.01
1966	.022	5063.	.66/ .50	.25	.01
1965	.020	4888.	.54/ .50	.25	.01
1964	.018	4588.	.54/ .50	.25	.01
1963	.016	4400.	.54/ .50	.25	.01

EMISSION FACTORS
CO 328.94GRAM/MILE
HC 24.92GRAM/MILE
NOX 3.20GRAM/MILE
CRANK-EVAP HYDROCARBONS 1.23 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 26.15 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.11GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.31GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS
CO 229.31GRAM/MILE
HC 17.67GRAM/MILE
NOX 3.03GRAM/MILE
CRANK-EVAP HYDROCARBONS 1.23 GRAM/MILE

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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 18.90 GRAM/MILE
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   AVE SPEED=      7.0MPH

      ***EMISSION FACTORS***
           CO           197.73GRAM/MILE
           HC            15.32GRAM/MILE
           NOX            2.98GRAM/MILE
           CRANK-EVAP HYDROCARBONS       1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 16.55 GRAM/MILE
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   AVE SPEED=      8.0MPH

      ***EMISSION FACTORS***
           CO           173.63GRAM/MILE
           HC            13.51GRAM/MILE
           NOX            2.94GRAM/MILE
           CRANK-EVAP HYDROCARBONS       1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 14.73 GRAM/MILE
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   AVE SPEED=      9.0MPH

      ***EMISSION FACTORS***
           CO           154.91GRAM/MILE
           HC            12.09GRAM/MILE
           NOX            2.91GRAM/MILE
           CRANK-EVAP HYDROCARBONS       1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 13.31 GRAM/MILE
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   AVE SPEED=     10.0MPH

      ***EMISSION FACTORS***
           CO           140.16GRAM/MILE
           HC            10.95GRAM/MILE
           NOX            2.90GRAM/MILE
           CRANK-EVAP HYDROCARBONS       1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 12.18 GRAM/MILE
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   AVE SPEED=     11.0MPH

      ***EMISSION FACTORS***
           CO           128.34GRAM/MILE
           HC            10.04GRAM/MILE
           NOX            2.90GRAM/MILE
           CRANK-EVAP HYDROCARBONS       1.23 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 11.26 GRAM/MILE
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   AVE SPEED=     12.0MPH

      ***EMISSION FACTORS***
           CO            118.75GRAM/MILE
           HC              9.29GRAM/MILE
           NOX             2.91GRAM/MILE
           CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 10.51 GRAM/MILE
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   AVE SPEED=     13.0MPH

      ***EMISSION FACTORS***
           CO            110.86GRAM/MILE
           HC              8.67GRAM/MILE
           NOX             2.93GRAM/MILE
           CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.89 GRAM/MILE
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   AVE SPEED=     14.0MPH

      ***EMISSION FACTORS***
           CO            104.26GRAM/MILE
           HC              8.15GRAM/MILE
           NOX             2.96GRAM/MILE
           CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.37 GRAM/MILE
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   AVE SPEED=     15.0MPH

      ***EMISSION FACTORS***
           CO             98.67GRAM/MILE
           HC              7.70GRAM/MILE
           NOX             2.99GRAM/MILE
           CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.93 GRAM/MILE
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   AVE SPEED=     16.0MPH

      ***EMISSION FACTORS***
           CO             93.85GRAM/MILE
           HC              7.32GRAM/MILE
           NOX             3.03GRAM/MILE
           CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
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      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.54 GRAM/MILE
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    AVE SPEED=     17.0MPH

      ***EMISSION FACTORS***
         CO              89.64GRAM/MILE
         HC               6.98GRAM/MILE
         NOX              3.08GRAM/MILE
         CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  8.20 GRAM/MILE
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    AVE SPEED=     18.0MPH

      ***EMISSION FACTORS***
         CO              85.90GRAM/MILE
         HC               6.68GRAM/MILE
         NOX              3.13GRAM/MILE
         CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.91 GRAM/MILE
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    AVE SPEED=     19.0MPH

      ***EMISSION FACTORS***
         CO              82.52GRAM/MILE
         HC               6.41GRAM/MILE
         NOX              3.18GRAM/MILE
         CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.64 GRAM/MILE
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*** *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION.FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1982

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 20.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1982	.061	5963.	.81/ .50	.25	.01
1981	.096	15563.	.81/ .50	.25	.01
1980	.095	14625.	.81/ .50	.25	.01
1979	.104	13663.	.81/ .50	.25	.01
1978	.084	12763.	.81/ .50	.25	.01
1977	.077	11863.	.81/ .50	.25	.01
1976	.077	10925.	.81/ .50	.25	.01
1975	.064	9963.	.81/ .50	.25	.01
1974	.054	9063.	.81/ .50	.25	.01
1973	.043	8163.	.81/ .50	.25	.01
1972	.036	7263.	.75/ .50	.25	.01
1971	.024	6663.	.75/ .50	.25	.01
1970	.030	6450.	.75/ .50	.25	.01
1969	.028	6088.	.75/ .50	.25	.01
1968	.026	5750.	.66/ .50	.25	.01
1967	.024	5350.	.66/ .50	.25	.01
1966	.022	5063.	.66/ .50	.25	.01
1965	.020	4888.	.54/ .50	.25	.01
1964	.018	4588.	.54/ .50	.25	.01
1963	.016	4400.	.54/ .50	.25	.01

EMISSION FACTORS
CO 79.06GRAM/MILE
HC 6.16GRAM/MILE
NOX 3.24GRAM/MILE
CRANK-EVAP HYDROCARBONS 1.23 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 7.39 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.11GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.31GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS
CO 76.20GRAM/MILE
HC 5.93GRAM/MILE
NOX 3.29GRAM/MILE
CRANK-EVAP HYDROCARBONS 1.23 GRAM/MILE

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 THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.16 GRAM/MILE
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  AVE SPEED=     22.0MPH

     ***EMISSION FACTORS***
          CO             73.52GRAM/MILE
          HC              5.72GRAM/MILE
          NOX             3.35GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.95 GRAM/MILE
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  AVE SPEED=     23.0MPH

     ***EMISSION FACTORS***
          CO             70.98GRAM/MILE
          HC              5.53GRAM/MILE
          NOX             3.41GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.75 GRAM/MILE
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  AVE SPEED=     24.0MPH

     ***EMISSION FACTORS***
          CO             68.57GRAM/MILE
          HC              5.34GRAM/MILE
          NOX             3.47GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.56 GRAM/MILE
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  AVE SPEED=     25.0MPH

     ***EMISSION FACTORS***
          CO             66.26GRAM/MILE
          HC              5.16GRAM/MILE
          NOX             3.53GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.39 GRAM/MILE
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  AVE SPEED=     26.0MPH

     ***EMISSION FACTORS***
          CO             64.05GRAM/MILE
          HC              4.99GRAM/MILE
          NOX             3.59GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.22 GRAM/MILE
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 AVE SPEED=     27.0MPH

     ***EMISSION FACTORS***
          CO             61.92GRAM/MILE
          HC              4.83GRAM/MILE
          NOX             3.64GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.06 GRAM/MILE
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 AVE SPEED=     28.0MPH

     ***EMISSION FACTORS***
          CO             59.89GRAM/MILE
          HC              4.68GRAM/MILE
          NOX             3.69GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.90 GRAM/MILE
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 AVE SPEED=     29.0MPH

     ***EMISSION FACTORS***
          CO             57.95GRAM/MILE
          HC              4.53GRAM/MILE
          NOX             3.74GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.75 GRAM/MILE
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 AVE SPEED=     30.0MPH

     ***EMISSION FACTORS***
          CO             56.09GRAM/MILE
          HC              4.39GRAM/MILE
          NOX             3.79GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.61 GRAM/MILE
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 AVE SPEED=     31.0MPH

     ***EMISSION FACTORS***
          CO             54.34GRAM/MILE
          HC              4.25GRAM/MILE
          NOX             3.84GRAM/MILE
          CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.48 GRAM/MILE
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AVE SPEED=     32.0MPH

***EMISSION FACTORS***
     CO             52.68GRAM/MILE
     HC              4.13GRAM/MILE
     NOX             3.88GRAM/MILE
     CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.35 GRAM/MILE
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AVE SPEED=     33.0MPH

***EMISSION FACTORS***
     CO             51.13GRAM/MILE
     HC              4.01GRAM/MILE
     NOX             3.92GRAM/MILE
     CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.24 GRAM/MILE
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AVE SPEED=     34.0MPH

***EMISSION FACTORS***
     CO             49.68GRAM/MILE
     HC              3.90GRAM/MILE
     NOX             3.96GRAM/MILE
     CRANK-EVAP HYDROCARBONS      1.23 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.12 GRAM/MILE
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*** *** -- AUTO EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1992

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H2O/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1992	.075	5963.	.81/ .50	.25	.01
1991	.107	15563.	.81/ .50	.25	.01
1990	.107	14625.	.81/ .50	.25	.01
1989	.106	13663.	.81/ .50	.25	.01
1988	.100	12763.	.81/ .50	.25	.01
1987	.092	11863.	.81/ .50	.25	.01
1986	.085	10925.	.81/ .50	.25	.01
1985	.077	9963.	.81/ .50	.25	.01
1984	.066	9063.	.81/ .50	.25	.01
1983	.052	8163.	.81/ .50	.25	.01
1982	.039	7263.	.81/ .50	.25	.01
1981	.027	6663.	.81/ .50	.25	.01
1980	.018	6450.	.81/ .50	.25	.01
1979	.014	6088.	.81/ .50	.25	.01
1978	.009	5750.	.81/ .50	.25	.01
1977	.006	5350.	.81/ .50	.25	.01
1976	.005	5063.	.81/ .50	.25	.01
1975	.005	4888.	.81/ .50	.25	.01
1974	.005	4588.	.81/ .50	.25	.01
1973	.004	4400.	.81/ .50	.25	.01

EMISSION FACTORS

CO	80.22 GRAM/MILE	2.96 IDLE-GRAM/MINUTE
HC	8.33	0.23
NOX	1.72	0.27

CRANK-EVAP HYDROCARBONS 0.17 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 8.51 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.05GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.25GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS

CO	56.26 GRAM/MILE	5.91 IDLE-GRAM/MINUTE
HC	5.92	0.46
NOX	1.63	0.54

CRANK-EVAP HYDROCARBONS 0.17 GRAM/MILE

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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.09 GRAM/MILE
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  AVE SPEED=      7.0MPH

    ***EMISSION FACTORS***
       CO            48.69 GRAM/MILE      8.87 IDLE-GRAM/MINUTE
       HC             5.14                0.69
       NOX            1.61                0.81
       CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
       THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.31 GRAM/MILE
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  AVE SPEED=      8.0MPH

    ***EMISSION FACTORS***
       CO            42.93 GRAM/MILE     11.82 IDLE-GRAM/MINUTE
       HC             4.54                0.91
       NOX            1.59                1.08
       CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
       THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.71 GRAM/MILE
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  AVE SPEED=      9.0MPH

    ***EMISSION FACTORS***
       CO            38.47 GRAM/MILE     14.78 IDLE-GRAM/MINUTE
       HC             4.07                1.14
       NOX            1.58                1.35
       CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
       THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.24 GRAM/MILE
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  AVE SPEED=     10.0MPH

    ***EMISSION FACTORS***
       CO            34.96 GRAM/MILE     17.74 IDLE-GRAM/MINUTE
       HC             3.69                1.37
       NOX            1.57                1.62
       CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
       THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.87 GRAM/MILE
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  AVE SPEED=     11.0MPH

    ***EMISSION FACTORS***
       CO            32.15 GRAM/MILE     20.69 IDLE-GRAM/MINUTE
       HC             3.39                1.60
       NOX            1.58                1.89
       CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
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        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.57 GRAM/MILE
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   AVE SPEED=     12.0MPH

      ***EMISSION FACTORS***
        CO              29.87 GRAM/MILE      23.65 IDLE-GRAM/MINUTE
        HC               3.15                 1.83
        NOX              1.59                 2.16
        CRANK-EVAP HYDROCARBONS       0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.32 GRAM/MILE
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   AVE SPEED=     13.0MPH

      ***EMISSION FACTORS***
        CO              28.00 GRAM/MILE      26.60 IDLE-GRAM/MINUTE
        HC               2.94                 2.06
        NOX              1.60                 2.43
        CRANK-EVAP HYDROCARBONS       0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.11 GRAM/MILE
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   AVE SPEED=     14.0MPH

      ***EMISSION FACTORS***
        CO              26.44 GRAM/MILE      29.56 IDLE-GRAM/MINUTE
        HC               2.77                 2.29
        NOX              1.62                 2.70
        CRANK-EVAP HYDROCARBONS       0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.94 GRAM/MILE
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   AVE SPEED=     15.0MPH

      ***EMISSION FACTORS***
        CO              25.11 GRAM/MILE      32.51 IDLE-GRAM/MINUTE
        HC               2.62                 2.52
        NOX              1.65                 2.96
        CRANK-EVAP HYDROCARBONS       0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.79 GRAM/MILE
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   AVE SPEED=     16.0MPH

      ***EMISSION FACTORS***
        CO              23.97 GRAM/MILE      35.47 IDLE-GRAM/MINUTE
        HC               2.49                 2.74
        NOX              1.68                 3.23
        CRANK-EVAP HYDROCARBONS       0.17 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.67 GRAM/MILE
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   AVE SPEED=     17.0MPH

     ***EMISSION FACTORS***
          CO            22.96 GRAM/MILE     38.43 IDLE-GRAM/MINUTE
          HC             2.38                2.97
          NOX            1.71                3.50
          CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.55 GRAM/MILE
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   AVE SPEED=     18.0MPH

     ***EMISSION FACTORS***
          CO            22.06 GRAM/MILE     41.38 IDLE-GRAM/MINUTE
          HC             2.28                3.20
          NOX            1.74                3.77
          CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.45 GRAM/MILE
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   AVE SPEED=     19.0MPH

     ***EMISSION FACTORS***
          CO            21.25 GRAM/MILE     44.34 IDLE-GRAM/MINUTE
          HC             2.19                3.43
          NOX            1.77                4.04
          CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
          THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.36 GRAM/MILE
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*** *** -- AUTO EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1992

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 20.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1992	.075	5963.	.81/ .50	.25	.01
1991	.107	15563.	.81/ .50	.25	.01
1990	.107	14625.	.81/ .50	.25	.01
1989	.106	13663.	.81/ .50	.25	.01
1988	.100	12763.	.81/ .50	.25	.01
1987	.092	11863.	.81/ .50	.25	.01
1986	.085	10925.	.81/ .50	.25	.01
1985	.077	9963.	.81/ .50	.25	.01
1984	.066	9063.	.81/ .50	.25	.01
1983	.052	8163.	.81/ .50	.25	.01
1982	.039	7263.	.81/ .50	.25	.01
1981	.027	6663.	.81/ .50	.25	.01
1980	.018	6450.	.81/ .50	.25	.01
1979	.014	6088.	.81/ .50	.25	.01
1978	.009	5750.	.81/ .50	.25	.01
1977	.006	5350.	.81/ .50	.25	.01
1976	.005	5063.	.81/ .50	.25	.01
1975	.005	4888.	.81/ .50	.25	.01
1974	.005	4588.	.81/ .50	.25	.01
1973	.004	4400.	.81/ .50	.25	.01

EMISSION FACTORS

CO	20.35 GRAM/MILE	2.96 IDLE-GRAM/MINUTE
HC	2.10	0.23
NOX	1.81	0.27

CRANK-EVAP HYDROCARBONS 0.17 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 2.27 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.05GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.25GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS

CO	19.65 GRAM/MILE	5.91 IDLE-GRAM/MINUTE
HC	2.02	0.46
NOX	1.84	0.54

CRANK-EVAP HYDROCARBONS 0.17 GRAM/MILE

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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.20 GRAM/MILE
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    AVE SPEED=     22.0MPH

      ***EMISSION FACTORS***
           CO              18.98 GRAM/MILE       8.87 IDLE-GRAM/MINUTE
           HC               1.95                 0.69
           NOX              1.88                 0.81
           CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.12 GRAM/MILE
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    AVE SPEED=     23.0MPH

      ***EMISSION FACTORS***
           CO              18.35 GRAM/MILE      11.82 IDLE-GRAM/MINUTE
           HC               1.88                 0.91
           NOX              1.92                 1.08
           CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.05 GRAM/MILE
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    AVE SPEED=     24.0MPH

      ***EMISSION FACTORS***
           CO              17.74 GRAM/MILE      14.78 IDLE-GRAM/MINUTE
           HC               1.81                 1.14
           NOX              1.95                 1.35
           CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.99 GRAM/MILE
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    AVE SPEED=     25.0MPH

      ***EMISSION FACTORS***
           CO              17.16 GRAM/MILE      17.74 IDLE-GRAM/MINUTE
           HC               1.75                 1.37
           NOX              1.99                 1.62
           CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
           THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.92 GRAM/MILE
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    AVE SPEED=     26.0MPH

      ***EMISSION FACTORS***
           CO              16.59 GRAM/MILE      20.69 IDLE-GRAM/MINUTE
           HC               1.69                 1.60
           NOX              2.03                 1.89
           CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.86 GRAM/MILE
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  AVE SPEED=     27.0MPH

     ***EMISSION FACTORS***
        CO           16.05 GRAM/MILE      23.65 IDLE-GRAM/MINUTE
        HC            1.63                 1.83
        NOX           2.06                 2.16
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.81 GRAM/MILE
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  AVE SPEED=     28.0MPH

     ***EMISSION FACTORS***
        CO           15.53 GRAM/MILE      26.60 IDLE-GRAM/MINUTE
        HC            1.58                 2.06
        NOX           2.09                 2.43
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.75 GRAM/MILE
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  AVE SPEED=     29.0MPH

     ***EMISSION FACTORS***
        CO           15.02 GRAM/MILE      29.56 IDLE-GRAM/MINUTE
        HC            1.53                 2.29
        NOX           2.12                 2.70
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.70 GRAM/MILE
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  AVE SPEED=     30.0MPH

     ***EMISSION FACTORS***
        CO           14.55 GRAM/MILE      32.51 IDLE-GRAM/MINUTE
        HC            1.48                 2.52
        NOX           2.15                 2.96
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.65 GRAM/MILE
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  AVE SPEED=     31.0MPH

     ***EMISSION FACTORS***
        CO           14.09 GRAM/MILE      35.47 IDLE-GRAM/MINUTE
        HC            1.43                 2.74
        NOX           2.18                 3.23
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.60 GRAM/MILE
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   AVE SPEED=     32.0MPH

     ***EMISSION FACTORS***
        CO             13.66 GRAM/MILE      38.43 IDLE-GRAM/MINUTE
        HC              1.38                 2.97
        NOX             2.21                 3.50
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.56 GRAM/MILE
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   AVE SPEED=     33.0MPH

     ***EMISSION FACTORS***
        CO             13.26 GRAM/MILE      41.38 IDLE-GRAM/MINUTE
        HC              1.34                 3.20
        NOX             2.23                 3.77
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.51 GRAM/MILE
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   AVE SPEED=     34.0MPH

     ***EMISSION FACTORS***
        CO             12.89 GRAM/MILE      44.34 IDLE-GRAM/MINUTE
        HC              1.30                 3.43
        NOX             2.25                 4.04
        CRANK-EVAP HYDROCARBONS      0.17 GRAM/MILE
        THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  1.47 GRAM/MILE
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*** *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1992

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED 4.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1992	.061	5963.	.81/ .50	.25	.01
1991	.096	15563.	.81/ .50	.25	.01
1990	.095	14625.	.81/ .50	.25	.01
1989	.104	13663.	.81/ .50	.25	.01
1988	.084	12763.	.81/ .50	.25	.01
1987	.077	11863.	.81/ .50	.25	.01
1986	.077	10925.	.81/ .50	.25	.01
1985	.064	9963.	.81/ .50	.25	.01
1984	.054	9063.	.81/ .50	.25	.01
1983	.043	8163.	.81/ .50	.25	.01
1982	.036	7263.	.81/ .50	.25	.01
1981	.024	6663.	.81/ .50	.25	.01
1980	.030	6450.	.81/ .50	.25	.01
1979	.028	6088.	.81/ .50	.25	.01
1978	.026	5750.	.81/ .50	.25	.01
1977	.024	5350.	.81/ .50	.25	.01
1976	.022	5063.	.81/ .50	.25	.01
1975	.020	4888.	.81/ .50	.25	.01
1974	.018	4588.	.81/ .50	.25	.01
1973	.016	4400.	.81/ .50	.25	.01

EMISSION FACTORS
CO 140.52GRAM/MILE
HC 12.37GRAM/MILE
NOX 1.95GRAM/MILE
CRANK-EVAP HYDROCARBONS 0.25 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 12.63 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.05GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.25GRAMS/MILE
* *

AVE SPEED= 6.0MPH

EMISSION FACTORS
CO 98.30GRAM/MILE
HC 8.77GRAM/MILE
NOX 1.85GRAM/MILE
CRANK-EVAP HYDROCARBONS 0.25 GRAM/MILE

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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  9.03 GRAM/MILE
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  AVE SPEED=      7.0MPH

    ***EMISSION FACTORS***
         CO              85.01GRAM/MILE
         HC               7.62GRAM/MILE
         NOX              1.82GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  7.87 GRAM/MILE
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  AVE SPEED=      8.0MPH

    ***EMISSION FACTORS***
         CO              74.90GRAM/MILE
         HC               6.72GRAM/MILE
         NOX              1.79GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.98 GRAM/MILE
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  AVE SPEED=      9.0MPH

    ***EMISSION FACTORS***
         CO              67.08GRAM/MILE
         HC               6.02GRAM/MILE
         NOX              1.78GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  6.28 GRAM/MILE
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  AVE SPEED=     10.0MPH

    ***EMISSION FACTORS***
         CO              60.93GRAM/MILE
         HC               5.47GRAM/MILE
         NOX              1.78GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.72 GRAM/MILE
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  AVE SPEED=     11.0MPH

    ***EMISSION FACTORS***
         CO              56.02GRAM/MILE
         HC               5.02GRAM/MILE
         NOX              1.78GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  5.27 GRAM/MILE
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  AVE SPEED=     12.0MPH

    ***EMISSION FACTORS***
         CO            52.04GRAM/MILE
         HC             4.65GRAM/MILE
         NOX            1.79GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.91 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     13.0MPH

    ***EMISSION FACTORS***
         CO            48.77GRAM/MILE
         HC             4.35GRAM/MILE
         NOX            1.81GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.60 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     14.0MPH

    ***EMISSION FACTORS***
         CO            46.04GRAM/MILE
         HC             4.09GRAM/MILE
         NOX            1.83GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.35 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     15.0MPH

    ***EMISSION FACTORS***
         CO            43.72GRAM/MILE
         HC             3.87GRAM/MILE
         NOX            1.86GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
         THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  4.13 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     16.0MPH

    ***EMISSION FACTORS***
         CO            41.72GRAM/MILE
         HC             3.68GRAM/MILE
         NOX            1.89GRAM/MILE
         CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
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    THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.94 GRAM/MILE
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  AVE SPEED=     17.0MPH

    ***EMISSION FACTORS***
      CO             39.96GRAM/MILE
      HC              3.51GRAM/MILE
      NOX             1.93GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.77 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     18.0MPH

    ***EMISSION FACTORS***
      CO             38.39GRAM/MILE
      HC              3.36GRAM/MILE
      NOX             1.96GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.62 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     19.0MPH

    ***EMISSION FACTORS***
      CO             36.96GRAM/MILE
      HC              3.23GRAM/MILE
      NOX             2.00GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.48 GRAM/MILE
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*** *** -- LIGHT TRUCK EMISSION FACTORS/NATIONAL AVERAGE ***

EMISSION FACTORS FOR LIGHT DUTY VEHICLES
THE CALENDAR YEAR IS 1992

EMISSION FACTORS FOR ALL LOW ALTITUDE
FRACTION HOT START .270
FRACTION COLD START .210
AMBIENT TEMPERATURE 60.0 DEG F
AVERAGE SPEED - 20.0 MILES PER HOUR HUMIDITY 75.0 GRAINS H20/LB DRY AIR

YEAR	CARS	MILES	AIR/USE	LOAD	TRAILER
1992	.061	5963.	.81/ .50	.25	.01
1991	.096	15563.	.81/ .50	.25	.01
1990	.095	14625.	.81/ .50	.25	.01
1989	.104	13663.	.81/ .50	.25	.01
1988	.084	12763.	.81/ .50	.25	.01
1987	.077	11863.	.81/ .50	.25	.01
1986	.077	10925.	.81/ .50	.25	.01
1985	.064	9963.	.81/ .50	.25	.01
1984	.054	9063.	.81/ .50	.25	.01
1983	.043	8163.	.81/ .50	.25	.01
1982	.036	7263.	.81/ .50	.25	.01
1981	.024	6663.	.81/ .50	.25	.01
1980	.030	6450.	.81/ .50	.25	.01
1979	.028	6088.	.81/ .50	.25	.01
1978	.026	5750.	.81/ .50	.25	.01
1977	.024	5350.	.81/ .50	.25	.01
1976	.022	5063.	.81/ .50	.25	.01
1975	.020	4888.	.81/ .50	.25	.01
1974	.018	4588.	.81/ .50	.25	.01
1973	.016	4400.	.81/ .50	.25	.01

EMISSION FACTORS
CO 35.40GRAM/MILE
HC 3.10GRAM/MILE
NOX 2.04GRAM/MILE
CRANK-EVAP HYDROCARBONS 0.25 GRAM/MILE
THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS 3.35 GRAM/MILE

EXHAUST TOTAL PARTICULATE= 0.05GRAMS/MILE
THE SUM OF EXHAUST & TIRE WEAR PARTICULATE= 0.25GRAMS/MILE
* *

AVE SPEED= 21.0MPH

EMISSION FACTORS
CO 34.17GRAM/MILE
HC 2.98GRAM/MILE
NOX 2.08GRAM/MILE
CRANK-EVAP HYDROCARBONS 0.25 GRAM/MILE

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      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.24 GRAM/MILE
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  AVE SPEED=     22.0MPH

    ***EMISSION FACTORS***
      CO             33.00GRAM/MILE
      HC              2.87GRAM/MILE
      NOX             2.12GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.13 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     23.0MPH

    ***EMISSION FACTORS***
      CO             31.89GRAM/MILE
      HC              2.77GRAM/MILE
      NOX             2.16GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  3.03 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     24.0MPH

    ***EMISSION FACTORS***
      CO             30.82GRAM/MILE
      HC              2.67GRAM/MILE
      NOX             2.20GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.93 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     25.0MPH

    ***EMISSION FACTORS***
      CO             29.79GRAM/MILE
      HC              2.58GRAM/MILE
      NOX             2.24GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.83 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     26.0MPH

    ***EMISSION FACTORS***
      CO             28.80GRAM/MILE
      HC              2.49GRAM/MILE
      NOX             2.28GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
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     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.74 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     27.0MPH

    ***EMISSION FACTORS***
     CO             27.84GRAM/MILE
     HC              2.40GRAM/MILE
     NOX             2.32GRAM/MILE
     CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.66 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     28.0MPH

    ***EMISSION FACTORS***
     CO             26.92GRAM/MILE
     HC              2.32GRAM/MILE
     NOX             2.36GRAM/MILE
     CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.58 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     29.0MPH

    ***EMISSION FACTORS***
     CO             26.04GRAM/MILE
     HC              2.24GRAM/MILE
     NOX             2.39GRAM/MILE
     CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.50 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

  AVE SPEED=     30.0MPH

    ***EMISSION FACTORS***
     CO             25.19GRAM/MILE
     HC              2.17GRAM/MILE
     NOX             2.43GRAM/MILE
     CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
     THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.42 GRAM/MILE
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  AVE SPEED=     31.0MPH

    ***EMISSION FACTORS***
     CO             24.39GRAM/MILE
     HC              2.10GRAM/MILE
     NOX             2.46GRAM/MILE
     CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
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THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.35 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

AVE SPEED=     32.0MPH

   ***EMISSION FACTORS***
      CO             23.64GRAM/MILE
      HC              2.03GRAM/MILE
      NOX             2.49GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.29 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

AVE SPEED=     33.0MPH

   ***EMISSION FACTORS***
      CO             22.94GRAM/MILE
      HC              1.97GRAM/MILE
      NOX             2.51GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.22 GRAM/MILE
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

AVE SPEED=     34.0MPH

   ***EMISSION FACTORS***
      CO             22.28GRAM/MILE
      HC              1.91GRAM/MILE
      NOX             2.54GRAM/MILE
      CRANK-EVAP HYDROCARBONS      0.25 GRAM/MILE
      THE SUM OF EXHAUST PLUS CRANK-EVAP HYDROCARBONS IS  2.17 GRAM/MILE
```

Appendix 2

Carbon Monoxide Emission Calculation

Tables

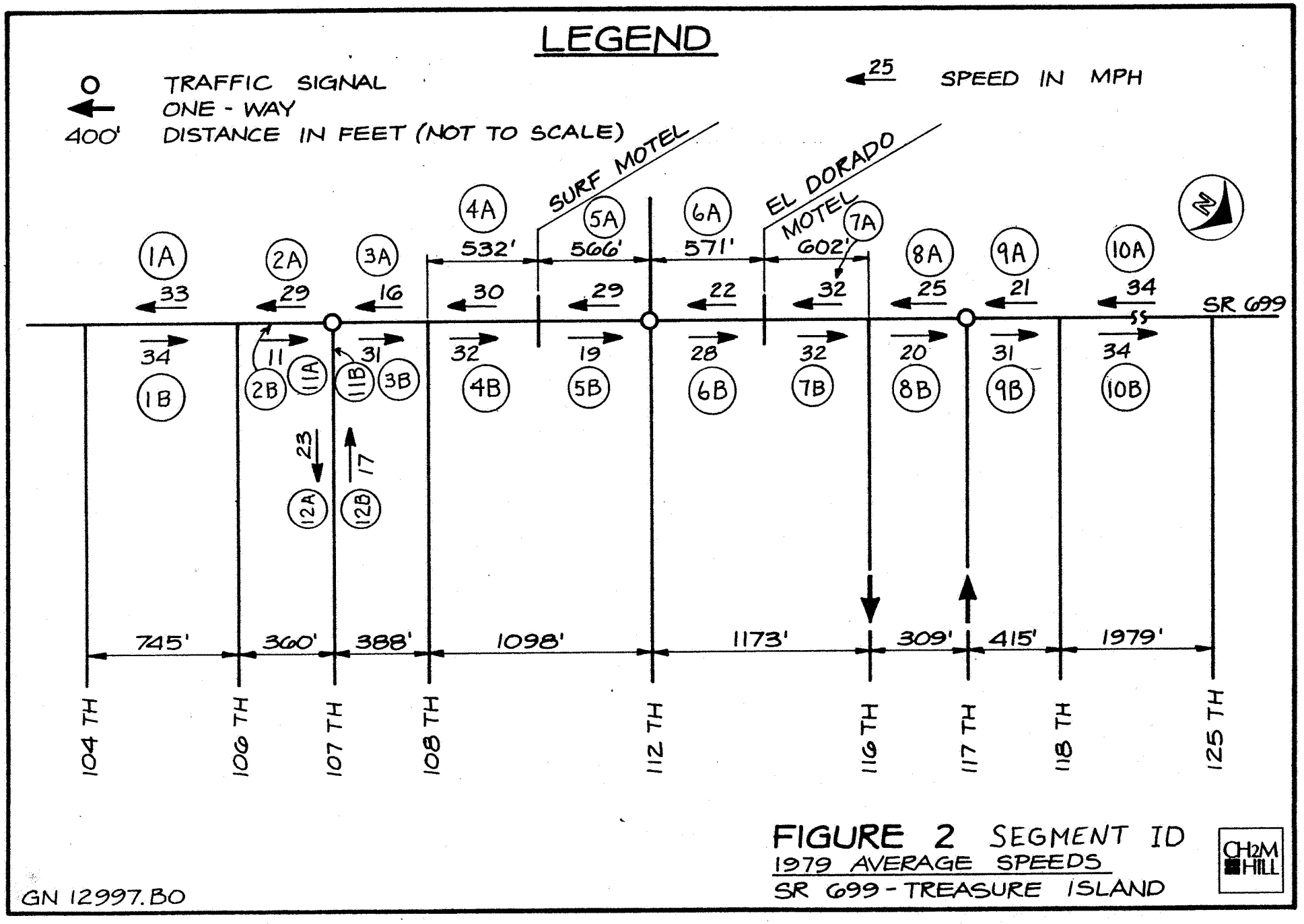

FIGURE 2 SEGMENT ID
1979 AVERAGE SPEEDS
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

TABLE 2A

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1979

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x 1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	745	0.67	32	48.6	4.59	4.74	33	47.2	3.96	9.30	33	47.2	2.59
1B	745	0.75	33	47.2	4.99	5.34	34	45.8	4.33	9.30	34	45.8	2.51
2A	360	0.67	28	55.3	2.53	4.74	29	53.5	2.17	9.30	29	53.5	1.42
2B	360	0.75	10	135.3	6.92	5.34	11	123.3	5.69	9.30	11	123.3	3.28
3A	388	0.80	15	93.1	5.47	5.67	16	88.3	4.63	11.15	16	88.3	3.03
3B	388	0.90	30	51.8	3.43	6.39	31	50.2	2.96	11.15	31	50.2	1.72
4A	532	0.92	29	53.5	4.96	6.52	30	51.8	4.27	12.85	30	51.8	2.80
4B	532	1.03	31	50.2	5.21	7.35	32	48.6	4.52	12.85	32	48.6	2.63
5A	566	0.92	28	55.3	5.45	6.52	29	53.5	4.70	12.85	29	53.5	3.08
5B	566	1.03	18	80.2	8.86	7.35	19	76.9	7.62	12.85	19	76.9	4.43
6A	571	0.90	21	70.8	6.89	6.26	22	68.2	5.80	12.35	22	68.2	3.81
6B	571	1.02	27	57.2	6.31	7.05	28	55.3	5.30	12.35	28	55.3	3.09
7A	602	0.90	31	50.2	5.15	6.26	32	48.6	4.36	12.35	32	48.6	2.86
7B	602	1.02	31	50.2	5.84	7.05	32	48.6	4.91	12.35	32	48.6	2.86
8A	309	0.78	24	63.5	2.90	5.46	25	61.3	2.46	10.75	25	61.3	1.61
8B	309	0.89	19	76.9	4.01	6.16	20	73.6	3.34	10.75	20	73.6	1.94
9A	415	0.68	20	73.6	3.93	4.66	21	70.8	3.26	9.20	21	70.8	2.14
9B	415	0.77	30	51.8	3.13	5.25	31	50.2	2.60	9.20	31	50.2	1.52
10A	1979	0.68	33	47.2	12.03	4.66	34	45.8	10.04	9.20	34	45.8	6.60
10B	1979	0.77	33	47.2	13.62	5.25	34	45.8	11.32	9.20	34	45.8	6.60
11A	400	0.595	22	68.2	3.07	3.87	23	65.8	2.42	7.35	23	65.8	1.53
11B	400	0.595	16	88.3	3.98	3.87	17	84.0	3.10	7.35	17	84.0	1.96
12A	375	0.595	22	68.2	2.88	3.87	23	65.8	2.27	7.35	23	65.8	1.44
12B	375	0.595	16	88.3	3.73	3.87	17	84.0	2.91	7.35	17	84.0	1.83

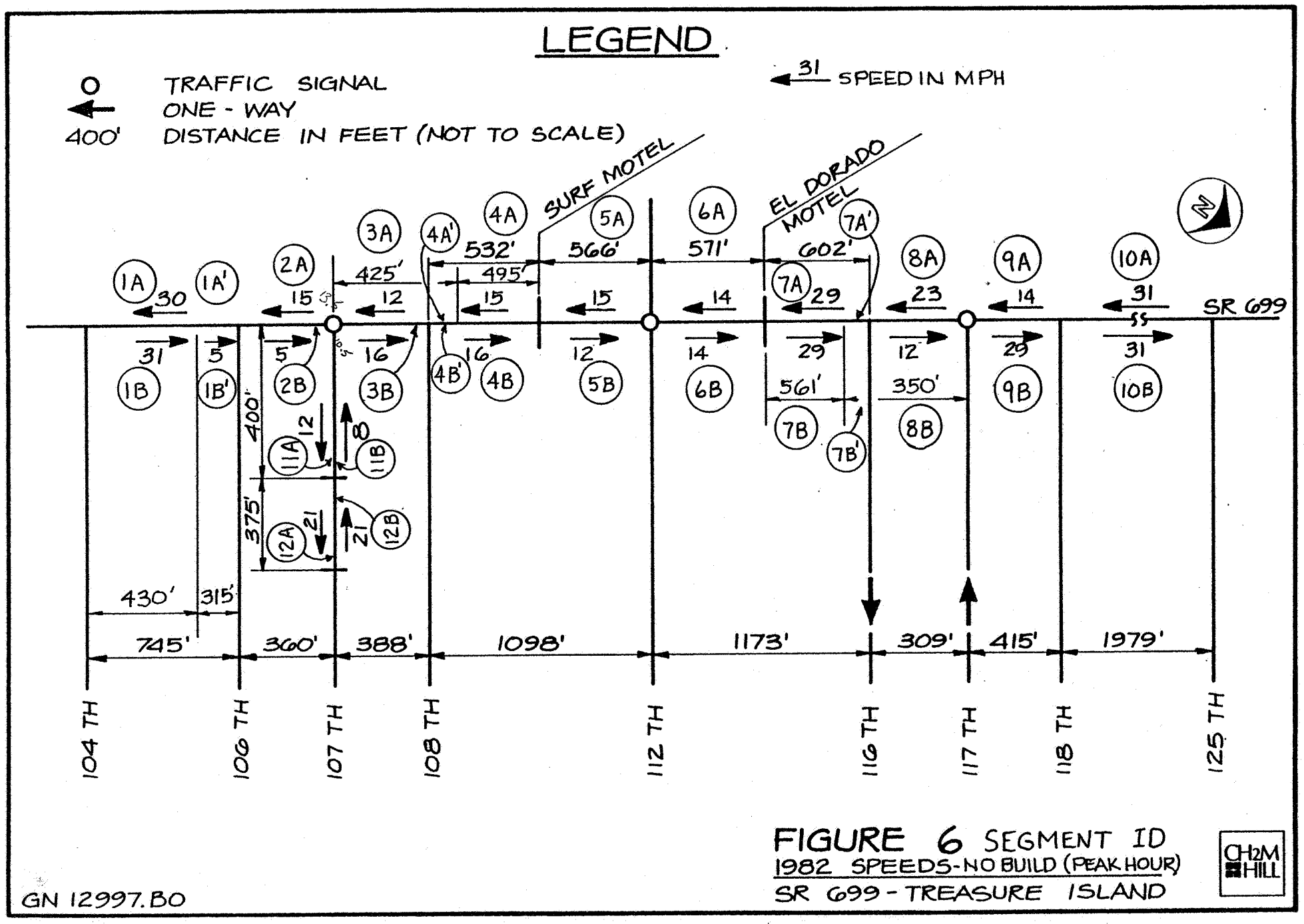

FIGURE 6 SEGMENT ID
1982 SPEEDS-NO BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

TABLE 3A

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1982 No-Build

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	430	1.00	30	39.7	3.23	5.60	32	37.2	2.15	9.85	32	37.2	1.25
1B	430	1.17	31	38.4	3.66	6.08	33	36.1	2.26	9.85	33	36.1	1.22
1A'	315	1.00	30	39.7	2.37	5.60	32	37.2	1.57	9.85	32	37.2	0.92
1B'	315	1.17	5	201.5	14.06	6.08	33	36.1	3.08	9.85	31	38.4	1.39
2A	360	1.00	15	70.4	4.80	5.60	26	45.4	2.38	9.85	26	45.4	1.34
2B	360	1.17	5	201.5	16.07	6.08	7	142.2	7.96	9.85	9	111.2	3.86
3A	388	1.30	12	85.0	8.12	7.28	14	74.5	5.11	12.85	15	70.4	2.90
3B	388	1.52	16	66.9	7.47	7.92	28	42.4	3.43	12.85	28	42.4	1.78
4A'	37	1.53	12	85.0	0.91	8.64	29	41.0	0.37	15.15	15	70.4	0.33
4B'	37	1.80	16	66.9	0.84	9.36	28	42.4	0.39	15.15	28	42.4	0.20
4A	495	1.53	15	70.4	10.10	8.64	28	42.4	4.80	15.15	28	42.4	2.68
4B	495	1.80	16	66.9	11.29	9.36	28	42.4	5.17	15.15	29	41.0	2.65
5A	566	1.80	15	70.4	13.58	10.08	27	43.9	6.57	17.85	27	43.9	3.71
5B	566	2.12	12	85.0	19.32	10.96	15	70.4	10.75	17.85	16	66.9	5.65
6A	571	1.59	14	74.5	12.81	8.88	17	63.9	7.90	15.65	19	58.7	4.42
6B	571	1.85	14	74.5	14.90	9.68	26	45.4	6.67	15.65	26	45.4	3.45
7A	561	1.44	29	41.0	6.27	8.13	32	37.2	4.09	14.25	32	37.2	2.37
7B	561	1.70	29	41.0	7.41	8.80	32	37.2	4.43	14.25	32	37.2	2.38
7A'	41	1.44	29	41.0	0.46	8.13	32	37.2	0.30	14.25	32	37.2	0.18
7B'	41	1.70	12	85.0	1.12	8.80	32	37.2	0.40	14.25	30	39.7	0.20
8A	309	1.59	23	50.4	4.69	9.28	25	47.0	3.23	13.10	25	47.0	1.51
8B	309	1.20	12	85.0	5.97	6.24	14	74.5	3.49	13.10	17	63.9	2.23
9A	415	1.13	14	74.5	6.62	6.32	18	61.2	3.95	11.15	19	58.7	2.24
9B	415	1.32	29	41.0	4.25	6.88	31	38.4	2.63	11.15	31	38.4	1.41
10A	1979	1.13	31	38.4	16.26	6.32	34	35.1	10.57	11.15	34	35.1	6.17
10B	1979	1.32	31	38.4	19.00	6.88	34	35.1	11.52	11.15	34	35.1	6.18

TABLE 3A (continued)

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1982 No-Build

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
11A	400	0.85	12	85.0	5.47	4.64	21	54.2	2.63	7.95	21	54.2	1.44
11B	400	0.90	8	124.7	8.50	4.80	11	91.9	4.46	7.95	13	79.2	2.27
12A	375	0.85	21	54.2	3.27	4.64	22	52.2	2.17	7.95	22	52.2	1.23
12B	375	0.90	21	54.2	3.46	4.80	22	52.2	2.24	7.95	22	52.2	1.23

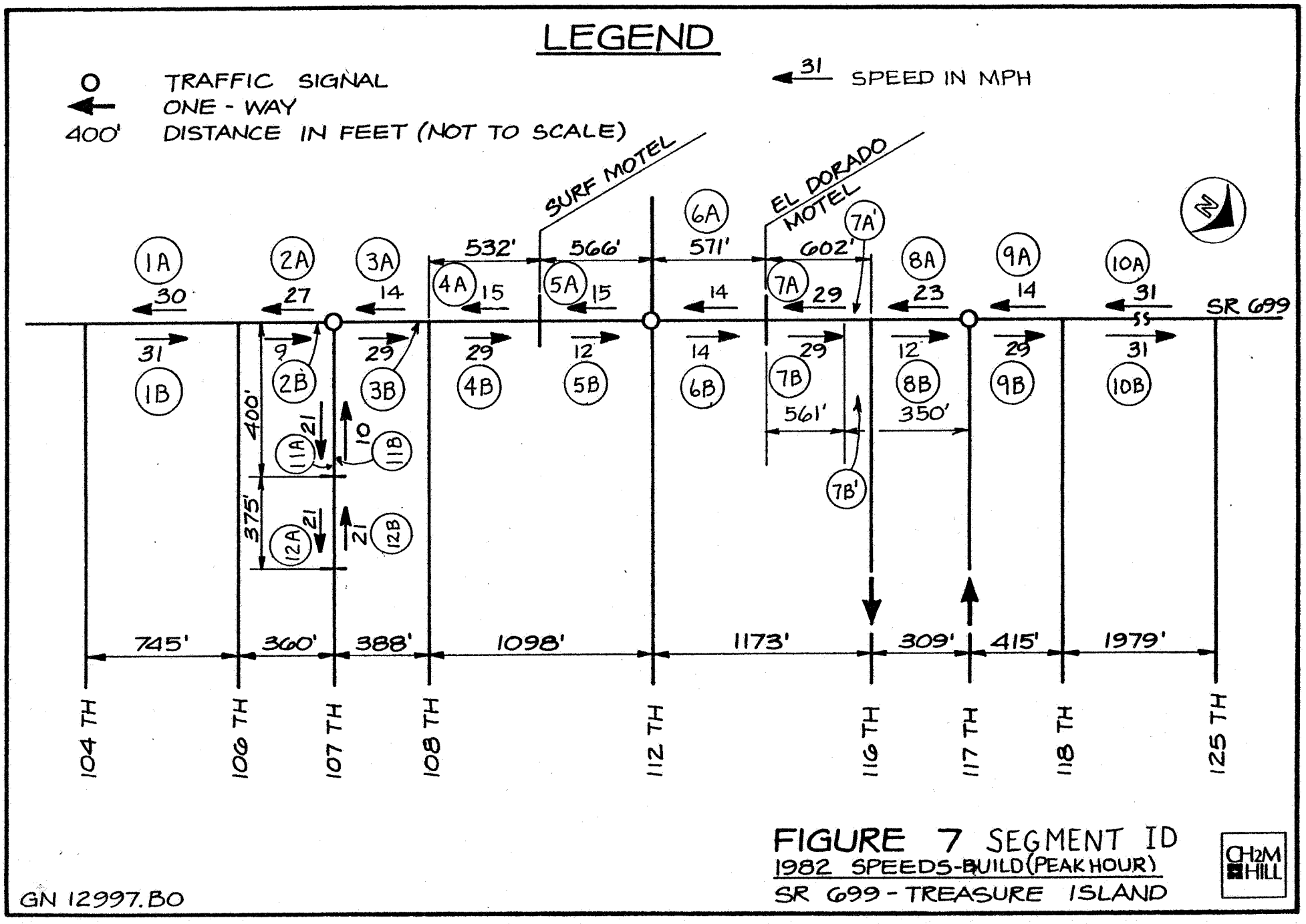

FIGURE 7 SEGMENT ID
1982 SPEEDS-BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

TABLE 4A

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1982 BUILD

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	745	1.00	30	39.7	5.60	5.60	32	37.2	3.72	9.85	32	37.2	2.17
1B	745	1.17	31	38.4	6.34	6.08	33	36.1	3.92	9.85	33	36.1	2.11
2A	360	1.00	27	43.9	2.99	5.60	29	41.0	1.98	9.85	29	41.0	1.16
2B	360	1.17	9	111.2	8.87	6.08	10	100.5	5.31	9.85	10	100.5	2.85
3A	388	1.30	14	74.5	7.12	7.28	14	74.5	4.98	12.85	15	70.4	2.86
3B	380	1.52	29	41.0	4.58	7.92	31	38.4	2.93	12.85	31	38.4	1.52
4A	532	1.53	15	70.4	10.85	8.64	28	42.4	5.15	15.15	28	42.4	2.88
4B	532	1.80	29	41.0	7.44	9.36	31	38.4	4.59	15.15	31	38.4	2.46
5A	566	1.80	15	70.4	13.58	10.08	27	43.9	6.57	17.85	27	43.9	3.71
5B	566	2.12	12	85.0	19.32	10.96	15	70.4	10.75	17.85	16	66.9	5.65
6A	571	1.59	14	74.5	12.81	8.88	17	63.9	7.90	15.65	19	58.7	4.42
6B	571	1.85	14	74.5	14.90	9.68	26	45.4	6.67	15.65	26	45.4	3.45
7A	561	1.44	29	41.0	6.27	8.13	32	37.2	4.09	14.25	32	37.2	2.37
7B	561	1.70	29	41.0	7.41	8.80	32	37.2	4.43	14.25	32	37.2	2.38
7A'	41	1.44	29	41.0	0.46	8.13	32	37.2	0.30	14.25	32	37.2	0.18
7B'	41	1.70	12	85.0	1.12	8.80	32	37.2	0.40	14.25	30	39.7	0.20
8A	309	1.59	23	50.4	4.69	9.28	25	47.0	3.23	13.10	25	47.0	1.51
8B	309	1.20	12	85.0	5.97	6.24	14	74.5	3.49	13.10	17	63.9	2.23
9A	415	1.13	14	74.5	6.62	6.32	18	61.2	3.95	11.15	19	58.7	2.24
9B	415	1.32	29	41.0	4.25	6.88	31	38.4	2.63	11.15	31	38.4	1.41
10A	1979	1.13	31	38.4	16.26	6.32	34	35.1	10.57	11.15	34	35.1	6.17
10B	1979	1.32	31	38.4	19.00	6.88	34	35.1	11.52	11.15	34	35.1	6.18

TABLE 4A

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1982 BUILD

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	745	1.00	30	39.7	5.60	5.60	32	37.2	3.72	9.85	32	37.2	2.17
1B	745	1.17	31	38.4	6.34	6.08	33	36.1	3.92	9.85	33	36.1	2.11
2A	360	1.00	27	43.9	2.99	5.60	29	41.0	1.98	9.85	29	41.0	1.16
2B	360	1.17	9	111.2	8.87	6.08	10	100.5	5.31	9.85	10	100.5	2.85
3A	388	1.30	14	74.5	7.12	7.28	14	74.5	4.98	12.85	15	70.4	2.86
3B	388	1.52	29	41.0	4.58	7.92	31	38.4	2.83	12.85	31	38.4	1.52
4A	532	1.53	15	70.4	10.85	8.64	28	42.4	5.15	15.15	28	42.4	2.88
4B	532	1.80	29	41.0	7.44	9.36	31	38.4	4.59	15.15	31	38.4	2.46
5A	566	1.80	15	70.4	13.58	10.08	27	43.9	6.57	17.85	27	43.9	3.71
5B	566	2.12	12	85.0	19.32	10.96	15	70.4	10.75	17.85	16	66.9	5.65
6A	571	1.59	14	74.5	12.81	8.88	17	63.9	7.90	15.65	19	58.7	4.42
6B	571	1.85	14	74.5	14.90	9.68	26	45.4	6.67	15.65	26	45.4	3.45
7A	561	1.44	29	41.0	6.27	8.13	32	37.2	4.09	14.25	32	37.2	2.37
7B	561	1.70	29	41.0	7.41	8.80	32	37.2	4.43	14.25	32	37.2	2.38
7A'	41	1.44	29	41.0	0.46	8.13	32	37.2	0.30	14.25	32	37.2	0.18
7B'	41	1.70	12	85.0	1.12	8.80	32	37.2	0.40	14.25	30	39.7	0.20
8A	309	1.59	23	50.4	4.69	9.28	25	47.0	3.23	13.10	25	47.0	1.51
8B	309	1.20	12	85.0	5.97	6.24	14	74.5	3.49	13.10	17	63.9	2.23
9A	415	1.13	14	74.5	6.62	6.32	18	61.2	3.95	11.15	19	58.7	2.24
9B	415	1.32	29	41.0	4.25	6.88	31	38.4	2.63	11.15	31	38.4	1.41
10A	1979	1.13	31	38.4	16.26	6.32	34	35.1	10.57	11.15	34	35.1	6.17
10B	1979	1.32	31	38.4	19.00	6.88	34	35.1	11.52	11.15	34	35.1	6.18

TABLE 4A (Continued)

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1982 Build

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
11A	400	0.85	21	54.2	3.49	4.64	22	52.2	2.31	7.95	22	52.2	1.32
11B	400	0.90	10	100.5	6.85	4.80	11	91.9	4.25	7.95	14	74.5	2.15
12A	375	0.85	21	54.2	3.27	4.64	22	52.2	2.17	7.95	22	52.2	1.23
12B	375	0.90	21	54.2	3.46	4.80	22	52.2	2.24	7.95	22	52.2	1.23

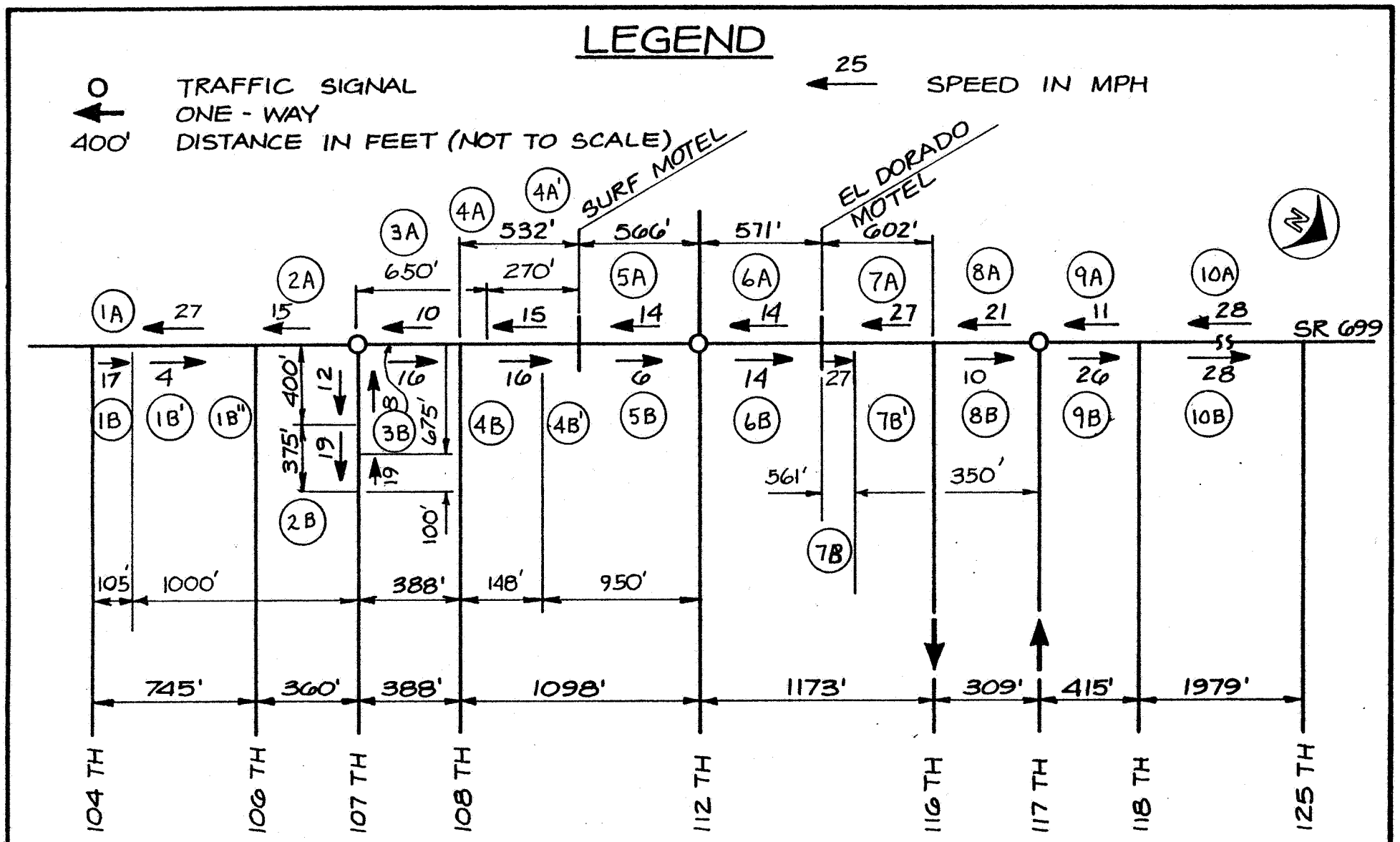

FIGURE 9 SEGMENT ID
1992 SPEEDS-NO BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

TABLE 5A

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1992 NO-BUILD

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	745	1.32	27	18.4	3.43	7.04	28	17.8	2.22	12.45	30	16.7	1.27
1B	105	1.19	17	26.4	0.62	7.68	29	17.2	0.35	12.45	30	16.7	0.18
1B'	600	1.19	4	92.3	12.48	7.68	29	17.2	3.15	12.45	29	17.2	1.44
1B''	40	1.19	4	92.3	0.83	7.68	7	56.0	0.45	12.45	19	24.4	0.19
2A	360	1.32	15	28.8	2.59	7.04	19	24.4	1.51	12.45	23	21.1	0.83
2B	360	1.19	4	92.3	7.49	7.68	7	56.0	4.03	12.45	9	44.2	1.95
3A	388	1.58	10	40.2	4.67	8.88	10	40.2	3.28	15.65	13	32.2	1.76
3B	388	1.69	16	27.5	3.42	9.60	21	22.6	2.07	15.65	25	19.7	1.05
4A	262	1.84	10	40.2	3.67	10.41	26	19.0	1.47	18.25	26	19.0	0.80
4B	148	1.96	16	27.5	1.51	11.27	22	21.8	0.90	18.25	26	19.0	0.45
4A'	270	1.84	15	28.8	2.71	10.41	26	19.0	1.38	18.25	27	18.4	0.77
4B'	384	1.96	6	64.7	9.22	11.27	22	21.8	3.00	18.25	25	19.7	1.41
5A	566	1.99	14	30.4	6.48	11.20	26	19.0	3.15	19.70	26	19.0	1.78
5B	566	2.17	6	64.7	15.05	12.16	11	36.9	6.82	19.70	14	30.4	3.27
6A	571	1.76	14	30.4	5.79	9.92	13	32.2	4.28	17.40	17	26.4	2.32
6B	571	1.93	14	30.4	6.35	10.72	25	19.7	3.13	17.40	25	19.7	1.63
7A	602	1.63	27	18.4	3.42	8.81	31	16.2	2.09	15.45	31	16.2	1.20
7B	561	1.77	27	18.4	3.46	9.54	31	16.2	2.10	15.45	31	16.2	1.13
7B'	41	1.77	10	40.2	0.55	9.54	31	16.2	0.19	15.45	29	17.2	0.10
8A	309	1.69	21	22.6	2.24	9.28	24	20.4	1.41	14.15	24	20.4	0.71
8B	309	1.11	10	40.2	2.61	5.76	13	32.2	1.42	14.15	16	27.5	1.06
9A	415	1.06	11	36.9	3.07	5.92	17	26.4	1.64	10.45	18	25.3	0.92
9B	415	1.24	26	19.0	1.85	6.48	30	16.7	1.09	10.45	30	16.7	0.58
10A	1979	1.06	28	17.8	7.07	5.92	32	15.7	4.46	10.45	32	15.7	2.60
10B	1979	1.24	28	17.8	8.27	6.48	32	15.7	4.89	10.45	32	15.7	2.60

TABLE 5A (continued)

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

1992 NO-Build

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
11A	400	1.18	12	34.3	3.07	8.00	15	28.8	2.24	13.60	18	25.3	1.20
11B	400	1.42	8	49.3	5.30	8.08	8	49.3	3.77	13.60	12	34.3	1.85
11B'	275	1.42	8	49.3	3.65	8.08	19	24.4	1.51	13.60	17	26.4	0.82
12A	375	1.18	19	24.4	2.04	8.00	19	24.4	1.73	13.60	21	22.6	0.95
12B	100	1.42	19	24.4	0.66	8.08	19	24.4	0.47	13.60	19	24.4	0.26

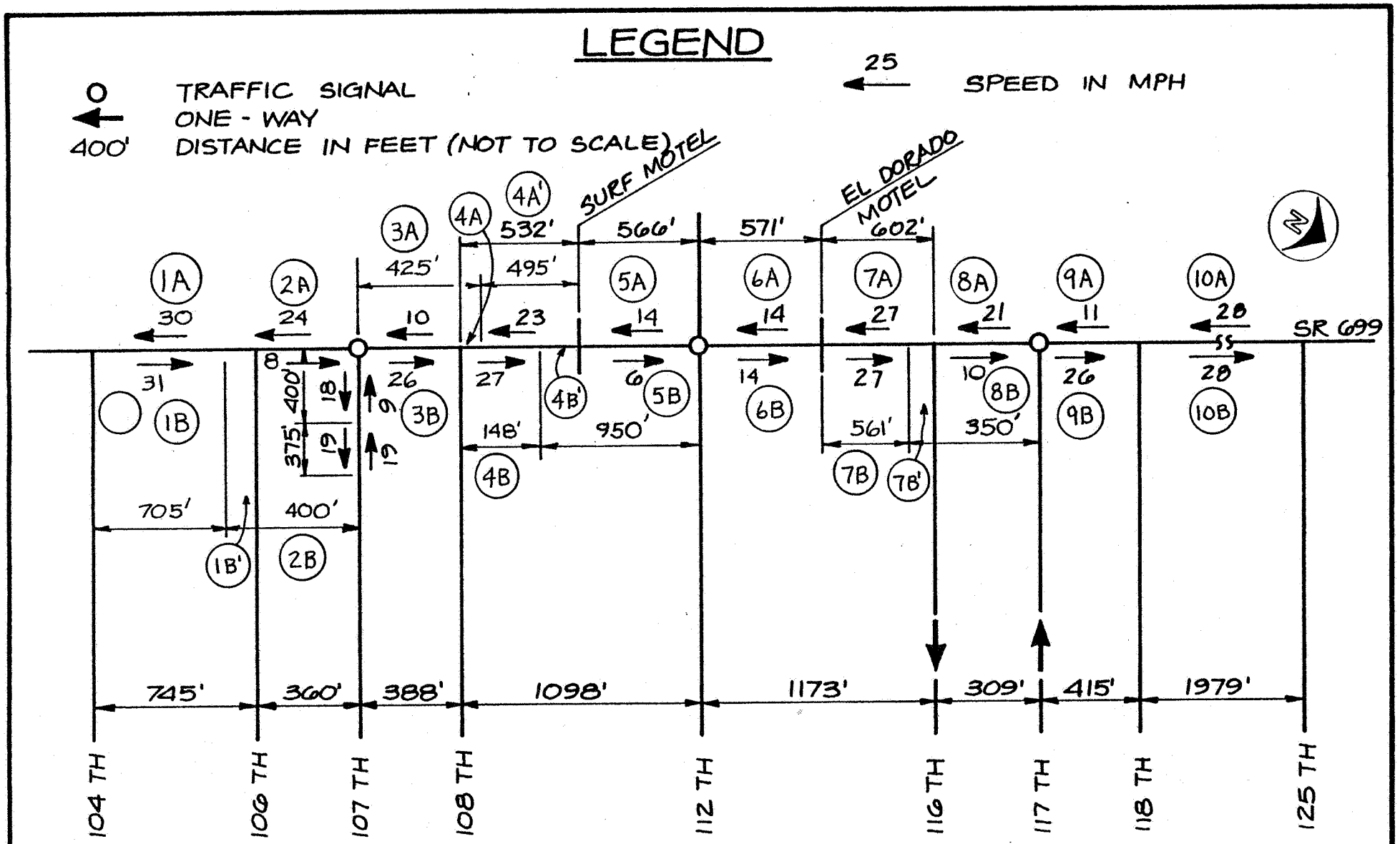

FIGURE 10 SEGMENT ID
1992 SPEEDS - BUILD (PEAK HOUR)
SR 699 - TREASURE ISLAND

CH2M HILL

GN 12997.BO

TABLE 6A

GROSS VEHICLE EMISSIONS OF

CARBON MONOXIDE

1992 BUILD

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
1A	745	1.32	30	16.7	3.11	7.04	31	16.2	2.02	12.45	32	15.7	1.17
1B	705	1.19	31	16.2	2.57	7.68	32	15.7	2.02	12.45	33	15.2	1.08
1B'	40	1.19	8	49.3	0.44	7.68	32	15.7	0.15	12.45	31	16.2	0.08
2A	360	1.32	24	20.4	1.84	7.04	27	18.4	1.13	12.45	28	17.8	0.65
2B	360	1.19	8	49.3	4.00	7.68	9	44.2	2.94	12.45	10	40.2	1.53
3A	388	1.58	10	40.2	4.67	8.88	12	34.3	2.88	15.65	14	30.4	1.59
3B	388	1.69	26	19.0	2.36	9.60	29	17.2	1.54	15.65	30	16.7	0.82
4A	37	1.84	10	40.2	0.52	10.41	26	19.0	0.21	18.25	26	19.0	0.11
4B	148	1.96	27	18.4	1.01	11.27	30	16.7	0.67	18.25	31	16.2	0.36
4A'	495	1.84	23	21.1	3.64	10.41	26	19.0	2.36	18.25	28	17.8	1.34
4B'	384	1.96	6	64.7	9.22	11.27	30	16.7	2.57	18.25	28	17.8	1.22
5A	566	1.99	14	30.4	6.48	11.20	26	19.0	3.15	19.70	26	19.0	1.78
5B	566	2.17	6	64.7	15.05	12.16	11	36.9	6.82	19.70	14	30.4	3.27
6A	571	1.76	14	30.4	5.79	9.92	13	32.2	4.28	17.40	17	26.4	2.32
6B	571	1.93	14	30.4	6.35	10.72	25	19.7	3.13	17.40	25	19.7	1.63
7A	602	1.63	27	18.4	3.42	8.81	31	16.2	2.09	15.45	31	16.2	1.20
7B	561	1.77	27	18.4	3.46	9.54	31	16.2	2.10	15.45	31	16.2	1.13
7B'	41	1.77	10	40.2	0.55	9.54	31	16.2	0.19	15.45	29	17.2	0.10
8A	309	1.69	21	22.6	2.24	9.28	24	20.4	1.45	14.15	24	20.4	0.71
8B	309	1.11	10	40.2	2.61	5.76	13	32.2	1.42	14.15	16	27.5	1.06
9A	415	1.06	11	36.9	3.07	5.92	17	26.4	1.64	10.45	18	25.3	0.92
9B	415	1.24	26	19.0	1.85	6.48	30	16.7	1.09	10.45	30	16.7	0.58
10A	1979	1.06	28	17.8	7.07	5.92	32	15.7	4.46	10.45	32	15.7	2.60
10B	1979	1.24	28	17.8	8.27	6.48	32	15.7	4.89	10.45	32	15.7	2.60

TABLE 6A (continued)

GROSS VEHICLE EMISSIONS OF CARBON MONOXIDE

SEGMENT		PEAK HOUR				PEAK 8 HOURS				AVERAGE DAY			
ID	Length (ft.)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)	Volume (x1000)	Sp. (mph)	E.F. (gm/mi)	CO (kg/hr)
11A	400	1.18	10	25.3	2.26	8.00	21	22.6	1.74	13.60	22	21.8	0.97
11B	400	1.42	9	44.2	4.75	8.08	11	36.9	2.92	13.60	14	30.4	1.50
12A	375	1.18	19	24.4	2.04	8.00	21	22.6	1.62	13.60	22	21.8	0.90
12B	375	1.42	19	24.4	2.46	8.08	21	22.6	1.64	13.60	22	21.8	0.90

Appendix 3

CALINE-2 Computer Printouts

(22 Degrees and 0 Degrees)

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 107TH: 1982 NO BUILD - PEAK HOUR

7mph

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2170	(Z FEET)	10	20	30	40	70	100
EF=	142 GMS/MI							
U=	2 MPH	30	13.9	13.5	13.1	12.8	11.6	10.2
PHI=	22 DEGREES	20	17.5	16.0	15.1	14.4	12.9	11.3
H=	0 FEET	15	19.7	17.4	16.0	15.2	13.4	11.7
CLAS=	4 (D)	10	21.9	18.7	16.8	15.7	13.8	12.0
W=	94 FEET	5	24.2	19.9	17.5	16.2	14.2	12.3
		0	24.2	19.9	17.5	16.2	14.2	12.3

MIXING CELL CONCENTRATION = 30.2 PPM

GULF BLVD SOUTH OF 107TH: 1982 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

10.5

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1359	(Z FEET)	10	20	30	40	70	100
EF=	96 GMS/MI							
U=	2 MPH	30	5.9	5.7	5.6	5.4	4.9	4.3
PHI=	22 DEGREES	20	7.4	6.8	6.4	6.1	5.5	4.8
H=	0 FEET	15	8.3	7.4	6.8	6.4	5.7	5.0
CLAS=	4 (D)	10	9.3	7.9	7.1	6.7	5.9	5.1
W=	94 FEET	5	10.2	8.4	7.4	6.9	6.0	5.2
		0	10.2	8.4	7.4	6.9	6.0	5.2

MIXING CELL CONCENTRATION = 12.8 PPM

GULF BLVD SOUTH OF 112TH: 1982 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

14.8

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	3920	(Z FEET)	10	20	30	40	70	100
EF=	78 GMS/MI							
U=	2 MPH	30	13.8	13.4	13.0	12.7	11.5	10.1
PHI=	22 DEGREES	20	17.3	15.9	15.0	14.3	12.8	11.2
H=	0 FEET	15	19.5	17.3	15.9	15.0	13.3	11.6
CLAS=	4 (D)	10	21.7	18.5	16.7	15.6	13.7	12.0
W=	94 FEET	5	24.0	19.8	17.4	16.1	14.1	12.2
		0	24.0	19.8	17.4	16.1	14.1	12.2

MIXING CELL CONCENTRATION = 29.9 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 112TH: 1982 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2446	(Z FEET)	10	20	30	40	70	100
EF=	58 GMS/MI							
U=	2 MPH	30	6.4	6.2	6.0	5.9	5.3	4.7
PHI=	22 DEGREES	20	8.0	7.4	6.9	6.6	5.9	5.2
H=	0 FEET	15	9.1	8.0	7.4	7.0	6.2	5.4
CLAS=	4 (D)	10	10.1	8.6	7.7	7.2	6.4	5.5
W=	94 FEET	5	11.1	9.2	8.1	7.5	6.5	5.7
		0	11.1	9.2	8.1	7.5	6.5	5.7

MIXING CELL CONCENTRATION = 13.9 PPM

GULF BLVD SOUTH OF 107TH: 1982 BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2170	(Z FEET)	10	20	30	40	70	100
EF=	81 GMS/MI							
U=	2 MPH	30	8.0	7.7	7.5	7.3	6.6	5.8
PHI=	- 22 DEGREES	20	10.0	9.2	8.6	8.2	7.4	6.4
H=	0 FEET	15	11.2	9.9	9.1	8.6	7.7	6.7
CLAS=	4 (D)	10	12.5	10.7	9.6	9.0	7.9	6.9
W=	94 FEET	5	13.8	11.4	10.0	9.2	8.1	7.0
		0	13.8	11.4	10.0	9.2	8.1	7.0

MIXING CELL CONCENTRATION = 17.2 PPM

GULF BLVD SOUTH OF 107TH: 1982 BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1359	(Z FEET)	10	20	30	40	70	100
EF=	72 GMS/MI							
U=	2 MPH	30	4.4	4.3	4.2	4.1	3.7	3.2
PHI=	22 DEGREES	20	5.5	5.1	4.8	4.6	4.1	3.6
H=	0 FEET	15	6.3	5.5	5.1	4.8	4.3	3.7
CLAS=	4 (D)	10	7.0	5.9	5.3	5.0	4.4	3.8
W=	94 FEET	5	7.7	6.3	5.6	5.1	4.5	3.9
		0	7.7	6.3	5.6	5.1	4.5	3.9

MIXING CELL CONCENTRATION = 9.6 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 107TH: 1992 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2510	(Z FEET)	10	20	30	40	70	100
EF=	59 GMS/MI							
U=	2 MPH	30	6.7	6.5	6.3	6.1	5.6	4.9
PHI=	22 DEGREES	20	8.4	7.7	7.3	6.9	6.2	5.4
H=	0 FEET	15	9.5	8.4	7.7	7.3	6.5	5.6
CLAS=	4 (D)	10	10.5	9.0	8.1	7.6	6.7	5.8
W=	94 FEET	5	11.6	9.6	8.4	7.8	6.8	5.9
		0	11.6	9.6	8.4	7.8	6.8	5.9

MIXING CELL CONCENTRATION = 14.5 PPM

GULF BLVD SOUTH OF 107TH: 1992 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1744	(Z FEET)	10	20	30	40	70	100
EF=	41 GMS/MI							
U=	2 MPH	30	3.2	3.1	3.0	3.0	2.7	2.4
PHI=	22 DEGREES	20	4.1	3.7	3.5	3.4	3.0	2.6
H=	0 FEET	15	4.6	4.0	3.7	3.5	3.1	2.7
CLAS=	4 (D)	10	5.1	4.3	3.9	3.6	3.2	2.8
W=	94 FEET	5	5.6	4.6	4.1	3.8	3.3	2.9
		0	5.6	4.6	4.1	3.8	3.3	2.9

MIXING CELL CONCENTRATION = 7.0 PPM

GULF BLVD SOUTH OF 112TH: 1992 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	4160	(Z FEET)	10	20	30	40	70	100
EF=	75 GMS/MI							
U=	2 MPH	30	14.1	13.7	13.3	12.9	11.7	10.3
PHI=	22 DEGREES	20	17.7	16.2	15.3	14.6	13.1	11.4
H=	0 FEET	15	19.9	17.6	16.2	15.3	13.6	11.9
CLAS=	4 (D)	10	22.2	18.9	17.0	15.9	14.0	12.2
W=	94 FEET	5	24.5	20.2	17.7	16.4	14.3	12.5
		0	24.5	20.2	17.7	16.4	14.3	12.5

MIXING CELL CONCENTRATION = 30.5 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 112TH: 1992 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2743	(Z FEET)	10	20	30	40	70	100
EF=	44 GMS/MI							
U=	2 MPH	30	5.5	5.3	5.1	5.0	4.5	4.0
PHI=	22 DEGREES	20	6.8	6.3	5.9	5.7	5.1	4.4
H=	0 FEET	15	7.7	6.8	6.3	5.9	5.3	4.6
CLAS=	4 (D)	10	8.6	7.3	6.6	6.2	5.4	4.7
W=	94 FEET	5	9.5	7.8	6.9	6.3	5.6	4.8
		0	9.5	7.8	6.9	6.3	5.6	4.8

MIXING CELL CONCENTRATION = 11.8 PPM

GULF BLVD SOUTH OF 107TH: 1992 BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2510	(Z FEET)	10	20	30	40	70	100
EF=	34 GMS/MI							
U=	2 MPH	30	3.9	3.7	3.6	3.5	3.2	2.8
PHI=	22 DEGREES	20	4.8	4.4	4.2	4.0	3.6	3.1
H=	0 FEET	15	5.5	4.8	4.4	4.2	3.7	3.2
CLAS=	4 (D)	10	6.1	5.2	4.6	4.4	3.8	3.3
W=	94 FEET	5	6.7	5.5	4.8	4.5	3.9	3.4
		0	6.7	5.5	4.8	4.5	3.9	3.4

MIXING CELL CONCENTRATION = 8.4 PPM

GULF BLVD SOUTH OF 107TH: 1992 BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1744	(Z FEET)	10	20	30	40	70	100
EF=	32 GMS/MI							
U=	2 MPH	30	2.5	2.4	2.4	2.3	2.1	1.8
PHI=	22 DEGREES	20	3.2	2.9	2.7	2.6	2.3	2.0
H=	0 FEET	15	3.6	3.2	2.9	2.7	2.4	2.1
CLAS=	4 (D)	10	4.0	3.4	3.0	2.8	2.5	2.2
W=	94 FEET	5	4.4	3.6	3.2	2.9	2.6	2.2
		0	4.4	3.6	3.2	2.9	2.6	2.2

MIXING CELL CONCENTRATION = 5.5 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 107TH: 1982 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2170	(Z FEET)	10	20	30	40	70	100
EF=	142 GMS/MI							
U=	2 MPH	30	15.9	15.3	14.9	14.4	13.0	11.4
PHI=	0 DEGREES	20	19.7	18.0	16.9	16.1	14.4	12.6
H=	0 FEET	15	22.0	19.4	17.8	16.9	14.9	13.0
CLAS=	4 (D)	10	24.4	20.8	18.6	17.4	15.4	13.3
W=	94 FEET	5	26.8	22.1	19.4	17.9	15.7	13.6
		0	26.8	22.1	19.4	17.9	15.7	13.6

MIXING CELL CONCENTRATION = 33.4 PPM

GULF BLVD SOUTH OF 107TH: 1982 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1359	(Z FEET)	10	20	30	40	70	100
EF=	96 GMS/MI							
U=	2 MPH	30	6.7	6.5	6.3	6.1	5.5	4.8
PHI=	0 DEGREES	20	8.3	7.6	7.2	6.8	6.1	5.3
H=	0 FEET	15	9.3	8.2	7.6	7.1	6.3	5.5
CLAS=	4 (D)	10	10.3	8.8	7.9	7.4	6.5	5.6
W=	94 FEET	5	11.4	9.4	8.2	7.6	6.6	5.8
		0	11.4	9.4	8.2	7.6	6.6	5.8

MIXING CELL CONCENTRATION = 14.1 PPM

GULF BLVD SOUTH OF 112TH: 1982 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	3920	(Z FEET)	10	20	30	40	70	100
EF=	78 GMS/MI							
U=	2 MPH	30	15.8	15.2	14.7	14.3	12.9	11.3
PHI=	0 DEGREES	20	19.5	17.9	16.8	16.0	14.3	12.5
H=	0 FEET	15	21.9	19.3	17.7	16.7	14.8	12.9
CLAS=	4 (D)	10	24.2	20.6	18.5	17.3	15.2	13.2
W=	94 FEET	5	26.6	21.9	19.2	17.8	15.6	13.5
		0	26.6	21.9	19.2	17.8	15.6	13.5

MIXING CELL CONCENTRATION = 33.1 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 112TH: 1982 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2446	(Z FEET)	10	20	30	40	70	100
EF=	58 GMS/MI							
U=	2 MPH	30	7.3	7.1	6.8	6.6	6.0	5.2
PHI=	0 DEGREES	20	9.1	8.3	7.8	7.4	6.6	5.8
H=	0 FEET	15	10.1	8.9	8.2	7.8	6.9	6.0
CLAS=	4 (D)	10	11.2	9.6	8.6	8.0	7.1	6.1
W=	94 FEET	5	12.4	10.2	8.9	8.3	7.2	6.3
		0	12.4	10.2	8.9	8.3	7.2	6.3

MIXING CELL CONCENTRATION = 15.4 PPM

GULF BLVD SOUTH OF 107TH: 1982 BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2170	(Z FEET)	10	20	30	40	70	100
EF=	81 GMS/MI							
U=	2 MPH	30	9.1	8.8	8.5	8.2	7.4	6.5
PHI=	0 DEGREES	20	11.2	10.3	9.6	9.2	8.2	7.2
H=	0 FEET	15	12.6	11.1	10.2	9.6	8.5	7.4
CLAS=	4 (D)	10	13.9	11.9	10.6	9.9	8.8	7.6
W=	94 FEET	5	15.3	12.6	11.1	10.2	9.0	7.8
		0	15.3	12.6	11.1	10.2	9.0	7.8

MIXING CELL CONCENTRATION = 19.0 PPM

GULF BLVD SOUTH OF 107TH: 1982 BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1359	(Z FEET)	10	20	30	40	70	100
EF=	72 GMS/MI							
U=	2 MPH	30	5.1	4.9	4.7	4.6	4.1	3.6
PHI=	0 DEGREES	20	6.2	5.7	5.4	5.1	4.6	4.0
H=	0 FEET	15	7.0	6.2	5.7	5.4	4.7	4.1
CLAS=	4 (D)	10	7.7	6.6	5.9	5.5	4.9	4.2
W=	94 FEET	5	8.5	7.0	6.2	5.7	5.0	4.3
		0	8.5	7.0	6.2	5.7	5.0	4.3

MIXING CELL CONCENTRATION = 10.6 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 107TH: 1992 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2510	(Z FEET)	10	20	30	40	70	100
EF=	59 GMS/MI							
U=	2 MPH	30	7.7	7.4	7.1	6.9	6.2	5.5
PHI=	0 DEGREES	20	9.5	8.6	8.1	7.8	6.9	6.0
H=	0 FEET	15	10.6	9.3	8.6	8.1	7.2	6.2
CLAS=	4 (D)	10	11.7	10.0	9.0	8.4	7.4	6.4
W=	94 FEET	5	12.9	10.6	9.3	8.6	7.5	6.5
		0	12.9	10.6	9.3	8.6	7.5	6.5

MIXING CELL CONCENTRATION = 16.0 PPM

GULF BLVD SOUTH OF 107TH: 1992 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1744	(Z FEET)	10	20	30	40	70	100
EF=	41 GMS/MI							
U=	2 MPH	30	3.7	3.6	3.4	3.3	3.0	2.6
PHI=	0 DEGREES	20	4.6	4.2	3.9	3.7	3.3	2.9
H=	0 FEET	15	5.1	4.5	4.1	3.9	3.5	3.0
CLAS=	4 (D)	10	5.7	4.8	4.3	4.0	3.6	3.1
W=	94 FEET	5	6.2	5.1	4.5	4.2	3.6	3.2
		0	6.2	5.1	4.5	4.2	3.6	3.2

MIXING CELL CONCENTRATION = 7.7 PPM

GULF BLVD SOUTH OF 112TH: 1992 NO BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	4160	(Z FEET)	10	20	30	40	70	100
EF=	75 GMS/MI							
U=	2 MPH	30	16.1	15.5	15.0	14.6	13.2	11.5
PHI=	0 DEGREES	20	19.9	18.2	17.1	16.4	14.6	12.7
H=	0 FEET	15	22.3	19.7	18.1	17.1	15.1	13.2
CLAS=	4 (D)	10	24.7	21.0	18.9	17.7	15.5	13.5
W=	94 FEET	5	27.2	22.4	19.6	18.2	15.9	13.8
		0	27.2	22.4	19.6	18.2	15.9	13.8

MIXING CELL CONCENTRATION = 33.8 PPM

CALINE2: CALIFORNIA LINE SOURCE DISPERSION MODEL,
REVISED JANUARY, 1975

GULF BLVD SOUTH OF 112TH: 1992 NO BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2743	(Z FEET)	10	20	30	40	70	100
EF=	44 GMS/MI							
U=	2 MPH	30	6.2	6.0	5.8	5.6	5.1	4.5
PHI=	0 DEGREES	20	7.7	7.0	6.6	6.3	5.6	4.9
H=	0 FEET	15	8.6	7.6	7.0	6.6	5.9	5.1
CLAS=	4 (D)	10	9.5	8.1	7.3	6.8	6.0	5.2
W=	94 FEET	5	10.5	8.7	7.6	7.0	6.1	5.3
		0	10.5	8.7	7.6	7.0	6.1	5.3

MIXING CELL CONCENTRATION = 13.1 PPM

GULF BLVD SOUTH OF 107TH: 1992 BUILD - PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	2510	(Z FEET)	10	20	30	40	70	100
EF=	34 GMS/MI							
U=	2 MPH	30	4.4	4.3	4.1	4.0	3.6	3.2
PHI=	0 DEGREES	20	5.4	5.0	4.7	4.5	4.0	3.5
H=	0 FEET	15	6.1	5.4	4.9	4.7	4.1	3.6
CLAS=	4 (D)	10	6.8	5.8	5.2	4.8	4.3	3.7
W=	94 FEET	5	7.4	6.1	5.4	5.0	4.3	3.8
		0	7.4	6.1	5.4	5.0	4.3	3.8

MIXING CELL CONCENTRATION = 9.2 PPM

GULF BLVD SOUTH OF 107TH: 1992 BUILD - OFF PEAK HOUR

PREDICTED CO CONCENTRATION (PPM)

VARIABLES		RECEPTOR HEIGHT	DISTANCE PERPENDICULAR TO HIGHWAY (D FEET)					
VPH=	1744	(Z FEET)	10	20	30	40	70	100
EF=	32 GMS/MI							
U=	2 MPH	30	2.9	2.8	2.7	2.6	2.4	2.1
PHI=	0 DEGREES	20	3.6	3.3	3.1	2.9	2.6	2.3
H=	0 FEET	15	4.0	3.5	3.2	3.1	2.7	2.4
CLAS=	4 (D)	10	4.4	3.8	3.4	3.2	2.8	2.4
W=	94 FEET	5	4.9	4.0	3.5	3.2	2.8	2.5
		0	4.9	4.0	3.5	3.2	2.8	2.5

MIXING CELL CONCENTRATION = 6.0 PPM

Ambient Carbon Monoxide Measurements

From Tuesday, 4 December 1979 through Wednesday, 19 December 1979, CH2M HILL conducted air sampling within the city of Treasure Island (Pinellas County), Florida. Air samples were taken using a sequential bag sampler with 12 individual pumps (Environmental Measurements, Inc., Model AQS-II). Sampling was generally done from 6 a.m. to 10 p.m. The hourly bag samples were returned to the CH2M HILL Clearwater office where they were analyzed for carbon monoxide (CO). In addition, wind speed and direction were recorded on a 10 meter mast at the Bill Lyons Field on Capri Circle.

Two bag samplers were used in the study. One began operation at Lyons Field as a background station away from the major thoroughfare, Gulf Boulevard. That sampler was subsequently moved on 12 December to south of 112th (194 feet) on the west side of Gulf Boulevard (about 7 feet from the curb), across from the Howard Johnson's. The other sampler was located and remained south of 107th (935 feet) also on the west side of Gulf Boulevard (about 14 feet from the curb), across from a Burger Chef restaurant.

The samples were analyzed by an Interscan CO detector (model 1146, 0-50 ppm), which uses the electrochemical cell technique. The detector was zeroed between each sample bag and spanned regularly with 10 ppm and 30 ppm mixtures of CO in air (AIRCO cylinders).

The measured hourly average CO concentrations varied from less than 1 ppm to about 10 ppm. The measurements are presented in the attached tables by day and hour along with the average wind direction and speed. During this two week study the winds were predominantly from the N to NE, putting the Gulf Boulevard sampling sites downwind of the signalized intersections at 107th and 112th.

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE ___ — SHEET NO. ___ OF ___ — PROJECT NO. GN12997.A0

Tuesday, December 4, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700				
0700 - 0800				
0800 - 0900				
0900 - 1000				
1000 - 1100				
1100 - 1200				
1200 - 1300				
1300 - 1400				
1400 - 1500				
1500 - 1600				
1600 - 1700				
1700 - 1800				
1800 - 1900	N	2 mph	2.0	4.0
1900 - 2000	N	2	2.5	4.0
2000 - 2100	N	3	1.5	3.0
2100 - 2200	N	2	1.5	3.0
2200 - 2300	N - NNE	1	1.75	2.75
2300 - 2400	N	2	1.25	2.5

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —

SHEET NO. — OF —

PROJECT NO. GN12997.A0

Wednesday, December 5, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NNE - NE	4 mph	1.25	1.5
0700 - 0800	NE	4	2.25	2.5
0800 - 0900	NNE - ENE	4	2.75	3.5
0900 - 1000	ENE	6	1.5	2.5
1000 - 1100	ENE	6	1.5	2.0
1100 - 1200	E	5	1.5	—
1200 - 1300	ESE	5	1.0	5.0
1300 - 1400	ESE - SE	4	1.0	6.0
1400 - 1500	ESE - SE	3	1.0	6.5
1500 - 1600	ESE	2	1.5	6.25
1600 - 1700	ESE	0	1.75	6.0
1700 - 1800	SE - SSW	1	2.75	4.5
1800 - 1900	ESE - SE	2	1.5	3.0
1900 - 2000	ESE - SE	5	1.5	2.5
2000 - 2100	ESE	3	1.25	2.0
2100 - 2200	ESE	4	1.0	1.75
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING
FLORIDA DEPT OF TRANSPORTATION

BY D. OBER DATE ___
SHEET NO. ___ OF ___
PROJECT NO. GN12997.A0

Thursday, December 6, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	SE	6 mph	1.0	1.5
0700 - 0800	SE	7	1.25	1.75
0800 - 0900	SE	7	1.5	2.5
0900 - 1000	SE - SSE	10	1.5	1.75
1000 - 1100	SSE	12	1.25	1.0
1100 - 1200	SSE	13	1.0	1.0
1200 - 1300	SSE	9	1.0	0.75
1300 - 1400	SSE	10	0.75	0.75
1400 - 1500	SSE - S	10	0.75	0.5
1500 - 1600	SSE - S	9	0.75	1.0
1600 - 1700	SSE - S	8	1.25	1.25
1700 - 1800	SSE - S	9	1.5	1.0
1800 - 1900	SSE	10	1.25	0.75
1900 - 2000	SSE - S	9	1.0	1.0
2000 - 2100	SSE - S	6	1.0	0.75
2100 - 2200	SSE - S	4	1.0	0.75
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING — BY D. OBER — DATE ___
FLORIDA DEPT OF TRANSPORTATION — SHEET NO. ___ OF ___
PROJECT NO. 6N129972.A0

Friday, December 7, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	SSE - S	4 mph	1.0	—
0700 - 0800	S	2	1.25	—
0800 - 0900	SSE - SSW	1	1.5	—
0900 - 1000	SSE - S	3	1.5	—
1000 - 1100	SSE - WNW	4	1.25	0.5
1100 - 1200	WNW - N	2	1.25	2.5
1200 - 1300	N	4	1.5	4.25
1300 - 1400	N	3	1.5	4.0
1400 - 1500	N	4	1.25	4.25
1500 - 1600	N	3	1.5	4.25
1600 - 1700	N - NNW	2	1.5	4.25
1700 - 1800	N	3	1.5	4.25
1800 - 1900	N - NW	3	1.5	4.0
1900 - 2000	NNW	4	1.0	2.5
2000 - 2100	NNW - N	5	1.0	2.5
2100 - 2200	N	5	0.75	2.5
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —
SHEET NO. — OF —
PROJECT NO. 6 N 1 2 9 9 7.A 0

Saturday, December 8, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	N	5 mph	1.0	1.5
0700 - 0800	N	6	0.75	1.5
0800 - 0900	N	7	1.0	2.0
0900 - 1000	N	8	1.0	2.0
1000 - 1100	N - NNE	7	1.0	2.25
1100 - 1200	N - NNE	6	1.25	2.75
1200 - 1300	NNE - NE	5	1.0	2.75
1300 - 1400	N - NE	5	1.0	2,5
1400 - 1500	NNE - NE	5	1.0	2,75
1500 - 1600	N - NE	3	1.25	2.75
1600 - 1700	N - NE	1	1.0	4.25
1700 - 1800	N	0	1.75	4.5
1800 - 1900	N - NNW	1	1.75	4.5
1900 - 2000	NNE - N	0	1.5	4.0
2000 - 2100	N	0	1.75	5.5
2100 - 2200	N	1	1.75	4.0
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — SHEET NO. — OF — PROJECT NO. GN12997.A0

Sunday, December 9, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NNE	4 mph	1.0	1.0
0700 - 0800	NNE - NE	4	0.75	1.25
0800 - 0900	NNE - NE	5	1.0	1.5
0900 - 1000	NNE - NE	6	1.0	1.75
1000 - 1100	NNE - NE	5	1.5	2.25
1100 - 1200	N - NE	5	1.0	2.25
1200 - 1300	N - NE	4	1.0	2.75
1300 - 1400	N - NE	4	1.25	3.0
1400 - 1500	N - NNE	3	1.0	2.5
1500 - 1600	NNW - NNE	4	1.0	2.75
1600 - 1700	N - NNW	4	1.25	2.5
1700 - 1800	N - NNW	3	1.25	3.25
1800 - 1900	N	3	1.5	3.5
1900 - 2000	N	3	1.5	3.25
2000 - 2100	N	3	1.5	3.0
2100 - 2200	N	3	1.5	2.5
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —
SHEET NO. — — — OF — — —
PROJECT NO. GN 12997.A0

Monday, December, 10, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NNE	3 mph	1.0	1.25
0700 - 0800	NNE	3	1.5	2.25
0800 - 0900	N-NE	3	1.5	3.0
0900 - 1000	NNE - NE	4	1.5	3.0
1000 - 1100	NNE - ENE	5	1.25	3.0
1100 - 1200	NE - ENE	5	1.5	2.75
1200 - 1300	NE - ENE	5	1.0	3.5
1300 - 1400	NNE - ENE	5	1.0	2.5
1400 - 1500	NNE - ENE	4	1.0	2.5
1500 - 1600	NNE - ENE	3	1.0	2.5
1600 - 1700	NE - E	3	1.0	3.5
1700 - 1800	NE - N	1	2.25	4.5
1800 - 1900	N - NNE	0	3.25	5.0
1900 - 2000	NNE - ENE	2	2.75	3.5
2000 - 2100	NE - ENE	4	1.75	2.5
2100 - 2200	NE	4	2.0	2.25
2200 - 2300				
2300 - 2400				

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —
SHEET NO. — OF —
PROJECT NO. GN12997.A0

Tuesday, December 11, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NE	3 mph	1.75	1.5
0700 - 0800	NE - NNE	3	2.0	2.5
0800 - 0900	NE - ENE	3	2.75	3.75
0900 - 1000	ENE - E	4	2.0	3.0
1000 - 1100	E	5	1.5	2.0
1100 - 1200	E - ENE	6	1.5	2.5
1200 - 1300	ENE - E	5	1.25	2.25
1300 - 1400	ENE - E	5	1.25	2.25
1400 - 1500	ESE - ENE	5	1.25	2.0
1500 - 1600	E	5	1.5	2.0
1600 - 1700	ENE - E	4	1.5	2.5
1700 - 1800	ENE	4	1.75	3.5
1800 - 1900	ENE	5	1.5	3.0
1900 - 2000	ENE	4	1.75	2.75
2000 - 2100	ENE - NE	4	1.75	3.0
2100 - 2200	NE - ENE	4	1.5	2.0
2200 - 2300	ENE - NE	2	2.0	2.5
2300 - 2400	NE - NNE	1	2.5	3.0

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE ___ — SHEET NO. ___ OF ___ — PROJECT NO. GN12997.A0

Wednesday, December 12, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	N - NNE	2 mph		1.75	2.0
0700 - 0800	NNE - NE	2		2.5	4.0
0800 - 0900	NNE - ENE	3		3.0	4.5
0900 - 1000	NE - ENE	4		2.5	4.0
1000 - 1100	NNE - ENE	4		—	2.75
1100 - 1200	NE - E	5	3.5		3.0
1200 - 1300	NE - SE	-	3.25		3.75
1300 - 1400	NE - E	-	3.25		3.0
1400 - 1500	NE - ESE	-	3.25		3.0
1500 - 1600	E - WNW	-	2.25		2.5
1600 - 1700	WNW	-	1.5		2.5
1700 - 1800	WNW - W	-	1.75		1.5
1800 - 1900	WNW - ESE	-	2.75		1.25
1900 - 2000	ESE - ENE	1	4.0		4.75
2000 - 2100	ENE	4	2.5		2.5
2100 - 2200	ENE - E	4	2.25		1.75
2200 - 2300	E	3	2.5		2.25
2300 - 2400	ENE - E	3	2.25		1.5

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION

BY D. OBER DATE ___

SHEET NO. ___ OF ___

PROJECT NO. GN12997.A0

Thursday, December 13, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	ESE - ENE	2 mph	2.5		1.75
0700 - 0800	E - ESE	-	5.0		2.5
0800 - 0900	ESE	-	6.0		3.0
0900 - 1000	ESE	-	5.5		3.0
1000 - 1100	ESE	4	5.5		3.25
1100 - 1200	ESE - SSE	4	4.5		3.0
1200 - 1300	SSE - S	5	3.0		2.25
1300 - 1400	SSE - SSW	4	2.0		2.0
1400 - 1500	S - WSW	3	1.5		1.5
1500 - 1600	WSW	3	1.5		1.5
1600 - 1700	WSW - WNW	3	1.75		2.5
1700 - 1800	WNW	5	1.5		3.5
1800 - 1900	WNW - NNW	2	2.75		3.0
1900 - 2000	WNW - NNW	0	2.0		2.5
2000 - 2100	WNW - NNW	0	1.75		1.75
2100 - 2200	NNW - WNW	1	2.0		2.25
2200 - 2300	NW - N	1	3.5		3.5
2300 - 2400	N - ENE	0	3.0		3.0

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — SHEET NO. — OF — PROJECT NO. GN12997.A0

Friday, December 14, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NE - N	0 mph	3.5		2.5
0700 - 0800	N	0	7.0		5.0
0800 - 0900	N - E	0	8.0		6.0
0900 - 1000	ENE - ESE	0	9.75		7.0
1000 - 1100	N - ENE	0	4.5		3.75
1100 - 1200	N - WSW	0	3.0		3.0
1200 - 1300	WNW	4	2.75		2.75
1300 - 1400	WNW	5	2.25		3.0
1400 - 1500	WNW	6	2.0		3.5
1500 - 1600	WNW - NNW	4	2.75		4.25
1600 - 1700	WNW - NNW	4	6.0		4.0
1700 - 1800	NNW	3	7.5		4.25
1800 - 1900	N	5	5.75		4.75
1900 - 2000	N	4	4.5		4.0
2000 - 2100	N	4	4.25		4.0
2100 - 2200	N	3	4.0		3.5
2200 - 2300	N - NNE	2	4.0		3.5
2300 - 2400	N	2	3.5		3.25

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —
SHEET NO. — OF —
PROJECT NO. GN12997.A0

Saturday, December 15, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	ENE - NE	4 mph	1.75		1.5
0700 - 0800	NE - ENE	5	2.25		1.75
0800 - 0900	ENE - NE	5	2.5		2.5
0900 - 1000	ENE - NE	5	3.5		2.5
1000 - 1100	ENE - NNE	4	4.0		3.0
1100 - 1200	ENE - NNE	4	3.75		3.25
1200 - 1300	NE - NNE	3	4.0		4.0
1300 - 1400	NNE - ENE	3	4.0		3.25
1400 - 1500	ENE - NNE	3	3.5		3.25
1500 - 1600	NE - N	3	4.25		4.25
1600 - 1700	N - NE	2	5.0		4.5
1700 - 1800	N - NNE	1	6.0		5.0
1800 - 1900	NNE - NE	2	5.25		4.5
1900 - 2000	NE - NNE	3	4.75		4.25
2000 - 2100	NNE - N	2	5.0		4.0
2100 - 2200	N	1	4.5		4.25
2200 - 2300	NE - NNE	1	4.5		4.5
2300 - 2400	E - NNE	0	4.25		3.75

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION

BY D. OBER DATE ___

SHEET NO. ___ OF ___

PROJECT NO. GN12997.A0

Sunday, December 16, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	ESE - E	-	1.75		1.75
0700 - 0800	E	-	1.75		2.0
0800 - 0900	E - NE	-	3.25		2.5
0900 - 1000	ENE - E	5 mph	3.75		2.5
1000 - 1100	E - ENE	4	4.5		3.25
1100 - 1200	ENE - NNE	4	5.0		4.25
1200 - 1300	NE - NNE	5	4.5		4.25
1300 - 1400	N	6	4.0		3.5
1400 - 1500	N - NE	5	3.25		2.75
1500 - 1600	E	8	3.5		2.5
1600 - 1700	E	5	3.75		3.0
1700 - 1800	E - NNE	3	5.25		4.5
1800 - 1900	NE - NNE	3	5.75		4.5
1900 - 2000	NE - ENE	3	4.5		4.0
2000 - 2100	NNE - N	1	5.0		4.25
2100 - 2200	N	2	4.5		4.0
2200 - 2300	N	5	3.0		2.5
2300 - 2400	N	7	2.25		1.5

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE ___ — SHEET NO. ___ OF ___ — PROJECT NO. GN12997.A0

Monday, December 17, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	N	8 mph	2.75		1.75
0700 - 0800	N	8	5.0		3.0
0800 - 0900	N	8	5.5		2.75
0900 - 1000	N	11	4.0		2.5
1000 - 1100	N	11	4.0		2.75
1100 - 1200	N	8	5.25		3.0
1200 - 1300	N - NNW	8	4.0		3.0
1300 - 1400	N - NW	10	3.5		2.0
1400 - 1500	N - NW	10	2.75		2.25
1500 - 1600	N - NNW	9	4.5		3.0
1600 - 1700	N - NNW	9	—		2.75
1700 - 1800	N	9	—		3.5
1800 - 1900	N	9	3.5		3.0
1900 - 2000	N - NNE	8	3.0		2.5
2000 - 2100	N - NE	9	2.5		2.25
2100 - 2200	N - NNE	8	2.75		2.25
2200 - 2300	N - NNE	8	2.25		2.25
2300 - 2400	N	9	2.25		1.75

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION — BY D. OBER — DATE — — —
SHEET NO. — OF — — —
PROJECT NO. GN12997.A0

Tuesday, December 18, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	N	7 mph	—		1.75
0700 - 0800	N	7	—		3.0
0800 - 0900	N	7	4.75		3.25
0900 - 1000	N	7	5.0		3.25
1000 - 1100	N	7	5.5		3.75
1100 - 1200	N	6	5.25		3.75
1200 - 1300	N	5	5.0		3.75
1300 - 1400	N - NW	5	5.0		3.25
1400 - 1500	N - NW	8	—		3.25
1500 - 1600	N - NNW	8	5.0		3.0
1600 - 1700	N - NNW	7	6.25		4.0
1700 - 1800	N	8	5.5		4.5
1800 - 1900	N	7	4.25		4.0
1900 - 2000	N	6	4.5		4.0
2000 - 2100	N	5	4.0		3.5
2100 - 2200	N - NNE	5	3.25		3.75
2200 - 2300	N - NNE	6	2.75		3.0
2300 - 2400	NNE - NE	5	—		2.75

CH2M HILL

SUBJECT AIR SAMPLING — FLORIDA DEPT OF TRANSPORTATION

BY D. OBER DATE ___

SHEET NO. ___ OF ___

PROJECT NO. GN12997.A0

Wednesday, December 19, 1979

CO Concentrations, PPM

HOUR	WIND DIRECTION	AVERAGE WIND SPEED	GULF BLVD SOUTH OF 112th	LYONS FIELD	GULF BLVD SOUTH OF 107th
0600 - 0700	NE	6 mph	3.0		2.75
0700 - 0800	NE	5	4.75		3.75
0800 - 0900	N - NNE	5	6.25		5.0
0900 - 1000	N - NNE	4	6.5		5.0
1000 - 1100	N	4	6.5		4.5
1100 - 1200	—	—	5.25		4.25
1200 - 1300	—	—	5.0		4.25
1300 - 1400					
1400 - 1500					
1500 - 1600					
1600 - 1700					
1700 - 1800					
1800 - 1900					
1900 - 2000					
2000 - 2100					
2100 - 2200					
2200 - 2300					
2300 - 2400					

PRINCIPLE AUTHORS

Traffic Analysis: Dean Hobson

Dean Hobson, CH2M HILL Traffic Engineer
1600 S.W. Western Blvd.
Corvallis, Oregon 97330
503/752-4271

Air Quality Analysis: Doug Ober

Doug Ober, CH2M HILL Air Quality Engineer
200 S.W. Market St.
Portland, Oregon 97201
503/224-9190

With field assistance from:

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1454 U.S. Highway 19, South
Clearwater, Florida 33516
813/536-9454

DEAN HOBSON
Transportation Engineer

Education

B.S., Civil Engineering, University of Nebraska, 1958
Certificate in Transportation Engineering, Bureau of Highway Traffic, Yale University, 1963

Experience

Since joining CH2M HILL in 1975, Mr. Hobson has been responsible for the following:

- Transportation Planning - Traffic evaluations of alternative design plans for Interstate 505 and for the Fremont Bridge Access Study, both in Portland, Oregon; resident project engineer, Corvallis, Oregon, Bypass Study; prepared transportation element of Woodburn, Oregon, comprehensive plan; prepared preliminary traffic volume estimates for a new bridge across Moses Lake, Moses Lake, Washington; assisted with traffic generation and traffic impact studies of numerous planned developments in various locations.

- Traffic Safety - Project manager, traffic safety studies for Benton County, Sweet Home, and Lebanon, Oregon; and for a study of the safety aspects of transporting long logs (100 feet) on U.S. Forest Service roads.

- Traffic Engineering - Assessment of the traffic impacts of: a proposed downtown shopping mall and one-way street system in Walla Walla, Washington, and the improvement of SR699 in Treasure Island, Florida; traffic engineering evaluations for the impact of shopping centers in Beaverton and Clackamas, Oregon, and for a manufacturing facility in Aloha, Oregon; served as a traffic engineering expert for a comprehensive master plan study in Dammam, Saudi Arabia.

- Traffic Signals - Prepared design plans, specifications, and bid documents, for five new signals for the Foothills Boulevard Assessment District near Roseville, California; assisted with traffic signal design projects in Denver and Westminster, Colorado.

- Parking - Project manager for a study of downtown parking needs in Springfield, Oregon; assisted with surface access and automobile parking plans for the Roseburg, Oregon, and Pocatello, Idaho, Airport Master Plans.

Mr. Hobson has also completed a certified value engineering workshop, required by the General Services Administration, for participation in EPA-funded value analysis studies. He has served as a team leader or team member on studies of several water and wastewater treatment plants.

DOUGLAS D. OBER
Air Quality Engineer

Education

B.S., Engineering and Applied Science, Portland State University, 1969
Post graduate studies, Portland State University, Applied Science/Air Pollution, 1974-1977

Experience

Mr. Ober came to CH2M HILL in 1977, after several years with two Oregon air quality regulatory agencies. He was involved in the review and evaluation of proposed air pollution control systems. He also assisted in air monitoring activities, conducted industrial plant surveys, assisted in source testing, and utilized computer dispersion model programs.

At CH2M HILL, Mr. Ober has assisted with environmental impact assessments for both industrial and transportation projects, including government agency permit applications in several states. These projects include the following:

- Preparing air quality permit applications for new zirconium plants in Utah and Texas
- Prevention of Significant Deterioration (PSD) permit for a wood-fired boiler in South Carolina, including computer modeling using CRSTER (EPA model)
- PSD permit for a wood-fired boiler/power plant in Washington, including computer modeling using VALLEY and PTMTP (EPA models)
- PSD permit application for expansion of an oil refinery in Hawaii, including computer modeling using VALLEY and PTMTP (used in evaluation of potential shoreline fumigation)
- Assessment of air quality impacts of motor vehicles associated with projects involving highway construction, retail shopping centers, light industrial/commercial parks, and hospital expansion in the States of Oregon, Washington, California, Idaho, and Florida. Involved air sampling with analyses for hourly average carbon monoxide concentrations
- Assisted in air monitoring network design for a new aluminum plant in South Carolina; monitoring subsequently performed for particulates, sulfur dioxide, and fluorides

Mr. Ober has served as a part-time instructor at Portland State University for an air conservation course.

Membership in Organizations

Air Pollution Control Association, Pacific Northwest International Section

DEAN HOBSON

Before joining CH2M HILL, his responsibilities included a wide variety of transportation projects for Wilbur Smith and Associates for a number of years. Mr. Hobson's many assignments included the following areas:

- Regional and urban transportation studies - Project manager for comprehensive transportation planning studies in Oklahoma City, Oklahoma; Cincinnati, Ohio; and Meridian, Mississippi; and assistant project manager for a similar study in Athens, Greece.

- Traffic engineering operations, signalization, access and circulation plans - Project manager for: TOPICS studies in Covington-Newport, Kentucky; Spartanburg, South Carolina; and Meridian, Mississippi; and for traffic access and circulation plans for the Manned Spacecraft Center in Houston, Texas; and Montgomery County Junior College, Rockville, Maryland.

- Parking needs and functional design - Project manager for: parking needs studies in Winchester, Virginia, and Holland, Michigan; and for functional parking garage design for Colony Square, Atlanta, Georgia.

- Route location and corridor studies - Prepared future travel projections for the Hastings-Grand Island, Nebraska corridor; for several proposed toll roads in the Atlanta, Georgia area; and for the Northeast Radial in Lincoln, Nebraska.

- Public transportation - Assisted with an operations study of the Fort Wayne, Indiana Transit System. Prepared preliminary passenger loading forecasts for subway system alternatives in Athens, Greece.

Earlier positions included:

- Senior Traffic Engineer, City of Houston, Texas. Responsible for transportation planning and geometric design.

- District Traffic Engineer, Missouri Department of Highways. Supervised traffic operations in an 11-county area.

Professional Engineer Registration

California, Kansas, Mississippi, Oklahoma, Oregon, South Carolina, Texas

Membership in Organizations

Institute of Transportation Engineers (Fellow)