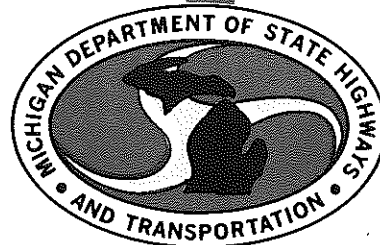


NOISE STUDY AND ANALYSIS, CITIES OF
ALLEN PARK, DEARBORN HEIGHTS, AND
TAYLOR, WAYNE COUNTY, RECONSTRUCTION
OF THE I 94 AND M 39 INTERCHANGE
(ADDENDUM)



**TESTING AND RESEARCH DIVISION
RESEARCH LABORATORY SECTION**

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ALLEN PARK, DEARBORN HEIGHTS, AND
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(ADDENDUM)

Research Laboratory Section
Testing and Research Division
Research Project 74 TI-214
Research Report No. R-1090

Michigan State Highway Commission
Peter B. Fletcher, Chairman; Carl V. Pellonpaa,
Vice-Chairman; Hannes Meyers, Jr., Weston E. Vivian
John P. Woodford, Director
Lansing, June 1978

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Introduction

This noise study and analysis is an addendum to Research Report No. R-927, dated June 1974, and considers the Scheme C alignment in the proposed reconstruction of the I 94 and M 39 interchange in the cities of Allen Park, Dearborn Heights, and Taylor, which are southeastern suburbs of Detroit. The study was performed by the Michigan Department of State Highways and Transportation as part of an Environmental Impact Statement required for the construction or reconstruction of highways, in order to be eligible for Federal-aid participation.

Traffic Data

Present alignment and the proposed Scheme C alignment are shown in Figures 1 and 2, respectively. The design year (2000) traffic data for the present alignment and the proposed Scheme C alignment are given in Tables 1 and 2, respectively, and were supplied by the Surveys and Analysis Division of the Bureau of Transportation Planning.

Geometric Data

The physical or geometric dimensions for the interchange reconstruction were selected from MDSHT Engineering Report No. 1852, associated topographical maps, and related information supplied by the Environmental Liaison Section of the Bureau of Transportation Planning.

Planned Facility Location

The I 94 and M 39 interchange reconstruction will occupy the existing interchange location with minimal additional right-of-way being required and is known as 'Scheme C.'

Discussion and Conclusions

Land use categories defined in accordance with FHPM 7-7-3 were determined for the areas along the proposed facility location and are depicted in Figure 3.

On May 1, 1978, noise measurements were made at 13 representative locations along the facility. Figure 3 shows the site locations where the noise level measurements and predictions were made.

The design year (2000) L₁₀ dbA noise levels for both the existing and the proposed alignments were predicted by the FHWA approved NCHRP Report 117/144 method. Table 3 contains a tabulation of the design year predicted levels for both the existing configuration and the proposed Scheme C alignment along with the comparable measured levels.

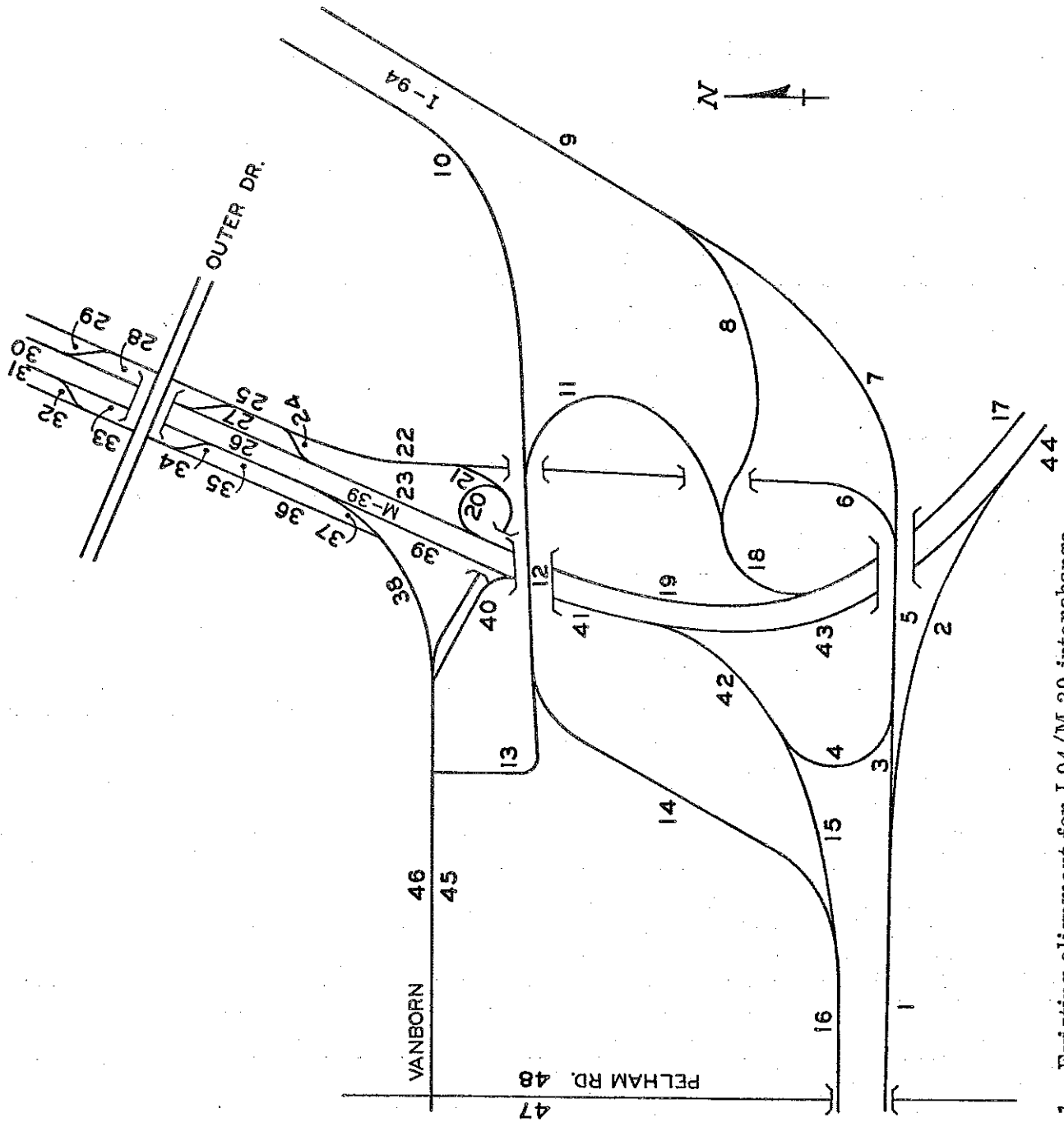


Figure 1. Existing alignment for I 94/M 39 interchange.

Assumptions necessary for the approved noise predictor computer programs in use today, coupled with the great difficulty in accurately predicting future traffic parameters, results in at least a 2 dbA uncertainty band around noise predictions. In an effort to compensate for this uncertainty, 2 ft has been added to the calculated height of each barrier. This precaution, as appropriate in all human environmental considerations, is designed to favor the potentially impacted citizen and will be achieved at a nominal additional cost.

In accordance with the above paragraph and Table 3, we are recommending three noise barriers for this facility (as indicated in Figure 3).

It is suggested that a variable height noise wall (heights being 2 ft greater than in Table 3) be constructed for sites 1 through 5 in the north-east quadrant of the interchange. This wall is estimated to reduce the design year (2000) noise levels to L_{10} 70 dbA or less. The wall should be placed along the R-O-W between the corner of Anne Ave and the M 39 service drive and the Parkside Blvd cul-de-sac.

The existing measured L_{10} noise levels and the predicted design year noise levels are within 1 dbA of the FHWA Design Level of L_{10} 70 dbA for sites 6 and 7. Since this is not a perceivable change, no noise abatement measures are proposed for this area.

A 13-ft high noise wall is suggested for the northwest quadrant (site 8) running from the corner of Culver and VanBorn Rd northeasterly to Hanover.

Due to driveway and street entries near site 9, a noise wall outside the service drive is not considered feasible. Placement of a noise wall between the service drive and M 39 at site 9 would be ineffective due to the service drive noise levels. Therefore, no noise abatement walls are proposed in this area.

In the James Cunningham Park area (site 13) a 12-ft high noise wall from the railroad fill to south of the Reeck Drain would be required to lower the design year noise level to the FHWA L_{10} 70 dbA level.

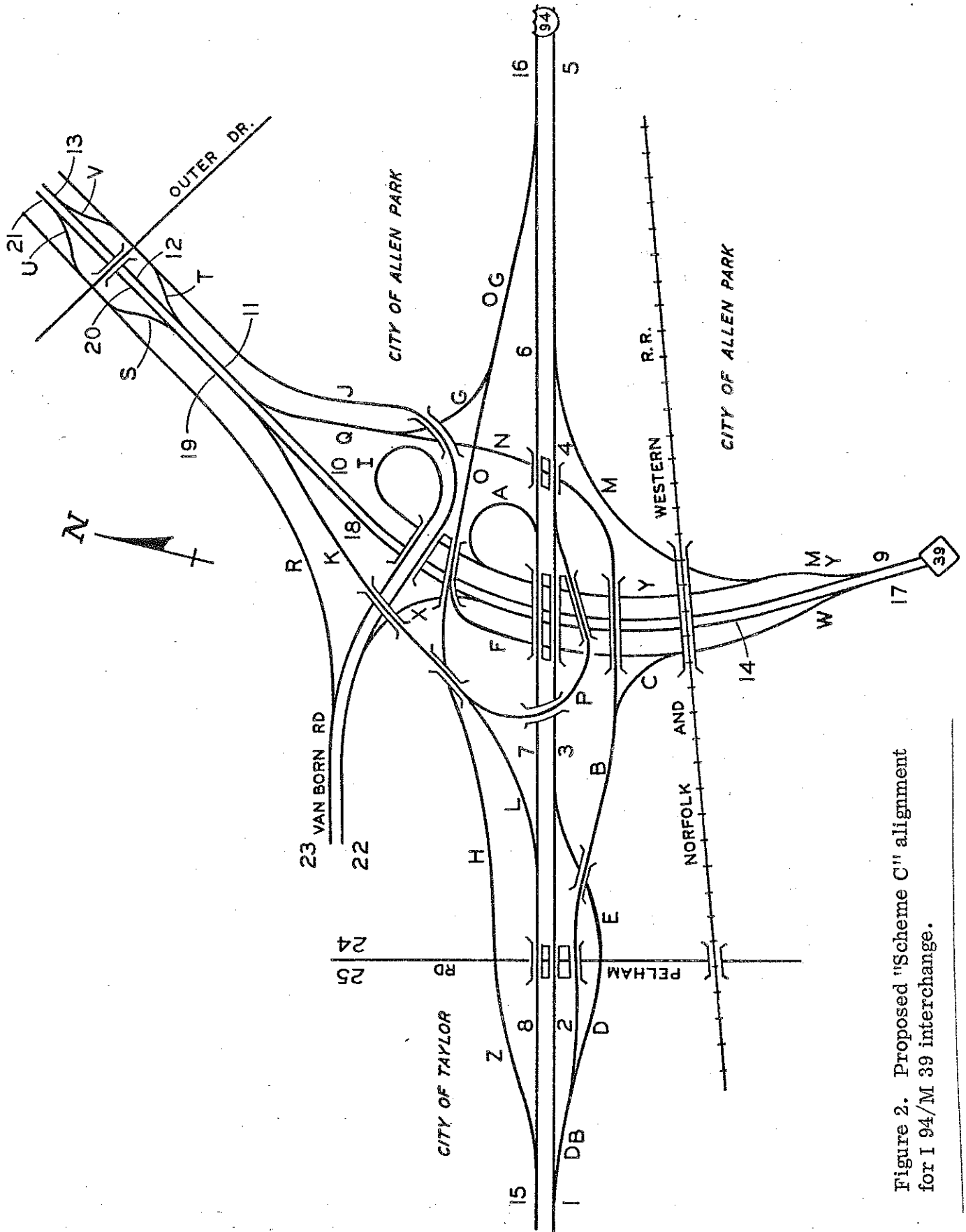










Figure 2. Proposed "Scheme C" alignment for I 94/M 39 interchange.

EXISTING LAND USE

-  SINGLE FAMILY RESIDENTIAL
-  MULTIPLE FAMILY RESIDENTIAL
-  COMMERCIAL & PARKING
-  INDUSTRIAL
-  PUBLIC
-  SEMI-PUBLIC
-  VACANT
-  CITY LIMITS

① Field noise measurement and computer noise prediction site.

..... Proposed noise barriers.

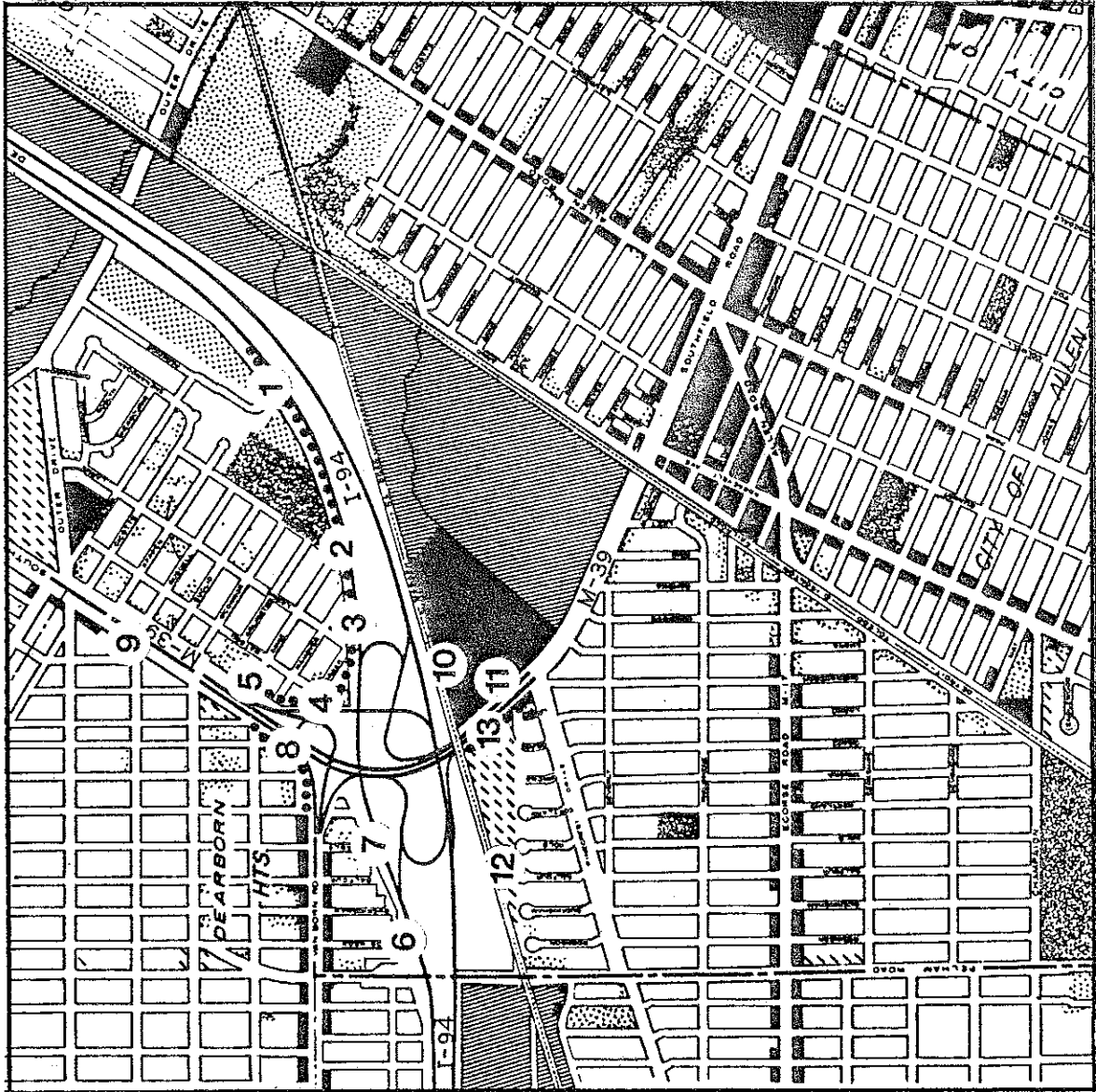


Figure 3. Existing land use and site locations for noise level predictions and measurements.

TABLE 1
I 94/M 39 INTERCHANGE, TRAFFIC PARAMETERS FOR THE
YEAR 2000 ON THE EXISTING SYSTEM (SEE FIG. 1)

| Link | Design Hourly Volume (DHV) | | | | Level of Service C | | | |
|------|----------------------------|--------------------|------------------|------------|--------------------|--------------------|------------------|------------|
| | Directional | Percent Commercial | Commercial Speed | Auto Speed | Volume | Percent Commercial | Commercial Speed | Auto Speed |
| 1 | 5800 | 6 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 2 | 820 | 4 | 30 | 35 | 1350 | 3 | 25 | 30 |
| 3 | 5150 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 4 | 1000 | 4 | 20 | 25 | 1350 | 3.5 | 20 | 25 |
| 5 | 5750 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 6 | 1700 | 4.5 | 30 | 35 | 2700 | 3.5 | 25 | 30 |
| 7 | 4360 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 8 | 640 | 4.5 | 30 | 35 | 1350 | 3.5 | 25 | 30 |
| 9 | 4960 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 10 | 4960 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 11 | 820 | 4 | 20 | 25 | 1350 | 3 | 15 | 20 |
| 12 | 5650 | 6 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 13 | 1510 | 4.5 | 25 | 30 | 1350 | 4.5 | 25 | 30 |
| 14 | 4200 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 15 | 1700 | 4.5 | 25 | 30 | 1350 | 5 | 30 | 35 |
| 16 | 5800 | 6 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 17 | 4800 | 2 | 30 | 35 | 2800 | 2.5 | 35 | 40 |
| 18 | 1070 | 4 | 20 | 25 | 1350 | 3.5 | 15 | 20 |
| 19 | 3730 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 20 | 380 | 5 | 20 | 25 | 1350 | 4 | 15 | 20 |
| 21 | 1420 | 3.5 | 25 | 30 | 1350 | 3.5 | 25 | 30 |
| 22 | 3100 | 2.5 | 20 | 25 | 1400 | 3.5 | 25 | 30 |
| 23 | 3350 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 24 | 520 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| 25 | 3600 | 2.5 | 20 | 25 | 1400 | 3.5 | 25 | 30 |
| 26 | 2900 | 3.5 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 27 | 1900 | 2.5 | 20 | 25 | 1350 | 3 | 25 | 30 |
| 28 | 4500 | 3 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 29 | 850 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| 30 | 5300 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 31 | 5600 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 32 | 1050 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| 33 | 4600 | 3 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 34 | 750 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| 35 | 5200 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 36 | 400 | 4 | 30 | 35 | 1400 | 3.5 | 25 | 30 |
| 37 | 1200 | 3 | 25 | 30 | 1350 | 3 | 25 | 30 |
| 38 | 1420 | 3.5 | 25 | 30 | 1400 | 3.5 | 25 | 30 |
| 39 | 4100 | 3 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 40 | 1740 | 3.5 | 20 | 25 | 1350 | 4 | 25 | 30 |
| 41 | 5700 | 2 | 35 | 40 | 4350 | 2.5 | 40 | 45 |
| 42 | 2300 | 4.5 | 25 | 30 | 2700 | 4 | 25 | 30 |
| 43 | 4000 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 44 | 4800 | 2 | 30 | 35 | 2800 | 2.5 | 35 | 40 |
| 45 | 2550 | 3 | 25 | 30 | 1400 | 4 | 30 | 35 |
| 46 | 3000 | 3 | 25 | 30 | 1400 | 4 | 30 | 35 |
| 47 | 2350 | 3 | 15 | 20 | 1400 | 4 | 20 | 25 |
| 48 | 2100 | 3 | 15 | 20 | 1400 | 4 | 20 | 25 |

TABLE 2
I 94/M 39 INTERCHANGE, TRAFFIC PARAMETERS FOR THE
YEAR 2000 ON PROPOSED RECONSTRUCTION (SEE FIG. 2)

| Link | Design Hourly Volume (DHV) | | | | Level of Service C | | | |
|------|----------------------------|--------------------|------------------|------------|--------------------|--------------------|------------------|------------|
| | Directional | Percent Commercial | Commercial Speed | Auto Speed | Volume | Percent Commercial | Commercial Speed | Auto Speed |
| A | 820 | 4 | 20 | 25 | 1350 | 3 | 15 | 20 |
| B | 2160 | 4.5 | 35 | 40 | 2700 | 4 | 30 | 35 |
| C | 820 | 4 | 30 | 35 | 1350 | 3 | 25 | 30 |
| D | 400 | 6 | 35 | 40 | 1350 | 5 | 30 | 35 |
| E | 470 | 4.5 | 35 | 40 | 1350 | 3.5 | 30 | 35 |
| F | 640 | 4.5 | 30 | 35 | 1350 | 3.5 | 25 | 30 |
| G | 460 | 4.5 | 30 | 35 | 1350 | 3.5 | 25 | 30 |
| H | 470 | 4.5 | 35 | 40 | 1350 | 3.5 | 30 | 35 |
| I | 380 | 5 | 20 | 25 | 1350 | 4 | 15 | 20 |
| J | 1420 | 3.5 | 25 | 30 | 1400 | 3.5 | 25 | 30 |
| K | 1820 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| L | 1650 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| M | 640 | 4.5 | 30 | 35 | 1350 | 3.5 | 25 | 30 |
| N | 1650 | 4.5 | 30 | 35 | 2700 | 3.5 | 25 | 30 |
| O | 1070 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| P | 460 | 4.5 | 25 | 30 | 1350 | 3.5 | 20 | 25 |
| Q | 1820 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| R | 1420 | 3.5 | 25 | 30 | 1400 | 3.5 | 25 | 30 |
| S | 750 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| T | 750 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| U | 1050 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| V | 1050 | 2.5 | 30 | 35 | 1350 | 2 | 25 | 30 |
| W | 1250 | 4 | 35 | 40 | 2700 | 3 | 30 | 35 |
| X | 380 | 5 | 30 | 35 | 1350 | 4 | 25 | 30 |
| Y | 1200 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| Z | 400 | 6 | 35 | 40 | 1350 | 5 | 30 | 35 |
| DB | 2440 | 4.5 | 35 | 40 | 2700 | 4 | 30 | 35 |
| MY | 1540 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| OG | 1510 | 4.5 | 35 | 40 | 2700 | 3.5 | 30 | 35 |
| 1 | 5800 | 6 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 2 | 3520 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 3 | 3940 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 4 | 4360 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 5 | 4960 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 6 | 3520 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 7 | 4200 | 7 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 8 | 5580 | 6.5 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 9 | 4800 | 2 | 30 | 35 | 2800 | 2.5 | 35 | 40 |
| 10 | 3350 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 11 | 5100 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 12 | 4400 | 3 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 13 | 5400 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 14 | 3660 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 15 | 5800 | 6 | 35 | 40 | 4350 | 7 | 40 | 45 |
| 16 | 4960 | 6.5 | 40 | 45 | 4350 | 7 | 40 | 45 |
| 17 | 4800 | 2 | 30 | 35 | 2800 | 2.5 | 35 | 40 |
| 18 | 3350 | 2 | 40 | 45 | 4350 | 2 | 40 | 45 |
| 19 | 5100 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 20 | 4400 | 3 | 40 | 45 | 4350 | 3 | 40 | 45 |
| 21 | 5400 | 2.5 | 35 | 40 | 4350 | 3 | 40 | 45 |
| 22 | 1650 | 4 | 30 | 35 | 1400 | 4 | 30 | 35 |
| 23 | 1650 | 4 | 30 | 35 | 1400 | 4 | 30 | 35 |
| 24 | 1580 | 4 | 20 | 25 | 1400 | 4 | 20 | 25 |
| 25 | 1580 | 4 | 20 | 25 | 1400 | 4 | 20 | 25 |

TABLE 3
MEASURED AND PREDICTED NOISE LEVELS

| Area Number and Location | Design Level and Land Use Category | 1978 Measured Noise Level (L10 dbA) | Year 2000 Predicted Noise Level (L10 dbA) | | Year 2000 Predicted Noise Level Scheme C With Barrier* | | | |
|---|------------------------------------|-------------------------------------|---|--------------------|--|---------------|---------------|---------------|
| | | | Existing Alignment | Scheme C Alignment | 10-ft Barrier | 11-ft Barrier | 13-ft Barrier | 14-ft Barrier |
| | | | | | | | | |
| 1. Sta. 170 WB I 94 | 70 (B) | 80 | 80 | 80 | -- | -- | 70 | -- |
| 2. Shenandoah and Anne at Right-of-Way | 70 (B) | 77 | 79 | 74 | -- | 69 | -- | -- |
| 3. Horger and Larne at Right-of-way | 70 (B) | 75 | 79 | 71 | 70 | -- | -- | -- |
| 4. Northwest Corner Watson and Horger | 70 (B) | 66 | 74 | 76 | -- | -- | -- | 69 |
| 5. Anne and NB Service Rd | 70 (B) | 76 | 79 | 80 | -- | 70 | -- | -- |
| 6. Robinson and Avalon at Right-of-Way | 70 (B) | 70 | 74 | 71 | -- | -- | -- | -- |
| 7. Kolb Ave at Right-of-Way | 70 (B) | 71 | 78 | 71 | -- | -- | -- | -- |
| 8. Croissant Ave at Right-of-Way | 70 (B) | 70 | 78 | 79 | -- | 70 | -- | -- |
| 9. Eton at SB Service Rd | 70 (B) | 72 | 78 | 82 | -- | -- | -- | -- |
| 10. Sta. 15 at NB M 39 | 75 (C) | 74 | 76 | 78 | -- | -- | -- | -- |
| 11. Sta. 139 EB I 94 | 75 (C) | 76 | 74 | 72 | -- | -- | -- | -- |
| 12. Sta. 124 EB I 94 (J. Cunningham Park) | 70 (B) | 68 | 71 | 70 | -- | -- | -- | -- |
| 13. Sta. 19 SB M 39 (J. Cunningham Park) | 70 (B) | 75 | 78 | 80 | 69 | -- | -- | -- |

* Barrier heights referenced to ground elevation at right-of-way.