

OFFICE MEMORANDUM



MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

960
April 28, 1975

To: G. J. McCarthy
Deputy Director - Highways

From: K. A. Allemeier

Subject: Response to I 75 City of Taylor Noise Complaint.
Research Project 73 TI-191, 74 NI-1. Research Report No. R-960.

Problem:

In a City of Taylor resolution dated August 19, 1974, resulting from a petition by the residents in the area of Eureka Rd and I 75, the City Council agreed that these residents are being subjected to unusually high noise levels from I 75 traffic. Both city government and residents requested that the Department construct suitable barriers to reduce the noise from I 75 traffic.

The resolution was brought to the Department's attention by Alfred A. Sheridan, 29th District State Representative, and also by H. B. LaFrance of the Metro District.

Alternative Department Responses

The alternatives presented below assume the City of Taylor to be in full compliance with all requirements of the "Bureau of Highways Guidelines for Noise Barriers."

1. Take no action. The controlling federal regulation, FHPM 7-7-3, designates projects such as this as "optional applications" to the Department. In this alternative we would choose not to treat the subject area.
2. Place in Department's program for some remote future year with other Priority No. 2 projects — in effect, an indefinite postponement.
3. Postpone any decision until after completion of the presently on-going statewide noise level inventory. Then, at that time, program the job in accordance with its priority as determined by the inventory — this would defer the decision for at least one year.
4. Erect a barrier along the west side of I 75 at a cost of approximately \$200,000.
5. Erect barriers along both west and east sides of I 75 at a cost of ap-

proximately \$419,000. (This alternative, although feasible, is not in full accord with Department Noise Barrier Guidelines as the R-value for the east side barrier would be less than 2.0.)

Recommendation

Any noise abatement action at the subject Taylor site, by the Department, is optional. The projects' dates of planning and construction are such as to preclude any obligatory compliance with the Federal Noise Standards (FHPM 7-7-3). The conditions and noise levels in the area, however, lead to the following recommendation (Alternative No. 4):

Erect a 12-ft high, 2,000-ft long noise barrier along the west side of I 75, in the City of Taylor. This structure would reduce the L_{10} traffic noise levels in the adjacent residential area from the present 77 -- 78 dbA to a more acceptable 70 dbA.

Fiscal Effects

The 12-ft high barrier recommended is estimated to cost approximately \$100 per foot for a total outlay of \$200,000.

Background

This noise study and analysis covers Interstate Freeway I 75 in the City of Taylor in Wayne County. It was initiated as a direct result of the "Resolution of the City of Taylor" (Appendix A) petitioning for barriers to reduce the noise levels from I 75. The main areas of concern are the residential properties along I 75 between Eureka Rd and Allen Rd. Study and analysis was conducted in accordance with the "Bureau of Highways Guidelines for Highway Noise Barriers" (Appendix B).

The applicable Federal Highway Noise Standards were first promulgated as Federal Highway Administration Policy and Procedure Memorandum 90-2 on February 8, 1973, and more recently in an expanded draft revision as FHPM 7-7-3 on August 1, 1974. Since this section of I 75 was in service prior to the existence of the noise standards (opened to traffic in 1966) it is not mandatory that noise abatement measures now be built into the project.

The Department is aware, however, that the potential impact of I 75 traffic noise may justify abatement procedures. Because of this possibility a voluntary application of the Federal noise standards is being explored so that FHWA financial participation can be obtained, should such an application be deemed appropriate.

As directed by the "Bureau of Highways Guidelines for Highway Noise Barriers," a preliminary noise analysis of the subject area has been completed. Paragraph A.3 Section IV of the "Guidelines for Developed Lands,"

requires that the local government furnish the Department with documentation of its existing future land use controls. These controls should be such as to reasonably preclude the necessity for noise barriers in the highway rights-of-way adjacent to that community's future developments. So far, this item has not been satisfied.

Discussion:

Estimates of the current (1973) and future (1990) design hourly volume (DHV), level of service C, and sound sensitive hours (9 p.m. through 12 midnight) traffic were provided by the Surveys and Analysis Division of the Bureau of Transportation Planning (Table 1). The appropriate vehicle volumes and speeds for noise predictions were selected in accordance with FHPM 7-7-3 and are delineated in Table 1.

The required physical dimensions for the noise predictions were taken from the construction plans (Control Section 82191E, C17, sheets 3-14, stations 570 to 635), from 1970 aerial photographs (CZL-125) and from field investigations.

In the main, the land uses along I 75 in Taylor are undeveloped (Category D) and residential (Category B) between Allen Rd (east city limits) and Eureka Rd, with scattered commercial (Category C) along Eureka, and undeveloped (Category D) between Eureka Rd and Pennsylvania Rd (south city limits). The applicable land uses in accordance with Federal Noise Standards (FHPM 7-7-3) are shown in Figure 1. Photographs 1 through 4 indicate the general appearance of the area.

I 75 was originally located through a Taylor subdivision. Subsequent to the freeway construction an apartment complex has been constructed on the east side south of Allen Rd.

Predictions of the existing (1973) and future (1990) noise levels were made utilizing the method of MDSHT Research Report No. R-890, "Traffic Noise Level Predictor Computer Program" (Version No. 7, August 1, 1974). Table 2 is a tabulation of the existing and future predicted L_{10} noise levels and present (1974) measured ambient L_{10} noise levels.

In the residential areas along I 75, between Eureka Rd and Allen Rd, the existing (1973) predicted noise levels at the right-of-way are 75 to 80 dbA and 76 to 80 dbA for the future (1990). During the sound sensitive hours (S.S.H.) of 9:00 p.m. to 12:00 midnight the levels are 74 to 78 dbA and 75 to 80 dbA, respectively. These levels are all significantly higher than the 70 dbA set by the FHPM 7-7-3 Federal Noise Standard as the limit for Category B residential land use. The 70 dbA noise contour lines for existing and future years are shown in Figure 2.

For the commercial area nearest I 75 (Station 587, west of I 75) the existing and future predicted L_{10} noise level is 75 dbA at the right-of-way and 72 dbA at the building. This noise level does not exceed the Draft FHPM 7-7-3 design noise level for commercial land use (Category C, 75 dbA).

The predicted L_{10} noise levels for the undeveloped land areas (Category D) within the area covered by this report are also listed in Table 2. There is no design noise level for this land use category; however, local government units should be made aware of these noise levels to aid them in preventing future incompatible land development.

On the west side of I 75, the impacted residential area would receive 1973 sound sensitive hour L_{10} values of 77 to 78 dbA. The barrier required to reduce these noise levels to 70 dbA would be 12 ft high and 2,000 ft long, and have an estimated cost of \$200,000. The real estate to be protected has been appraised at \$440,000. The resulting R-value of 2.2 ($440,000 \div 200,000$) for 77 to 78 dbA constitutes a Priority 2 in the Departments Barrier Guidelines (Fig. 3).

A condominium complex has recently been constructed along the east side of I 75 in the area between the DI&T Railroad and Allen Rd (condos are not shown on the attached Figure 2 photo). In determining the R-value for the entire area of concern east of I 75, the value of this complex has appropriately been omitted because of the roadway's earlier completion. Also appropriately omitted in the calculation is any length of barrier to protect the area.

Should the decision be made to include the condominiums in the R-value determination, without regard to any dates of planning or construction, and also include the length of barrier required to protect them, the situation is significantly altered. Assuming that a practical barrier wall could only protect the lower story of the condominium, and therefore only including the value of that story in the calculations, it is found that the R-value for the area along the east side of I 75 becomes 6.5 — a barrier is justified. This, however, is purely hypothetical, because the condominiums are not appropriate for inclusion in the calculation as they were built after the free-way.

The balance of the area on the east side — that appropriate for inclusion in an R-value determination — discloses the following: The area would receive 1973 S.S.H. L_{10} values of 75 to 78 dbA. A 12-ft high, 2,190-ft long barrier, with an estimated cost of \$219,000, would be required to shield the \$381,000 appraised property. The resulting R-value of 1.7 for 75 to 78 dbA falls into the "Barrier Unjustified" area of the Guideline control curve.

TESTING AND RESEARCH DIVISION



Engineer of Testing and Research

KAA:GHG:bf

cc: L. T. Oehler

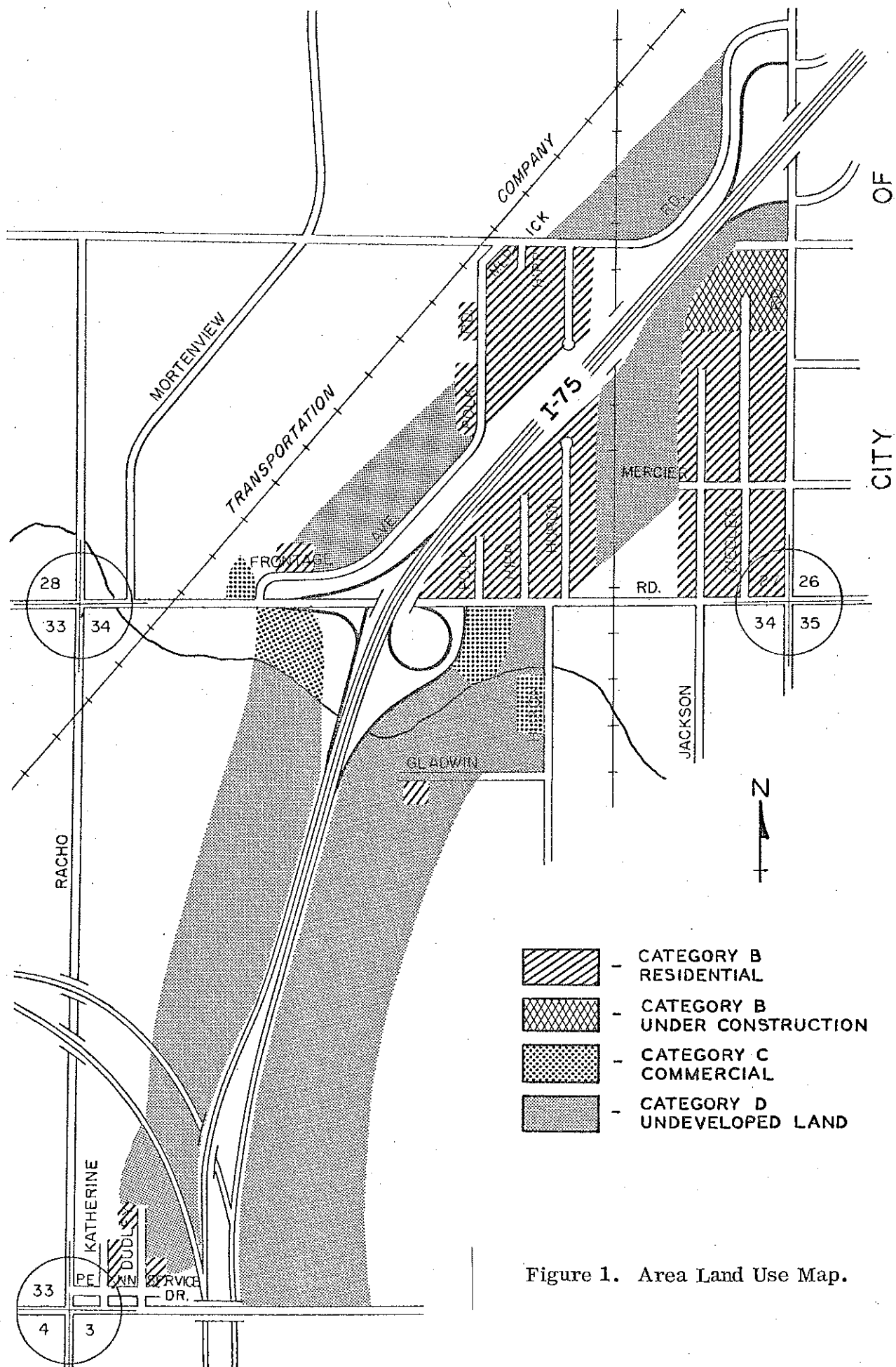


Figure 1. Area Land Use Map.

TABLE 1
 INTERSTATE HIGHWAY I 75, CITY OF TAYLOR, MICHIGAN
 TRAFFIC DATA

Item	Roadway Element											
	I 75 Allen to Eureka		I 75 Eureka to US 24 Connector		Allen Road North of I 75		Allen Road South of I 75		Eureka Road East of I 75		Eureka Road West of I 75	
	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990
Direction DHV	3,260*	3,850*	3,010*	3,680*	1,100*	1,370*	1,480*	2,050	910	2,000	960*	2,620
DHV Percent Commercial	10	10	10	10	5	5	5	5	5	5	5	5
DHV Auto Speed	55*	55*	55*	55*	40*	40*	40*	20	20	30	40*	20
DHV Truck Speed	55*	55*	55*	55*	40*	40*	40*	20	20	30	40*	20
Service C Hourly Volume	3,270	4,080	3,270	4,080	1,500	1,500	1,500	1,500*	700*	1,500*	2,000	2,000*
Service C Auto Speed	55	55	55	55	40	40	40	40*	30*	30*	40	40*
SSH Northbound Volume	1,086	1,604	752	1,143								
SSH Southbound Volume	815	1,203	752	1,143								
SSH Northbound Percent Commercial	21	21	21	21								
SSH Southbound Percent Commercial	35	35	35	35								
SSH Auto Speed	55	55	55	55								
SSH Truck Speed	55	55	55	55								

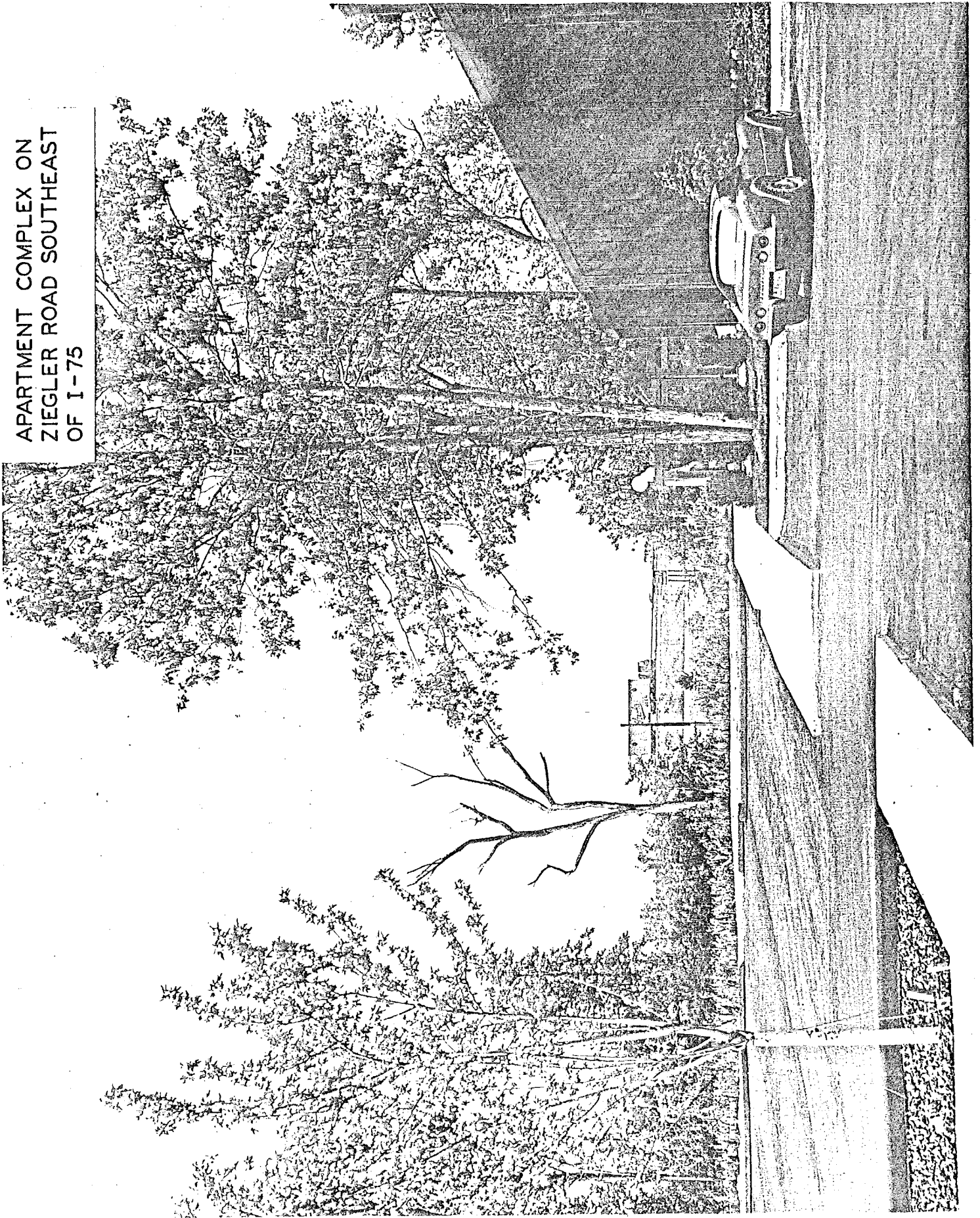
Item	I 75 at Allen Rd NB Off Ramp				I 75 at Allen Rd NB On Ramp				I 75 at Eureka Rd SB Off Ramp				I 75 at Eureka Rd SB On Ramp			
	1973		1990		1973		1990		1973		1990		1973		1990	
	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990	1973	1990
Direction DHV	230*	580*	350*	650*	720*	650*	100*	450*								
DHV Percent Commercial	5	5	5	5	5	5	5	5								
DHV Auto Speed	35*	35*	35*	35*	35*	35*	35*	35*								
DHV Truck Speed	35*	35*	35*	35*	35*	35*	35*	35*								
Service C Hourly Volume	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200								
Service C Auto Speed	35	35	35	35	35	35	35	35								
SSH Total Volume	43	110	74	128	188	186	18	84								
SSH Percent Commercial	5	5	5	5	5	5	5	5								
SSH Auto Speed	35	35	35	35	35	35	35	35								
SSH Truck Speed	35	35	35	35	35	35	35	35								

* Traffic volumes and speeds used in Draft FHPM 7-7-3 noise predictions.

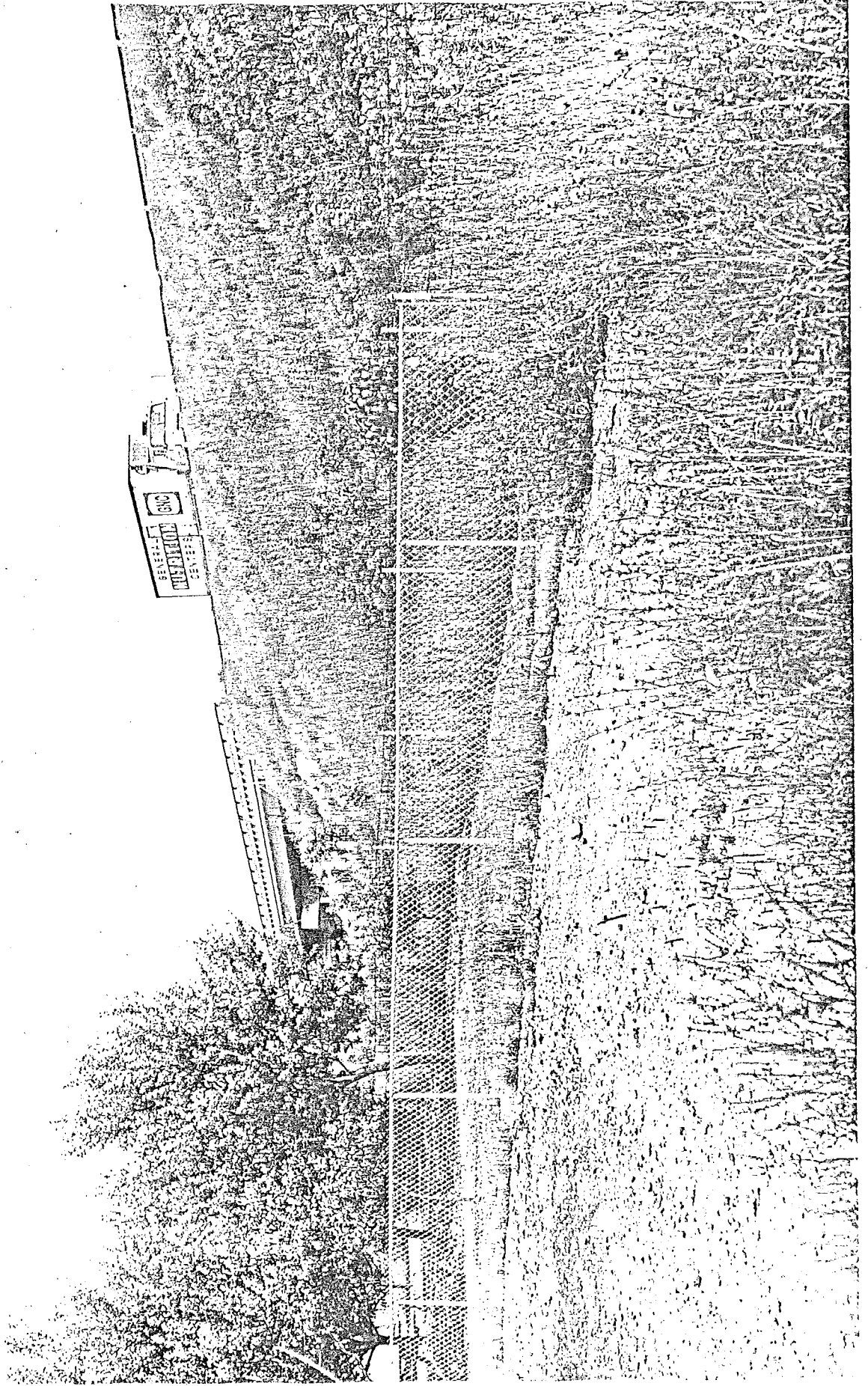
TABLE 2
 NOISE LEVEL IDENTIFICATION AND COMPARISON OF INTERSTATE HIGHWAY I 75 IN THE CITY OF TAYLOR
 (Predictions From Use of MDSHT Research Report R-890)

Area Location	FHPM 7-7-3 Category and Design Level	Measured Ambient L10 Noise Level	Predicted L10 dbA Noise Level At Right-of-Way (ft)						DN For L10 = 70 dbA							
			Without Barrier			With 12-ft. Barrier			1973			1990				
			1973		1990		1973		1990		1973		1990			
			FHPM 7-7-3	S.S.H.	FHPM 7-7-3	S.S.H.	FHPM 7-7-3	S.S.H.	FHPM 7-7-3	S.S.H.	FHPM 7-7-3	S.S.H.	FHPM 7-7-3	S.S.H.		
Station 602 East - Residential	B(70)	--	78	77	79	78	67	66	67	67	67	270	360	270	400	365
Station 608 East - Residential	B(70)	--	80	78	80	80	69	67	69	69	69	280	380	280	410	370
Station 608 West - Residential	B(70)	79	80	80	80	80	69	68	69	69	69	290	380	290	410	375
Station 615 East - Residential	B(70)	--	78	77	79	78	67	65	67	67	67	270	340	270	370	350
Station 615 West - Residential	B(70)	--	78	77	79	79	67	65	67	67	67	275	340	275	370	355
Station 619 East - Residential	B(70)	--	76	75	77	76	65	63	65	65	65	270	335	270	370	350
Station 619 West - Residential	B(70)	73	78	77	79	79	66	64	66	66	66	275	335	275	370	355
Station 622 East - Residential	B(70)	--	76	74	76	76	64	63	64	65	64	270	335	270	370	350
Station 622 West - Residential	B(70)	--	78	77	79	79	66	64	66	66	66	275	335	275	370	355
Station 630 East - Residential	B(70)	--	75	74	76	75	66	63	66	69	66	270	330	270	365	355
Station 587 West - Commercial	C(75)	--	75	--	75	--	--	--	--	--	--	---	---	---	---	---
Station 575 E & W - Undeveloped	D(--)	--	80	--	81	--	--	--	--	--	--	---	350	---	390	---
Station 602 West - Undeveloped	D(--)	--	78	--	79	--	--	--	--	--	--	---	360	---	400	---
Station 630 West - Undeveloped	D(--)	--	78	--	79	--	--	--	--	--	--	---	325	---	370	---

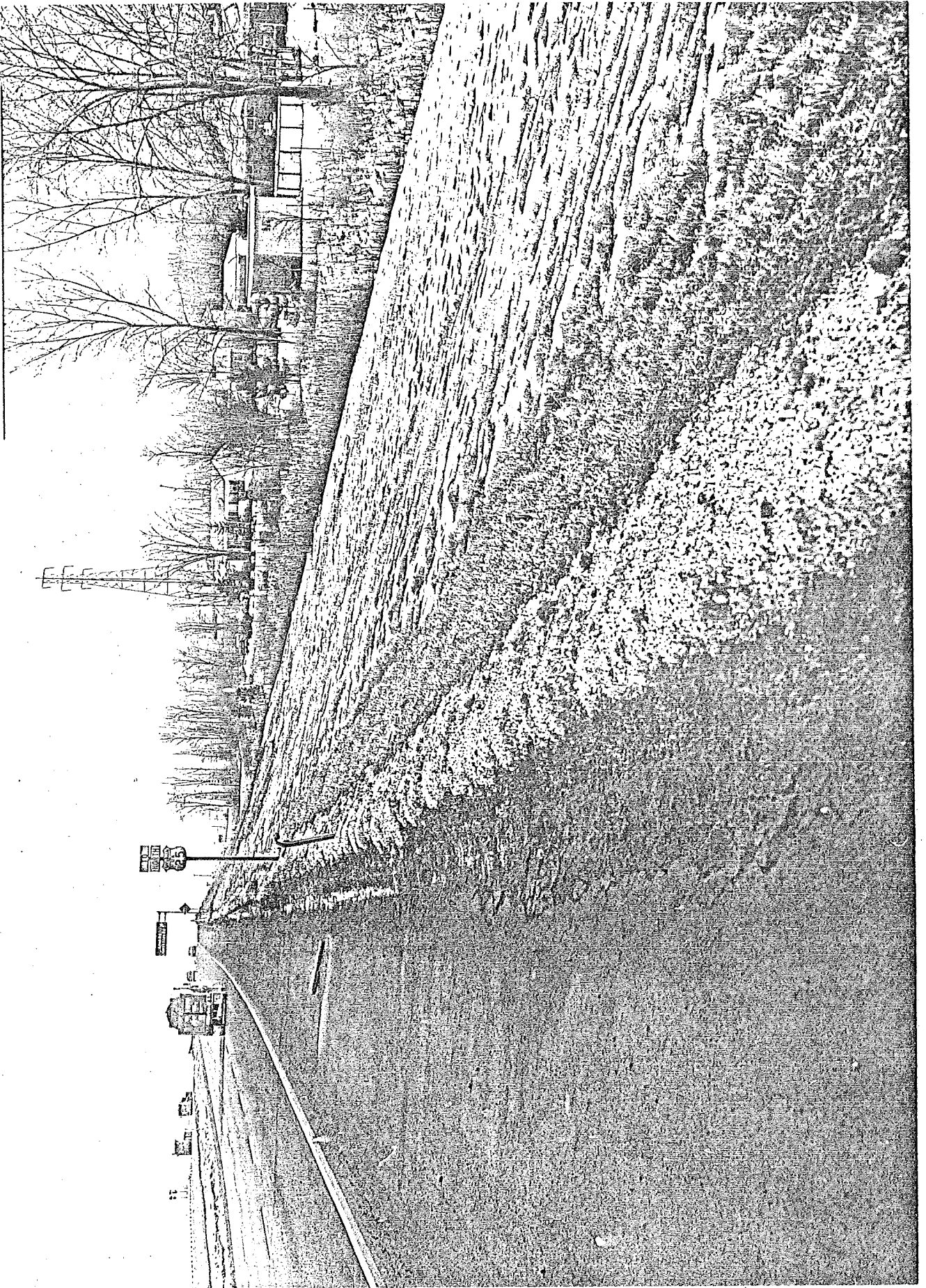
APARTMENT COMPLEX ON
ZIEGLER ROAD SOUTHEAST
OF I-75



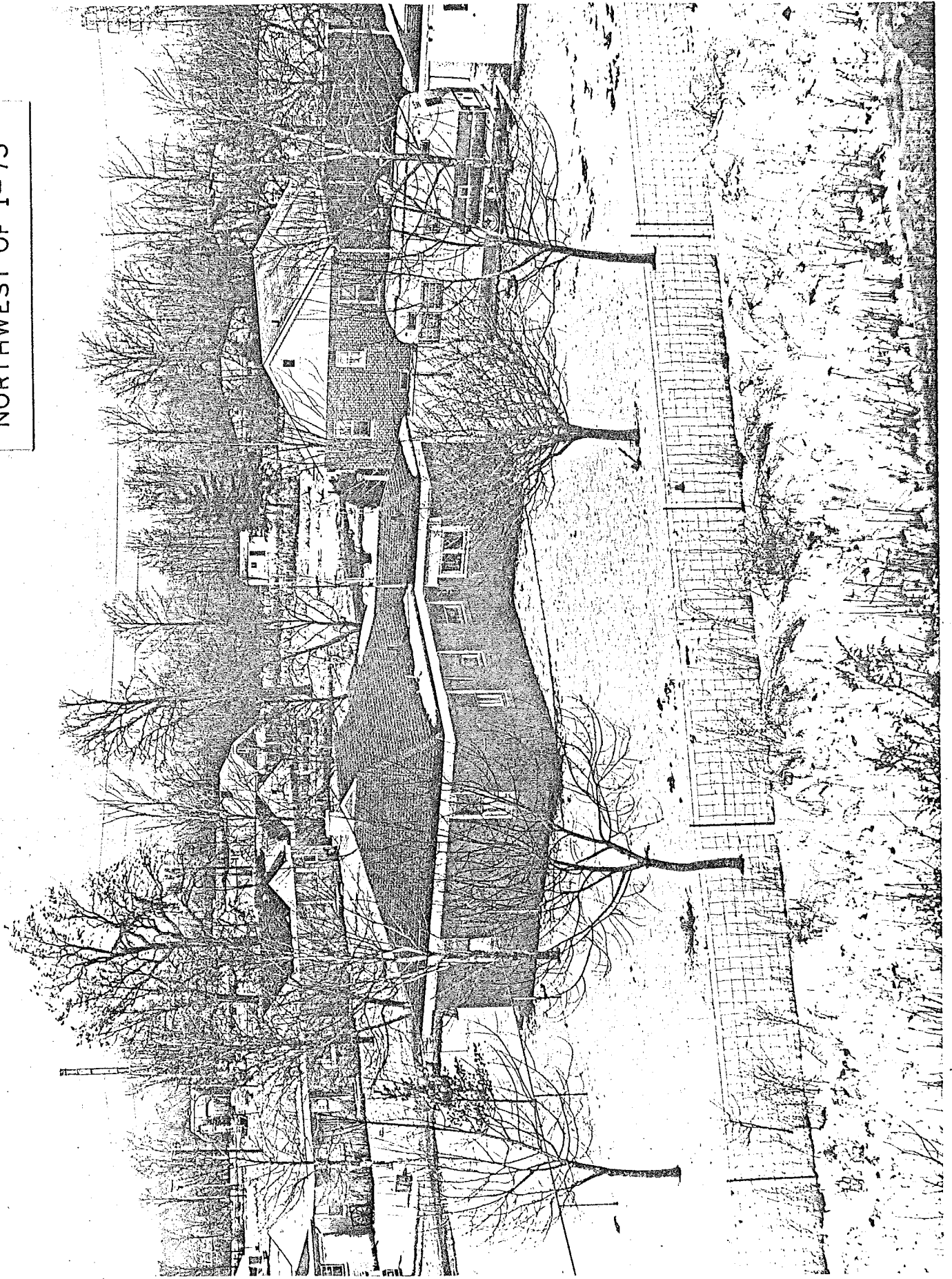
I-75 VIEWED FROM
HURON STREET,
LOOKING EAST

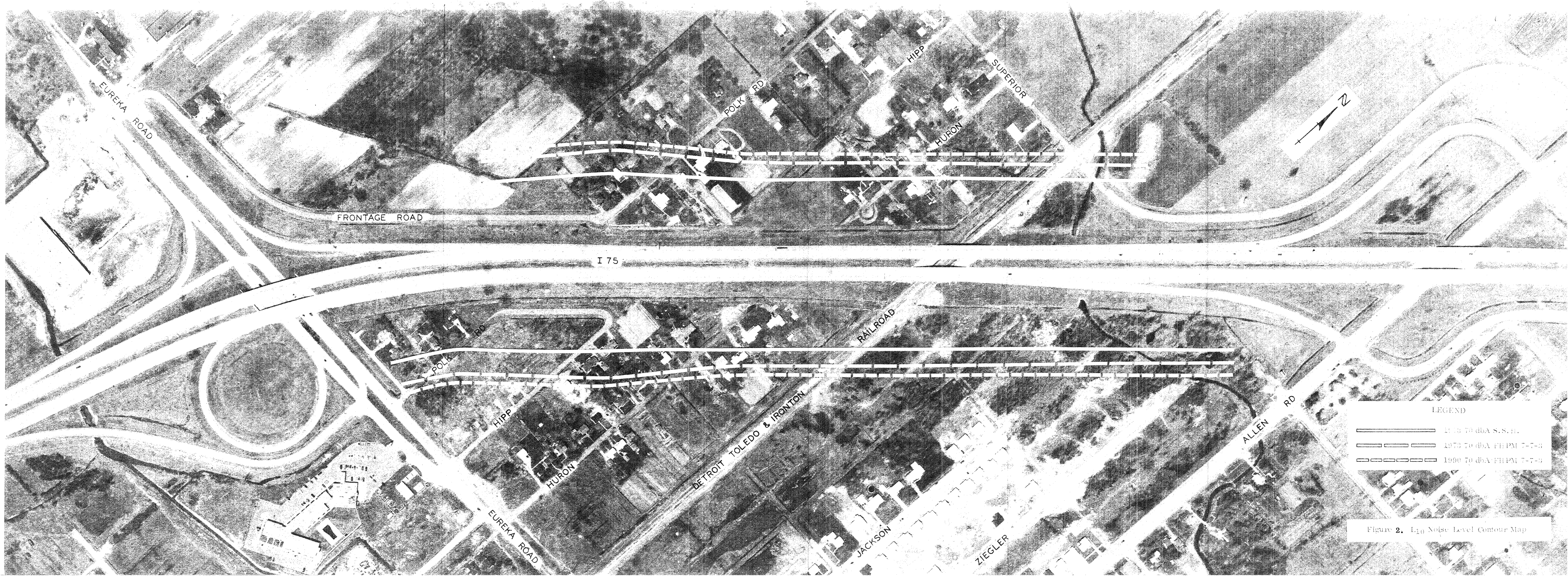


HURON STREET HOMES
SOUTHEAST OF I-75



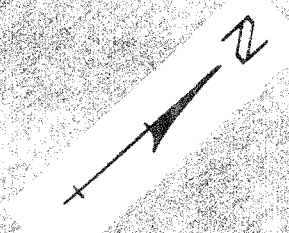
HURON STREET HOMES
NORTHWEST OF I-75





FRONTAGE ROAD

I 75




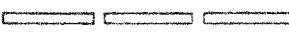
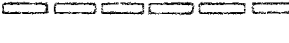
LEGEND	
	2003 70 dBA S.S.H.
	1973 70 dBA FH/PM 7-7-3
	1990 70 dBA FH/PM 7-7-3

Figure 2. I-10 Noise Level Contour Map

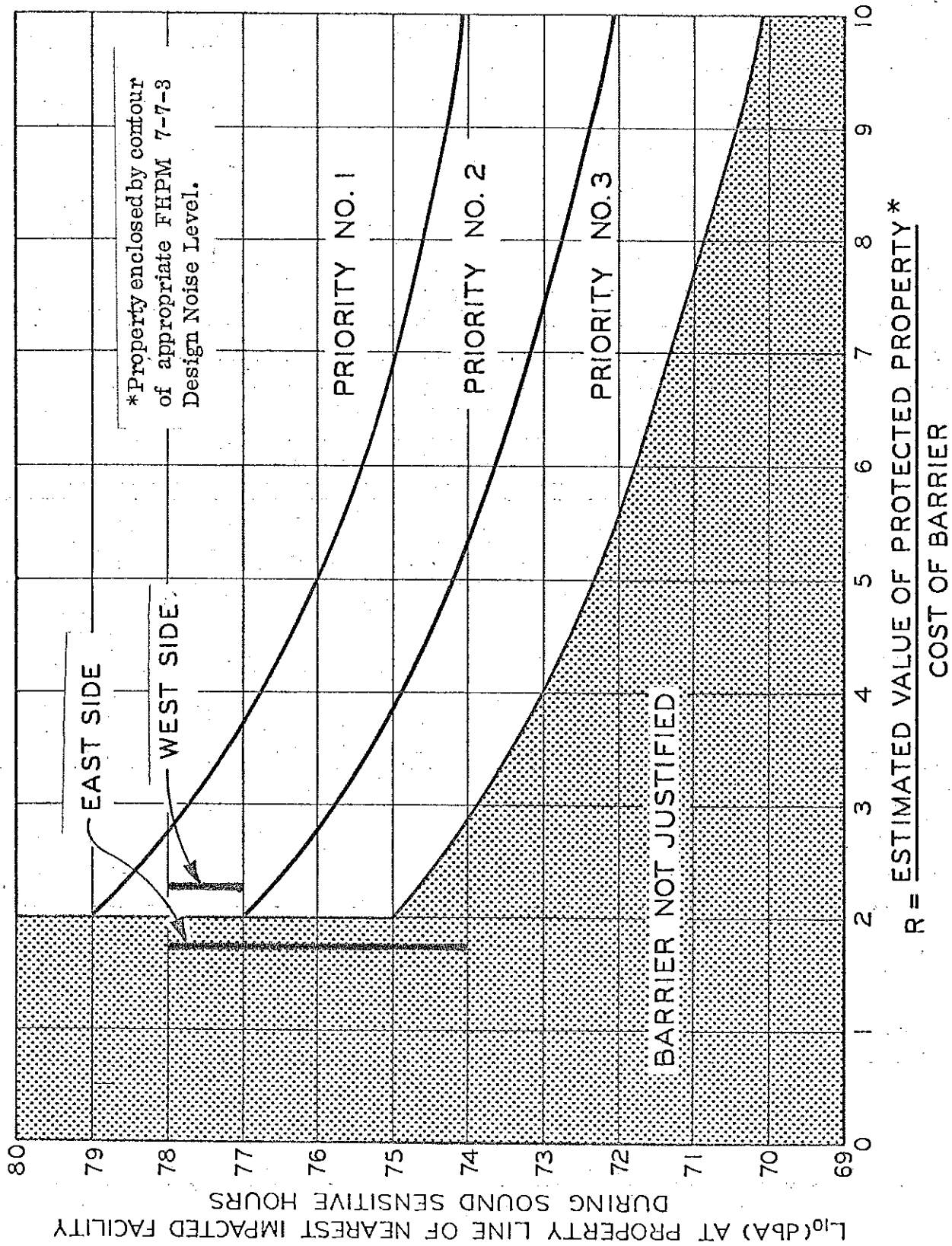


Figure 3. Priority levels for noise barrier construction.

APPENDIX A

RESOLUTION OF THE CITY OF TAYLOR

RESOLUTION

MOTION BY: Robinson

SUPPORTED BY: Zub

Resolved: Whereas, the residents in the area of Eureka and I-75 in the City of Taylor have been subjected to unusually high levels of noise created by the traffic flow on I-75 and;

Whereas, the residents of this area have petitioned the Taylor City Council and the State Highway Department for relief and;

Whereas, the Taylor City Council has reviewed this situation and does deem the noise level to be in the nature of a public nuisance;

Now Therefore Be It Resolved, that the City of Taylor join with the residents in the area of I-75 and Eureka in petitioning the Michigan State Highway Department to give immediate attention to this problem and;

Be It Further Resolved, that the City of Taylor call upon the Michigan State Highway Department to construct the necessary and suitable barriers to reduce the noise level from I-75 in this area.

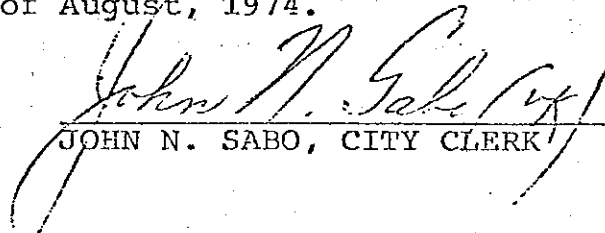
Yeas: Geiss, Scott, Robinson, Washburn, West, Zub, Olechowski

Nays: None

Motion Carried.

Resolution Number 8.607-74

I, John N. Sabo, Clerk of the City of Taylor do hereby certify that the foregoing is a true and complete copy of a resolution adopted by the Taylor City Council at the special meeting held on the nineteenth of August, 1974.


JOHN N. SABO, CITY CLERK

APPENDIX B

MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

BUREAU OF HIGHWAYS GUIDELINES FOR HIGHWAY NOISE BARRIERS

I PURPOSE:

To establish guidelines for use by the Bureau of Highways in the planning, design and construction of earth mound or wall type barriers to abate noise radiating from Michigan highways. Also, for guiding the procedures for review and issuance of construction permits for barriers within the highway right of way, to be financed and built by private interests; further to provide guidance with respect to the matter of barrier funding — public, private or shared.

The guidelines have been established to insure that consistent, appropriate and safe measures are taken with regard to noise barriers on existing highways; and that these measures are in the best public interest to achieve noise levels compatible with different land uses, with due consideration to social, economic and environmental effects. Specifically, they provide the decision maker with answers as to whether a noise barrier should be built, or permitted; if it is to be built by the Bureau what its priority should be; who should pay for it; and its design and construction details.

II APPLICABILITY

These guidelines may be applied, as appropriate, to those urban, suburban and rural FAI, FAP and FAS Michigan State trunkline projects covered by Federal Highway Administration Draft FHPM 7-7-3 (update of FHWA PPM 90-2 to include the congressional directive, with respect to noise, contained in the Federal-Aid Highway Act of 1973).

III EXCEPTIONS:

The conditions set forth here in answering the above questions will be complied with by Bureau personnel unless an exception has been authorized, in writing, by the Deputy Director, Bureau of Highways.

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12-19-74

2-4-75

4-10-75

IV CRITERIA FOR DECISION AS TO WHETHER OR NOT A PROPOSED BARRIER SHOULD BE BUILT, OR A PERMIT ISSUED:

A. DEVELOPED LANDS:

The first decision with respect to any noise problem at a developed site will be whether or not construction of a noise barrier in the highway right of way is justified. An affirmative decision requires that all of the following conditions be met.

1. For a residential area the noise problem must be brought to the Bureau's attention by the citizens affected or by an agency or organization representing their interests.
2. The request for noise abatement must be supported by a formal, local government resolution.
3. The local government must furnish the Department with documentation of its existing future land use controls, or which demonstrates or supports that government's intention to control future land development within its boundaries, so as to reasonably preclude the necessity for noise barriers in highway rights of way adjacent to such future developments.
4. A noise analysis performed in accordance with the general guidelines outlined in FHPM 7-7-3 must confirm that the noise level for the appropriate land use category is being exceeded.
5. In any FHPM 7-7-3 Category B area the 70 dbA L₁₀ limit must be exceeded during that area's sound sensitive hours (usually 9:00 p. m. to 12:00 midnight).

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6. Highway traffic noise must be the principal constituent of the area noise.

7. The relationship between barrier cost and estimated value of area to be protected, must be in accordance with Figure 1 to qualify for affirmative consideration of a noise barrier. (In general a barrier which costs more than 50 percent of the value of the area being protected, shall be deemed unjustified.)

8. In general, noise abatement projects will be programmed in accordance with the priorities of Figure 1.

9. The noise abatement benefits must be judged by the Bureau to outweigh the overall social, economic and environmental costs of the project.

10. There must be no foreseeable, future public need for the highway right of way on which the noise barrier is to be erected.

11. It must be reasonably proven that the subject noise barrier should be built on highway right of way rather than on adjacent non-highway property.

12. The standards and specifications of Section VI of this Guideline must be fully complied with.

13. The plans must be reviewed and approved by the Bureau.

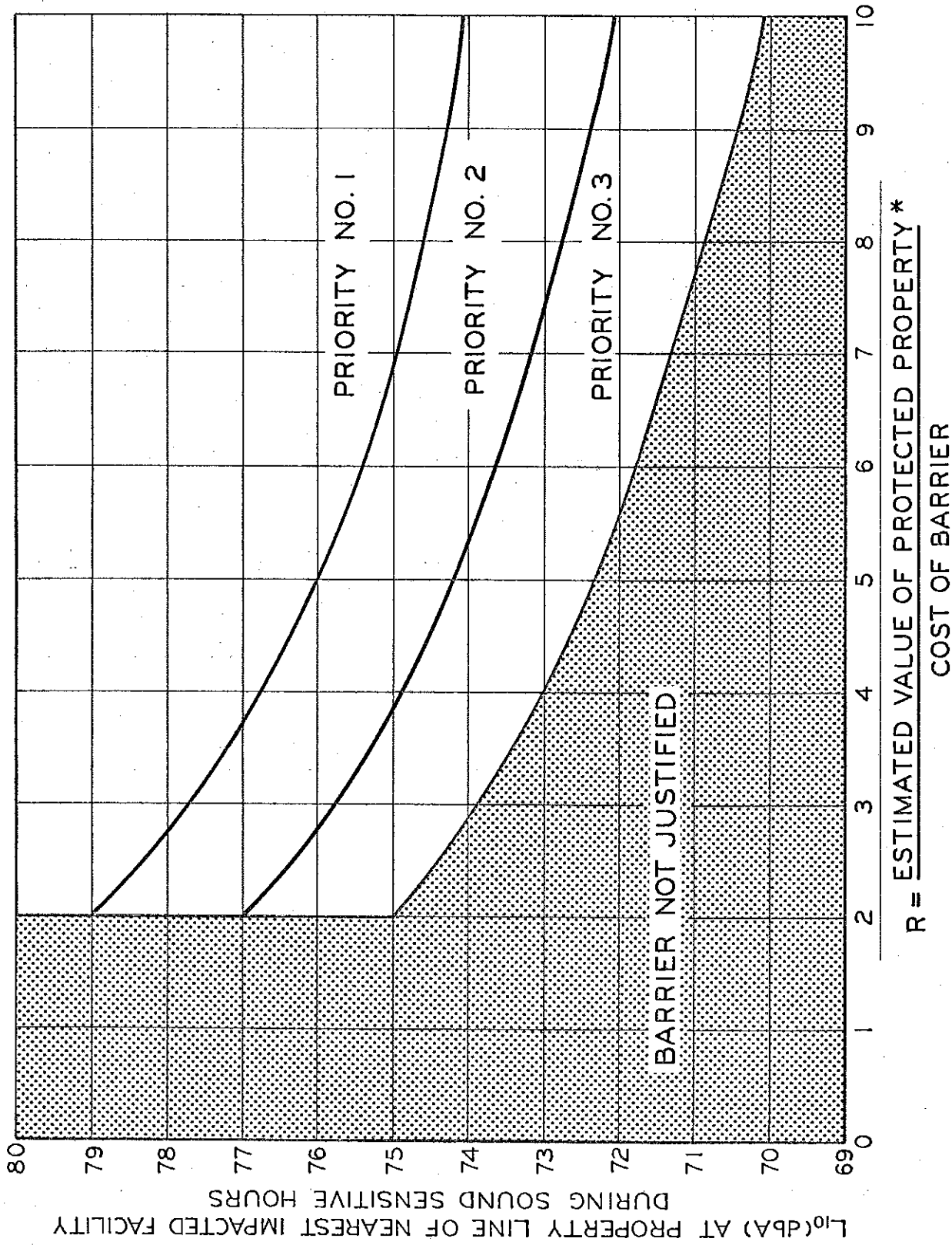
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*Property enclosed by contour of appropriate FHPM 7-7-3 Design Noise Level.

Figure 1

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- 12-4-74
- 12-19-74
- 2-4-75
- 4-10-75

B. UNDEVELOPED LANDS:

To justify, approve or permit erection of a noise barrier in the highway right of way adjacent to undeveloped lands shall require that the following conditions be met.

1. No prudent or feasible alternatives to such erection exist.
2. The local government unit must approve placement of the barrier in the highway right of way.
3. The barrier will be non-Departmentally funded.
4. Items 3, 4, 5, 6, 7, 9, 10, 12, and 13 of Section IV also apply.
5. The barrier must be maintenance free (vegetation covered earth mound would qualify), and wall-types will not be permitted.

V FUNDING NOISE BARRIERS

Funding for noise barriers will be arranged by the Department, or will be the responsibility of the affected property owners. When arranged by the Department it will include: (1) city participation as indicated by resolution and as required by state statute, (2) Federal Highway Administration participation as applicable and (3) Department participation as applicable. The source of funds will be determined as follows:

- A. If the impacted facility existed prior to the road project location approval, the Department will arrange funding.
- B. If the facility proposed for noise barrier protection was developed after the roadway, but it can be demonstrated that highway noise has increased by 10 dbA, or more, since the facility's construction then the Department will arrange funding. (This assumes that at the time of impacted facility construction the subject highway was completely open and had been open sufficiently long for traffic to stabilize.)
- C. If neither A nor B above apply, funding will be a responsibility of the property owners.

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VI BARRIER CONSTRUCTION AND PERFORMANCE SPECIFICATIONS.

For purposes of safety, economy, esthetics and effective noise abatement any noise barrier constructed by the Bureau or permitted by the Department to be constructed by others, within the right-of-way or on excess property, will meet the following requirements:

- A. A minimum decrease in the L_{10} noise level of 6 dbA must be achieved at the protected human activity facility nearest the barrier.
- B. An earth mound, if constructed, shall blend with existing slopes and shall provide for continued proper drainage. A sound barrier wall, whether constructed on top of an earth mound, or in lieu of an earth mound, may be no closer than 30 ft from the edge of pavement. Also, the toe of any earth mound may not be closer than 30 ft from the edge of pavement.
- C. The front slope of an earth mound having its toe 50 ft or less from the edge of pavement, may be no steeper than 1 on 3. This slope may be increased to 1 on 2 if the beginning of the mound is 50 ft or more from the edge of pavement. The back slope of the mound may be 1 on 2 or any slope that will stand if it is outside the right-of-way.
- D. Slopes steeper than 1 on 2 must be sodded.
- E. Erosion control and turf establishment shall be in accordance with the Standard Specifications and current special provisions.
- F. If the right-of-way fence must be removed and replaced, it shall be replaced in a condition equal to the existing fence; and shall be installed at the right-of-way line. If excess property owned by the Department is involved, the fence shall be installed at either the foot of the slope on the property owner side or, at the far side of the excess property line, whichever is closest to the roadway. (There could be cases where adjacent excess property, by itself, is sufficient to accomodate the earth fill.)
- G. Construction of any earth mound within the right-of-way must be completed within six (6) months after start of construction.
- H. Construction of any barrier shall not obstruct existing drainage, unless alternate drainage is provided. Adequate precaution shall be taken to prevent sediment from entering adjacent watercourses. Sediment must be removed from the road ditch at the conclusion of construction of the barrier.
- I. Any slopes damaged during the course of barrier construction shall be smoothed and restored and the entire highway facility shall be restored to pre-barrier construction condition.
- J. Where existing utilities must be adjusted or relocated due to noise barrier construction the work shall be coordinated with the affected utilities.

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4-10-75

12-19-74