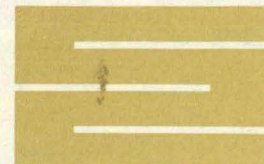


NOISE STUDY
MIDDLE ROAD
BETTENDORF, IOWA

CITY PROJECT 73.8

STATE PROJECT M-5004 (401)--81-82





STANLEY CONSULTANTS, INC

March 29, 1974

STANLEY BUILDING
MUSCATINE, IOWA 52761
TELEPHONE : 319/263-9494
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TELEX : 468402

Raymond L. Holland, P.E.
City Engineer
Bettendorf City Hall
Bettendorf, Iowa 52722

Dear Mr. Holland:

Re: Bettendorf, Iowa
Scott County
M 5004(401)--81-82
Middle Road Noise Survey and Report

We are pleased to submit our report on "The Noise Study for Middle Road" for your use in the preparation of the Environmental Impact Statement for this project.

This report has been prepared in accordance with the requirements of the agreement approved September 10, 1973.

Sincerely,

STANLEY CONSULTANTS, INC.

Paul C. Sandy
Paul C. Sandy, P.E.

PCS:ljf:6134

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Introduction

The City of Bettendorf, Iowa, is proposing to widen Middle Road from the I-74 interchange to a point approximately 700 feet east of the Belmont Road intersection. This improvement is being implemented under the Federal Aid Metropolitan Program. The City Project No. is 73.8 and State Project is M-5004 (401)--⁸¹~~47~~-82.

One of the Federal requirements for such an improvement is to conduct a noise study according to procedures set forth in the Department of Transportation's Policy and Procedure Memorandum 90-2 dated February 8, 1973. This report is submitted to fulfill the above requirements.

Background Information

The proposed improvements include the widening of Middle Road with the pavement section being 49 feet back-to-back of curbs. Horizontal and vertical alignments will remain as presently established except Belmont Road which will be relocated establishing a 90 degree intersection with Middle Road.

The design year chosen is 1995. Preliminary forecasted traffic for that year has been provided by the Iowa State Highway Commission and the Bi-State Metropolitan Planning Commission. The Highway Commission advises that the forecasted volumes are extremely preliminary and are subject to change.

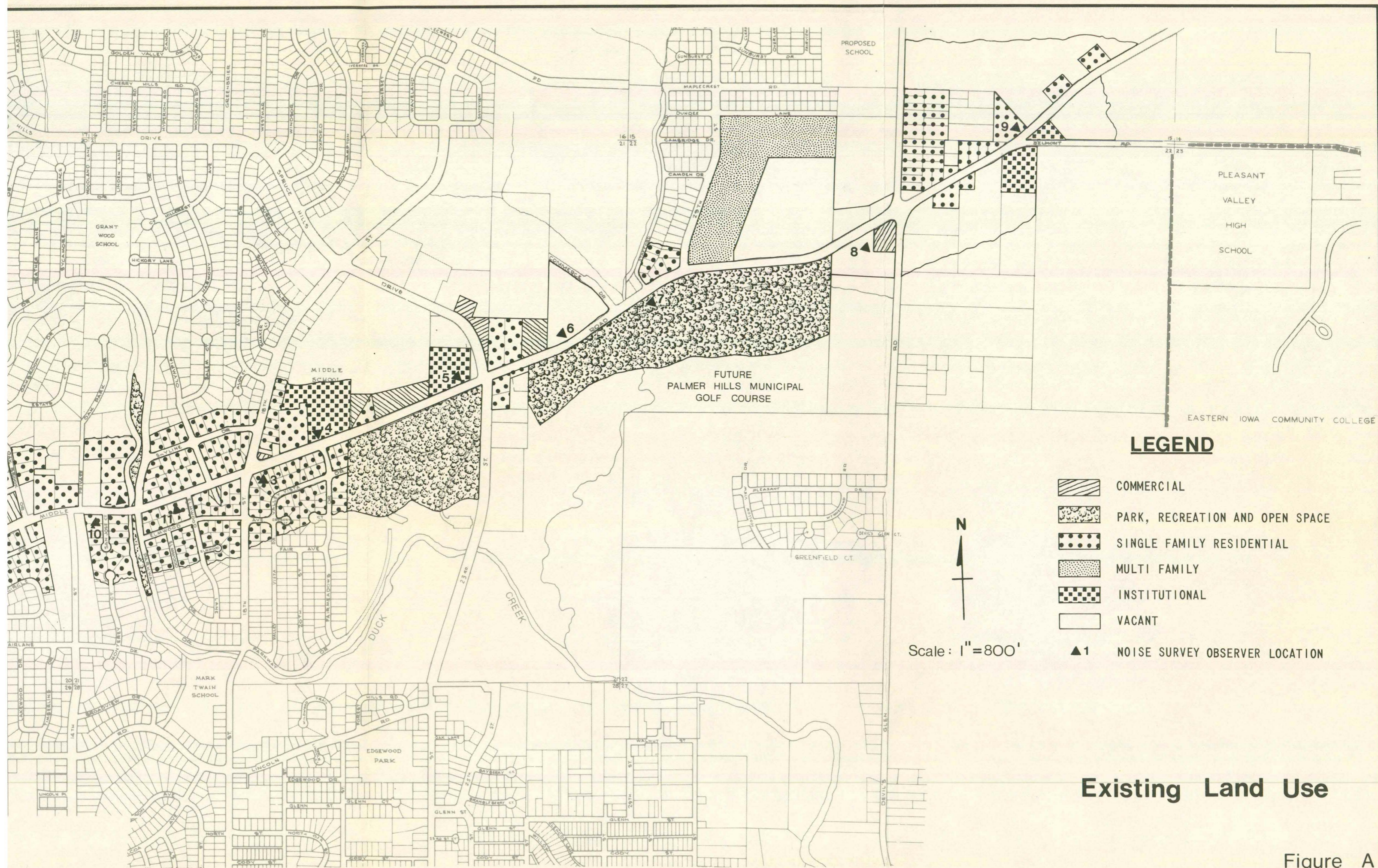
Existing Land Use

Land use along Middle Road can best be described as mixed. Major commercial development lies west of the I-74 interchange. The segment between I-74 and 18th Street is predominately single family residential. Single family dwellings, Middle School, Middle Park, an indoor tennis facility, a church, and a few vacant lots occupy the frontage between 18th and 23rd Streets.








The Palmer Hills Municipal Golf Course (under construction) dominates the south side of the road between 23rd Street and Devil's Glen Road. Single family homes, apartments, and several commercial uses occupy the north frontage between the two intersecting streets. Approximately one half of the frontage on the north side of Middle Road is vacant.

Residential uses, a church, school district administrative office, and vacant land front on Middle Road between Devil's Glen Road and a point east of Belmont Road.

Existing land use is found on Figure A.



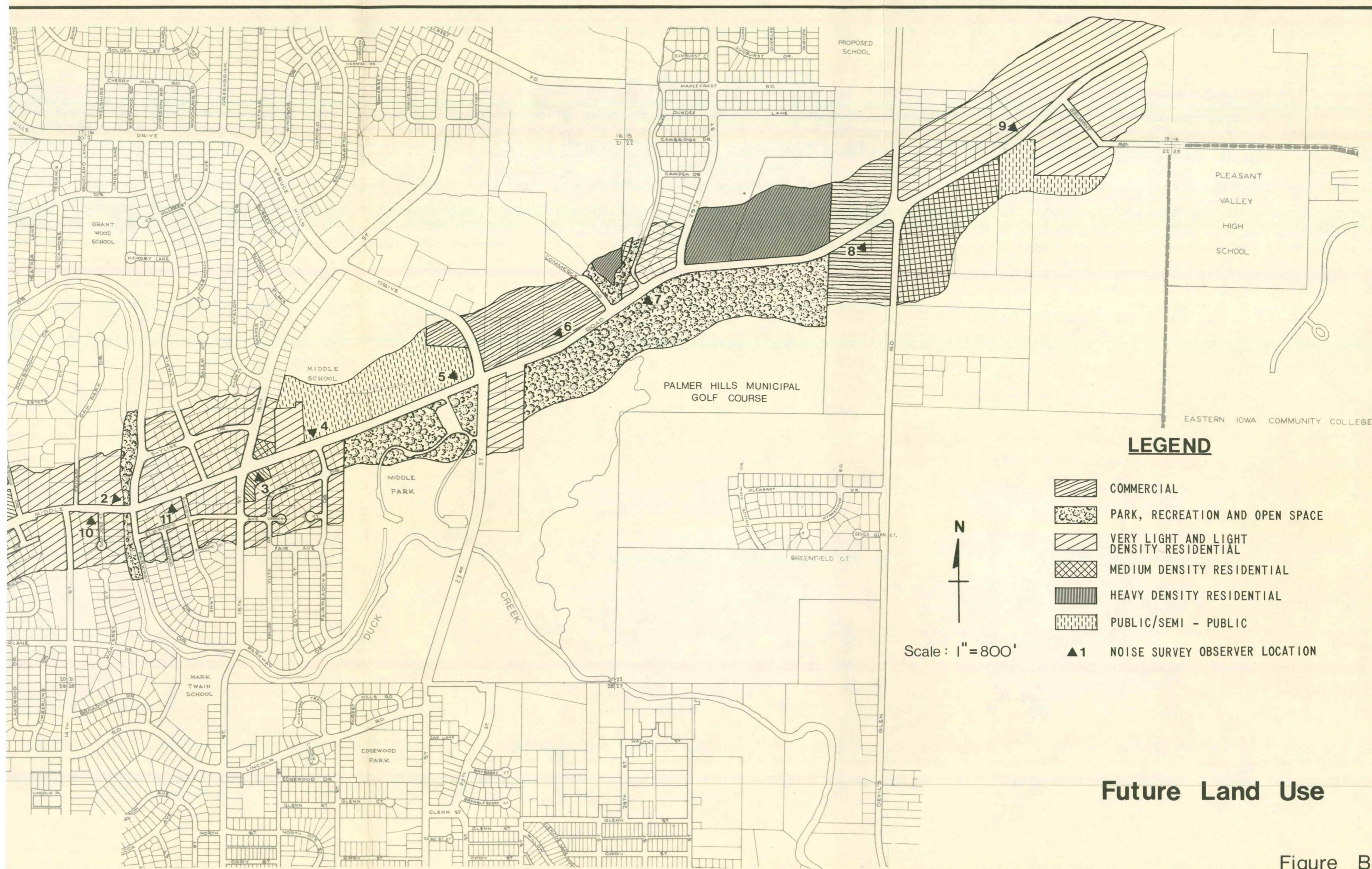
LEGEND

-  COMMERCIAL
-  PARK, RECREATION AND OPEN SPACE
-  SINGLE FAMILY RESIDENTIAL
-  MULTI FAMILY
-  INSTITUTIONAL
-  VACANT
-  ▲1 NOISE SURVEY OBSERVER LOCATION



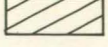


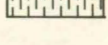

N
 ↑
 Scale: 1" = 800'

Existing Land Use

Figure A



LEGEND

-  COMMERCIAL
-  PARK, RECREATION AND OPEN SPACE
-  VERY LIGHT AND LIGHT DENSITY RESIDENTIAL
-  MEDIUM DENSITY RESIDENTIAL
-  HEAVY DENSITY RESIDENTIAL
-  PUBLIC/SEMI - PUBLIC
-  ▲1 NOISE SURVEY OBSERVER LOCATION



Scale : 1" = 800'

Future Land Use

Figure B

Future Land Use

The City of Bettendorf is in the process of adopting a new land use plan. This new plan has been developed by local staff over a two-year period and should be adopted by City Council during the spring of 1974. The Middle Road portion of this unadopted 1995 land use plan is shown on Figure B.

The 1995 pattern of land use is expected to be an extension of the existing situation and emerging trends--commercial development on the west; residential, commercial, institutional, and park uses in the center; and residential and institutional uses on the east. Most, if not all, of the Middle Road frontage in the project area will be developed by 1995. Noise monitoring sites which were undeveloped in 1973 will be occupied by residences and commercial uses.

Existing Noise Survey

Existing noise levels were measured during the peak traffic hour on week days commencing October 16, 1973, and continuing through October 26, 1973. Additional measurements were taken on January 16 and 17, 1974. Measurements were made by using a B&K 2209 Precision Peak and Impulse Sound Level Meter. The measurements were made with "A" weighting network (dBA) with the meter set on fast response.

Readings to determine existing noise levels were taken at eleven points along Middle Road. These locations are shown on Figure A. Nine of the eleven readings were taken at points which have been classified as "B" using Federal Highway Administration categories. "B" land uses include residences, schools, churches, recreation areas, and parks.

The two remaining readings were taken at locations which presently are undeveloped. Future uses at these sites are discussed in the preceding section.

Locations numbered 10 and 11 were taken at an offset from the street centerline equal to that of the residences in the area. The projected traffic volumes for these locations are also the highest along Middle Road. Therefore, it is assumed that these points will represent the noisiest locations along the route.

TABLE 1
METER LOCATION AND LAND USE

Location No.	Meter Location		FWHA Category		Land Use
	Station	Side of Road	Existing	Future	Description
1	26+00	112' N	B	B	Church, Mortuary, Residences
2	36+84	112' N	B	B	Residences
3	51+19 (Back) =0+00 (Ahead)	112' S	D	B	Undeveloped - Future residences and office commercial
4	8+00	112' N	B	B	School, Residences
5	22+00	112' N	B	B	Church, Park
6	35+00	112' N	B	B	Undeveloped, Active Sports Area (Under Construction) Residences
7	42+33	112' S	B	B	Active Sports Area (Under Construction) Residences
8	65+00	112' S	D	C	Undeveloped - Future Commercial
9	84+00	112' N	B	B	Residences, Office, Undeveloped - Future residences and institutional
10	35+30	80' S	B	B	Residences
11	43+42	67' S	B	B	Residences

The procedure in the field for the survey at each location was as follows:

1. Meter location established.
2. Differences in elevation between roadway and meter location established.
3. Barriers (if any) were located and tied down.
4. Speeds for both automobiles and trucks were measured.
5. Traffic was counted between the hours of 4:30 p.m. and 5:30 p.m. distinguishing between automobiles and trucks.
6. Peak pass-by noise level was measured for both passenger cars and trucks, using the "Peak Hold" feature of the meter.
7. Noise level readings were taken every five seconds for a period of 25 minutes usually between 4:50 p.m. and 5:15 p.m.

From the 300 readings taken, the 30th highest reading constituted the value used for the noise level exceeded 10 percent of the time (L_{10}) and the 150th reading was used as the level exceeded 50 percent of the time (L_{50}).

Results from the noise level survey are shown in Table 2.

TABLE 2
EXISTING NOISE LEVELS - dBA

<u>Location</u>	<u>Measured Peak Pass-By</u>		<u>Measured</u>		<u>Calculated</u>	
	<u>Auto</u>	<u>Trucks</u>	<u>L₁₀</u>	<u>L₅₀</u>	<u>L₁₀</u>	<u>L₅₀</u>
1	73	75	63	59	64	61
2	78	82	63	60	63	60
3	72	74	61	56	62	57
4	70	75	58	53	60	56
5	62	69	60	57	59	55
6	74	77	61	56	58	54
7	76	78	62	58	63	59
8	68	70	57	53	61	56
9	58	62	56	51	58	52
10	76	79	68	63	66	62
11	78	78	68	64	68	63

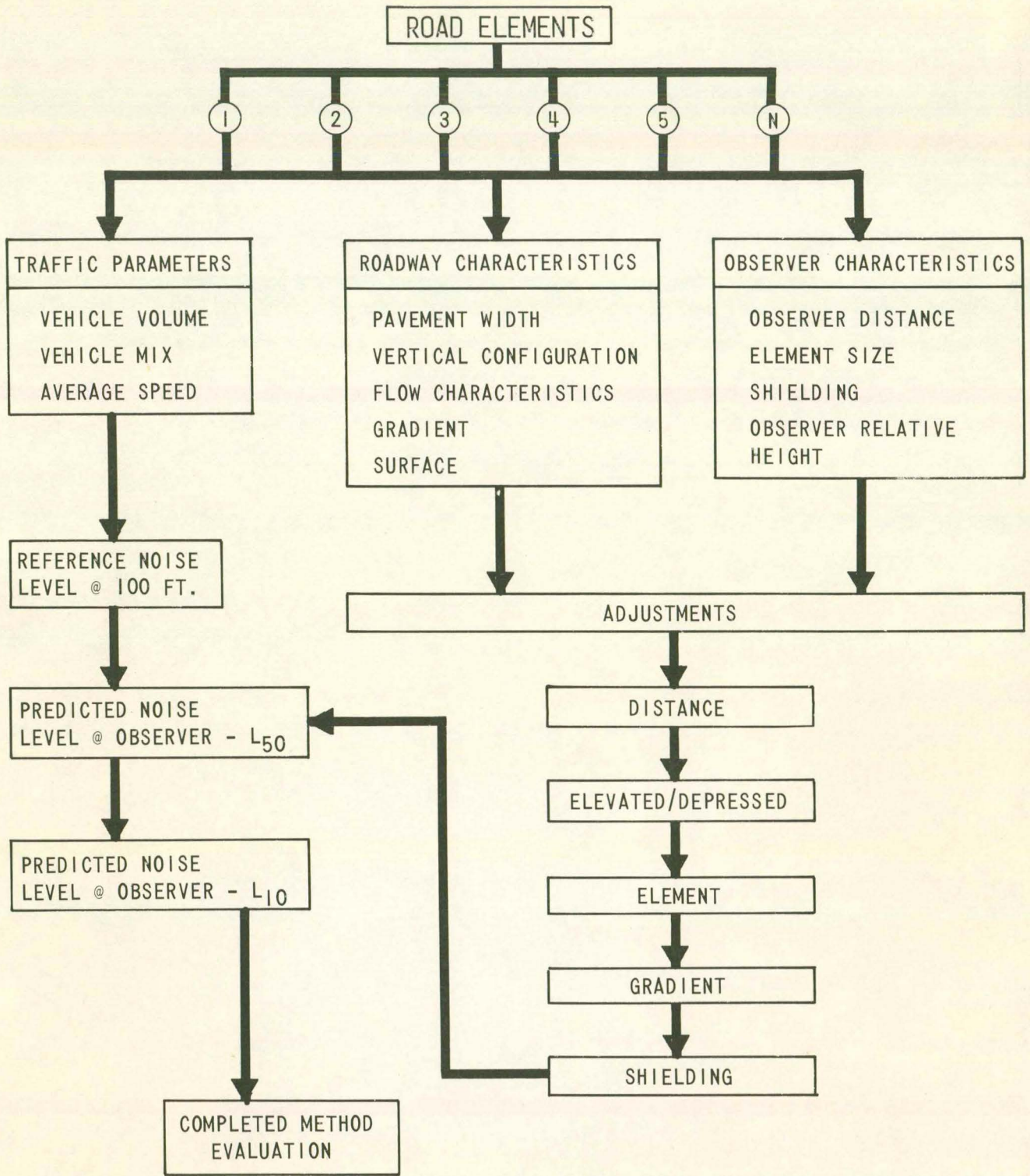
As can be noted in the table, values for L₁₀ range from the upper 50's to the upper 60's all of which are within the standards set forth by Federal Highway Administration. The peak pass-by levels range from 58 to 82 dBA.

Table 2 also shows the calculated noise values using present-day traffic and speed conditions. In theory these values should be equivalent to those of the measured values. However, many factors can influence the values measured such as wind, humidity, temperature, and the human element. Therefore, absolute precision can not be expected nor is it warranted for this particular study.

Predicted Noise

The traffic generated noise level was predicted at each of the eleven monitoring locations using the long method according to the National Cooperative Highway Research Program Report No. 117. The methodology used in predicting noise levels is shown by the flow diagram on Figure C. The calculations are based on conditions anticipated for the year 1995 assuming the traffic parameters and roadway characteristics for that date.

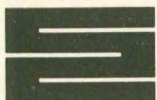
Table 3 shows the traffic parameters of Middle Road as measured for present day conditions and forecasted for 1995.



Flow Diagram
Predicted Traffic
Noise Methodology

Source : NCHRP Report 117

Figure C



STANLEY CONSULTANTS

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TABLE 3
MIDDLE ROAD TRAFFIC PARAMETERS

Location	Measured				Forecasted - 1995			
	Peak Hour DHV	Percent Trucks	Operating Speed		ADT	DHV 10% of ADT	Average Speed	
			Autos	Trucks			w/Improvement	w/o Improvement
1	1,455	0.27	32	32	17,170	1,717	28	26
2	1,212	0.25	32	28	18,758	1,876	27	25
3	697	0.14	25	26	17,988	1,799	27	25
4	643	0.33	31	22	6,456	646	29	29
5	662	0.30	27	22	6,456	646	29	29
6	922	0.22	37	33	14,270	1,427	37	32
7	902	0.33	38	32	14,270	1,427	37	32
8	689	0.29	38	34	14,270	1,427	37	32
9	335	0.30	38	44	9,496 9,024	950 902	38 --	-- 35
10	1,276	0.23	31	35	18,758	1,876	27	25
11	1,073	0.28	33	30	17,486	1,749	28	26

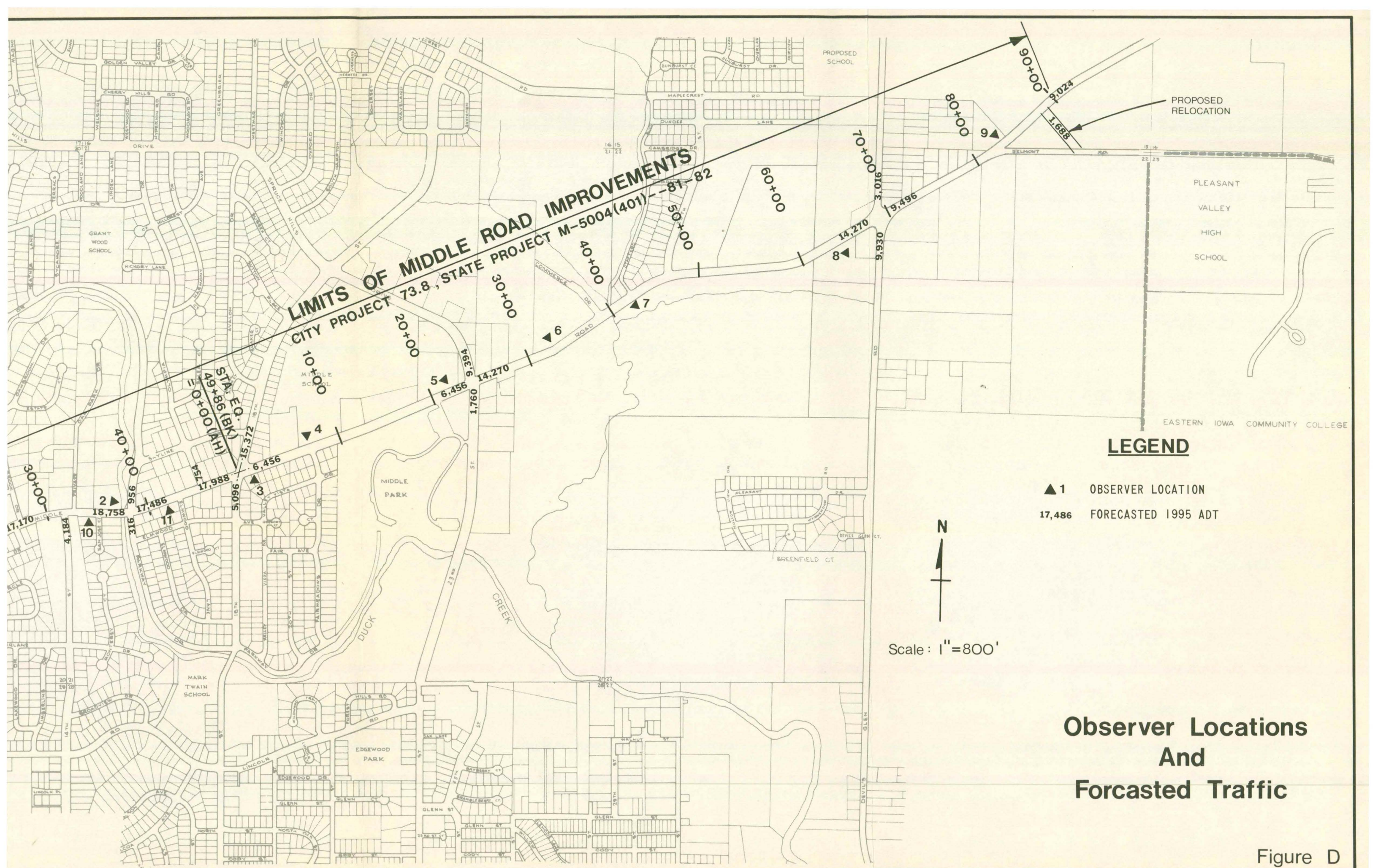


Figure D

Predicted noise levels for 1995, with improvements, vary from 59 to 64 at a distance of 112 ft. from centerline of pavement. At 80 ft from centerline, the level is 65 and at 67 ft., the level is 68.

On a "Do Nothing" basis, the predicted noise levels for 1995 will be as great or slightly less than if the improvements are made.

Table 4 summarizes measured and predicted noise levels along the improvement project.

Evaluation

The purpose of this study is to examine noise levels along Middle Road, comparing the measured and predicted noise levels with the design level listed as FHWA standard. If projected levels for a given category of land use exceed the recommended design noise level because of the improvements being made, actions must be taken to reduce predicted noise to an acceptable level by construction of an approved abatement measure. Should the abatement measures be economically not feasible, conflict with desired aesthetic quality or important ecological conditions, FHWA will allow for exception to a higher noise level, if a written summary report is submitted meeting specific requirements set forth in PPM 90-2.

Exterior noise levels do not and are not expected to exceed 68 decibels for 10 percent of the time at a distance of at least 67 feet from the centerline of road. With the present zoning ordinance, future commercial buildings could be constructed as close as 56.5 feet and residences 75 feet and, if the minimum front yard setbacks are observed, the exterior noise levels at the building will not exceed the FHWA standard.

Conclusions

All points along the proposed improvement of Middle Road fall within the noise level standards as set forth by the Federal Highway Administration in their Policy and Procedure Memorandum 90-2, dated February 8, 1973.

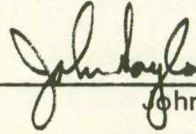
TABLE 4
NOISE LEVEL COMPARISON

Location	Land Use Category (Future)	Exterior Noise Level - dBA						
		FHWA Standard L ₁₀	As Measured		Predicted - 1995			
			L ₁₀	L ₅₀	With Improvements		Without Improvements	
			L ₁₀	L ₅₀	L ₁₀	L ₅₀	L ₁₀	L ₅₀
1	B	70	63	59	63	60	63	59
2	B	70	63	60	63	59	62	59
3	B	70	61	56	63	58	63	57
4	B	70	58	53	59	55	59	55
5	B	70	60	57	60	55	60	55
6	B	70	61	56	59	56	58	55
7	B	70	62	58	63	61	63	60
8	C	75	57	53	63	60	62	59
9	B	70	56	51	64	60	62	58
10	B	70	68	63	65	62	64	61
11	B	70	68	64	68	64	67	63

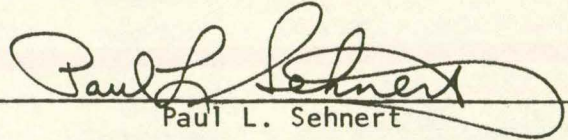
Therefore, special noise abatement measures are not required for the proposed improvement.

Respectfully submitted,


STANLEY CONSULTANTS, INC.



John Sayles



Paul L. Sehnert



Lloyd J. Larson

APPENDIX

SUPPORTING DATA

Weather Conditions at Time of Noise Measure-
ments

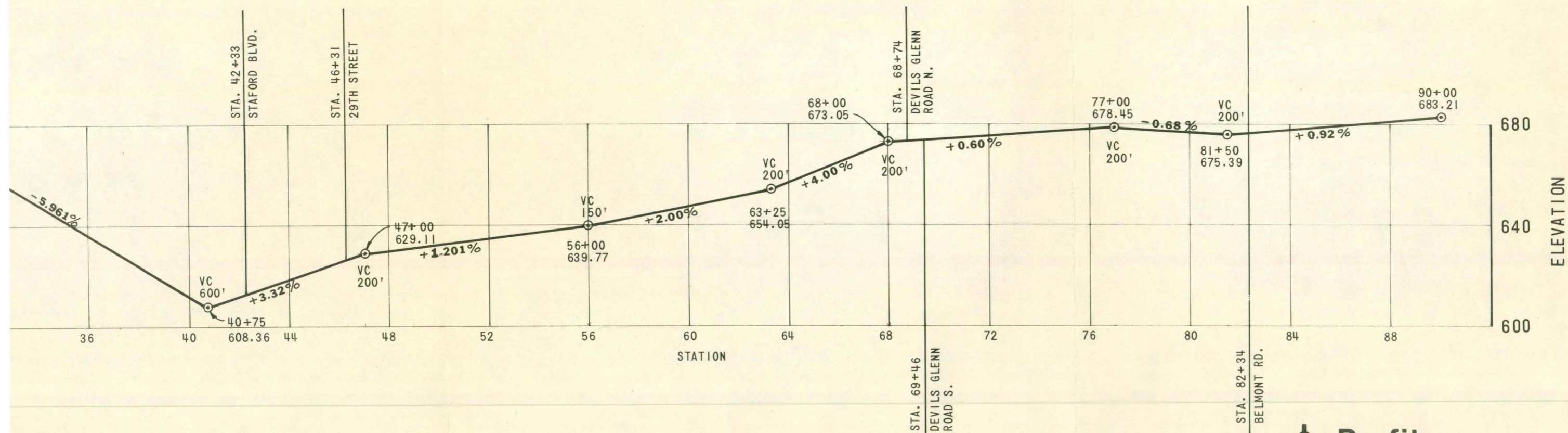
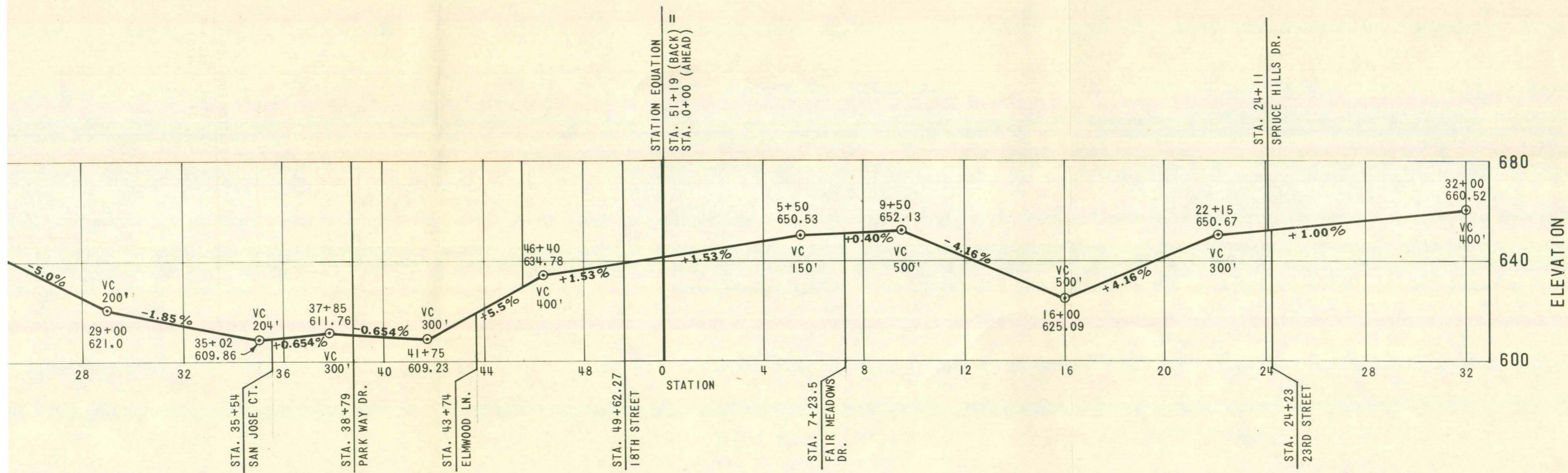
Profile of Centerline for Middle Road

Tabulation of Setback Distances for Residences
or Buildings

TABLE 5

WEATHER CONDITIONS AT TIME OF NOISE MEASUREMENTS

<u>Location</u>	<u>Date</u>	<u>Temperature</u>	<u>Wind</u> (mph)	<u>Humidity</u> (Percent)
1	10-18-73	63° Clear	5-W	31
2	10-22-73	74° Clear	7-S	59
3	10-19-73	66° Clear	14-NW	36
4	10-23-73	75° Partly Cloudy	7-S	55
5	10-17-73	58° Partly Cloudy	12-SW	37
6	10-25-73	63° Partly Cloudy	12-WSW	50
7	10-24-73	79° Clear	20-S	38
8	10-26-73	68° Clear	7-SW	39
9	10-16-73	55° Fair	18-NW	38
10	1-17-74	38° Cloudy	13-SE	89
11	1-16-74	38° Cloudy	7-WSW	73



Scale: Horiz. 1" = 400'
Vert. 1" = 40'

**Profile
Middle Road**

Figure E

TABLE 6
EXISTING BUILDING SETBACK DISTANCE

<u>Type of Building</u>	<u>± Station</u>	<u>Distance From ± Middle Road</u>	
		<u>North</u>	<u>South</u>
Residence	25+40		120
Residence	25+95		119
Residence	26+55		118
Residence	27+20		118
----- Oak Brook Drive -----			
Residence	29+05		110
----- 14th Street -----			
Residence	34+85		80
Residence	36+40		80
----- Parkway Drive -----			
Residence	40+20		72
Residence	40+10	100	
Residence	40+90	100	
Residence	40+95		68
Residence	41+70	110	
Residence	41+90		67
Residence	42+85	113	
Residence	42+90		69
----- Elmwood Lane -----			
Residence	43+75	100	
Residence	44+15		68
Residence	44+80	93	
Residence	45+25		72
----- Olympia Drive -----			
Residence	46+05		88
Residence	46+30	90	
Residence	47+45		72
Residence	48+30	95	
Residence	48+30		75
Residence	49+40	93	
----- 18th Street -----			
Sta. Equation 51+19 (Bk) = 0+00 (AH)			

TABLE 6 (Cont.)

<u>Type of Building</u>	<u>☉ Station</u>	<u>Distance from ☉ Middle Road</u>	
		<u>North</u>	<u>South</u>
Residence	5+00	150	
Residence	5+00		80
Residence	5+85		80
Residence	6+40		80
----- Fairmeadows Drive -----			
Residence	7+90		80
Residence	10+85	90	
Swimming Pool	18+10		123
Church	21+20	175	
Tennis Court	21+20		70
-- 23rd Street - Spruce Hills Drive --			
Residence	25+30		90
Residence	27+35	115	
Residence	29+50	225	
Residence	32+15	80	
----- Stafford Blvd. -----			
Residence	42+80	80	
Residence	43+90	90	
Residence	44+55	90	
Residence	45+80	105	
----- 29th Street -----			
Residence	67+70		80
----- Devils Glen Road -----			
Residence	70+95	135	
Residence	72+60	110	
Residence	73+35		125
Residence	74+15	80	
Residence	75+60	70	
Residence	76+30		65
Residence	76+95	85	
Residence	78+00	135	
Residence	79+10	85	

TABLE 6 (Cont.)

<u>Type of Building</u>	<u>Station</u>	<u>Distance from ϵ Middle Road</u>	
		<u>North</u>	<u>South</u>
Residence	80+30	68	
	----- Belmont Road -----		
Residence	83+30	140	
School Administration	85+55		82
Residence	87+70	93	

Note: This tabulation does not include all buildings along Middle Road but does cover those which are significantly close to the street.

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3 1723 02095 3105