

984

*See
misc.*

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**APPLICATION FOR FEDERAL FINANCIAL
PARTICIPATION IN
TRAFFIC NOISE BARRIER CONSTRUCTION
ALONG A SELECTED SEGMENT OF
I 75 IN SOUTHEASTERN MICHIGAN**



**MICHIGAN DEPARTMENT OF
STATE HIGHWAYS AND TRANSPORTATION**

APPLICATION FOR FEDERAL FINANCIAL
PARTICIPATION IN
TRAFFIC NOISE BARRIER CONSTRUCTION
ALONG A SELECTED SEGMENT OF
I 75 IN SOUTHEASTERN MICHIGAN

Application is made to the Federal Highway Administration under
Section 114 of the Federal-Aid Highway Act of 1973,
Section 109(i), Title 23 U.S. C.
Noise Standards and Procedures for Type II Projects.

Research Laboratory Section
Testing and Research Division
Technical Investigation 75 TI-299
Research Report No. R-984

Michigan State Highway Commission
Peter B. Fletcher, Chairman; Charles H. Hewitt,
Vice-Chairman, Carl V. Pellonpaa, Hannes Meyers, Jr.
John P. Woodford, Director
Lansing, November 1975

PREFACE

The purpose of this document is to describe and justify a traffic noise abatement project for which Federal financial participation is requested. Specifically, it is proposed to construct approximately 1,800 lineal ft of traffic noise barrier along the east side of I 75 between Champaign Road and the Southfield Highway in Lincoln Park.

The authority for the application herein being made to the Federal Highway Administration derives from Section 114 of the Federal-Aid Highway Act of 1973, Section 109(i), Title 23 U.S.C., Noise Standards and Procedures for Type II Projects.

INTRODUCTION

The Michigan Department of State Highways and Transportation has selected the herein described segment of I 75 to be the subject of an optional application for Federal-Aid on a traffic noise abatement project. Under the permissive authority granted by the Federal-Aid Highway Act of 1973 the Federal Highway Administration has established regulations for dealing with noise on "previously constructed" highways. These are designated as Type II projects (location approval received prior to July 1, 1972) and are undertaken at the option of the state highway agency.

The subject route segment of I 75 is located along the southern edge of the metropolitan Detroit area. The area immediately adjacent to the freeway is occupied by a high density group of single-family dwellings.

The freeway is composed generally of two roadways of three lanes each, separated by a 26 ft median. It is a limited access facility built to Interstate standards. The selected segment studied here is primarily an urban facility, going from depressed under Champaign Rd to elevated over the Southfield Highway.

The decision to apply noise abatement procedures to the subject roadway segment, and as to the type or types of abatement devices to use, is

based in part on certain preceding decisions:

1. Noise levels along the route in future years will almost certainly be much lower than those at time of opening. This should occur because of eventual enforced statutory limits on the noise of both new and in-service vehicles; technological improvements in the noise abatement aspects of vehicle design and manufacture; and very probably from reduced future traffic volumes and speeds resulting from energy conservation measures. However, because of the uncertainty of the timetable for these future events, and of the magnitude of the reductions that may result, the Department believes it appropriate to treat the problem as it appears to exist at the present — not at some hopefully quieter future time.
2. The applicable Federal regulations for Type II projects do not require that the Federal noise standards be met to obtain FHWA financial participation. The Department believes, however, that every effort should be made to achieve those standards. Therefore, they are designed for in this project.
3. Care must be exercised in the selection and design of any barrier walls to guard against light reflections, sight distance problems,

to minimize the hazards of sharp shadows falling across the roadways and to provide for drainage and snow removal. Because of the nature of this project these problems are concluded to be minimal and do not require any extensive or involved remedies.

Selection of this particular segment of I 75 for noise abatement application is not meant to imply that it is the only problem area along I 75, or that it precludes future noise abatement applications for other segments of this freeway. The segment was selected because of a serious noise problem in the adjacent residential area brought to the Department's attention by objections and protests from the area residents and requests from city, state, and federal officials and legislators.

In June 1975 a somewhat spectacular, and unfortunate, accident occurred in the area of the gore between I 75 and the A Ramp of the Southfield Interchange (see Appendix). This accident however, must be considered a "freak" occurrence and certainly not the type of event which can, or should, form the basis for safe, rational design of a highway appurtenance.

Study of the accident report appending this application reveals that a truck traveling north on I 75, not on the ramp, blew a right front tire and swerved out of control across the beginning end of the ramp, overturning and coming to rest with part of the cab protruding through the fence onto the edge of Lincoln Street.

Obviously such an occurrence justifies alarm and anxiety on the part of those living in nearby homes. And in recognition of this predictable response, and to restore a sense of security to the residents, the Department is proposing that the noise barrier wall, herein applied for, be constructed of reinforced concrete. Also, where appropriate, steel beam guardrail will be installed, or reinstalled, between the ramp and the concrete noise barrier.

Examination of the accident history of the A Ramp in question discloses only an average accident rate for the type of road segment. The Department's Traffic and Safety Division reports a total of 27 accidents on the ramp in the last three and one-half years. During this period an estimated 10,000,000 vehicles have traversed the ramp thereby producing a rate of about one accident for every 400,000 vehicle passbys. As stated above this is not at all an excessive accident rate, however, the Department believes the actions proposed in this application constitute an appropriate response to both the objective facets of the problem and also to the less well defined subjective facets.

NOISE ABATEMENT APPLICATIONS

APPLICATION

The Michigan Department of State Highways and Transportation is requesting Interstate financial participation by the Federal Highway Administration in the noise abatement measures detailed here for the described segment of I 75.

AUTHORITY

The Federal Highway Noise Standards were first promulgated as Federal Highway Administration Policy and Procedure Memorandum 90-2 on January 24, 1973. On February 20, 1974, "Interim Guidelines for Noise Abatement Projects on Previously Constructed Highways" was issued. Under these interim guidelines, Regional Federal Highway Administrators or delegated Division Engineers were given authority to approve noise abatement projects for previously constructed highways on any Federal-Aid system, provided:

- (1) A noise analysis has been performed using the general guidelines outlined in PPM 90-2 (Section 3, Chapter 7, Volume 7, Federal-Aid Highway Program Manual).
- (2) A determination has been made that the noise abatement projects are clearly of high priority.

- (3) The noise abatement project will achieve a significant noise reduction.
- (4) The noise abatement benefits are judged to outweigh the overall economic and environmental cost of the project.
- (5) The noise abatement measures are for noise-sensitive developed activities which are in existence on January 1, 1973.

MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION
NOISE ABATEMENT PROGRAM

Noise Committee

In spring 1974 the Department established an ad hoc Noise Committee to formulate guidelines for the construction of noise barriers. In September of 1974 this committee was redesignated as standing, and given the assignment of dealing with and advising the Department on all noise problems.

Noise Barrier Guidelines

The Department's Bureau of Highways Guidelines for Noise Barriers was 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, the guidelines 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 specifications.

Vehicle Noise Control Legislation

In July, 1975 Michigan House of Representatives Bill No. 5486 was introduced and referred to the House Committee on Public Safety. The bill establishes noise emission limits for all new and existing cars, trucks and motorcycles using Michigan roadways. It was prepared by the Michigan Motor Vehicle Noise Control Committee, chaired by a member of Highways and Transportation and with representatives from State Police, Commerce, and Natural Resources plus support personnel from the Governor's Office, Attorney General and the House of Representatives. This group and their respective departments are actively supporting vehicle noise control legislation to supplement that already implemented by the Federal Government for vehicles in Interstate commerce.

Noise Level Inventory

In a further attempt to insure equitable distribution of Michigan noise abatement funds, a statewide freeway noise level inventory is being conducted. This inventory should be completed during 1976 and the state will

thus be better able to determine where its limited noise abatement funds should be utilized to achieve maximum citizen benefit.

Earlier Michigan Noise Barriers

To date several experimental barriers have been constructed in the state, notably a wooden wall along I 75 in Allen Park, a steel wall along I 75 in Southgate and an earthmound along I 94 near Kalamazoo. A questionnaire has been sent out to the residents shielded by the Allen Park wooden wall resulting in over a 50 percent response to the subjective questions. These and other results are being correlated with attenuation measures in order to help the Department select the most visually acceptable and effective noise barriers.

NOISE ANALYSIS

In order to prevent any ambiguities, several terms used in the FHWA Interim Guidelines for Noise Abatement Projects, on previously constructed highways are given Michigan definitions as follows:

- (a) Significant Noise Reduction - An attenuation of at least 6 dbA (preferably over 10 dbA), in the L_{10} noise level at the protected human activity facility nearest the barrier.
- (b) Noise Abatement Benefits - Any improvement in, or the betterment of, the environmental noise conditions associated with humans.

(c) Noise Sensitive Developed Activities - Those portions of land which contain improvements or activities devoted to frequent human use or habitation. For improvements under construction or subsequently added, the date of issue of a building permit establishes the date of existence.

Existing noise levels were measured at nine representative locations in the subject area during off-peak traffic flow. These L_{10} levels ranged from 73 to 83 dbA at the R-O-W down to 65 dbA at distances of over 1,000 ft outside the R-O-W. The locations and L_{10} levels as they existed in September 1975, are presented in the Figure.

Based upon 1974 traffic data of Table 1 and the appropriate plan and elevation sheets, L_{10} noise levels were predicted as outlined in PPM 90-2 (Section 3, Chapter 7, Volume 7, Federal-Aid Highway Program Manual). The resulting design year L_{10} contour is shown in the Figure.

The residential communities bordering the east side of the I 75 R-O-W and the plat registration dates also are identified on the Figure. This information was obtained from the public records of the City of Lincoln Park.

TABLE 1
TRAFFIC DATA

1974 Existing

Location	Design Hourly Volume			Level of Service C	
	Direct Volume	Percent Commercial	Vehicle Speed	Hourly Volume	Vehicle Speed
I 75 - south of M 39	7,000	13	55	8,300	55
Ramp A - northbound I 75 to M 39	1,550	10	30		
Ramp B - southbound M 39 to northbound I 75	400	10	30		

For noise abatement projects on previously constructed highways, such as this portion of I 75, only those noise-sensitive developed activity

areas which existed on January 1, 1973 are eligible for Federal funding.

In addition only those noise-sensitive developed activity areas in which a significant portion of the area has been impacted will be considered for noise abatement measures in this application.

Having identified the existing and predicted noise levels, and thereby becoming aware of the potential problem it is appropriate to consider the available alternates. It is the Department's opinion that in this case there are essentially only two:

Alternate A - Do Nothing

This alternate calls for no special action for noise abatement. Noise

complaints would be rejected because the project predates the Federal Noise standards.

Alternate B - Build Noise Barriers

Under this alternate the Federal residential noise limit of L_{10} 70 dbA and a significant noise reduction would be achieved at all residences within noise-sensitive, developed activity areas where the noise abatement benefits are judged to outweigh the economic cost of the project. The existing noise predictions were calculated according to PPM 90-2 and are tabulated in Table 2 and the predicted no-barrier 70 dbA noise contour is also given on the Figure. The total length of required barrier amounts to about 1,800 lineal ft at an estimated total of \$215,000.

Because of the narrow R-O-W along the impacted subject area, the noise barrier will be of the wall type design. The necessary safety considerations such as protecting guardrail where appropriate will be part of the design.

This residential area for which a noise barrier is proposed constitutes a severe environmental noise impact as demonstrated by the existing measured and predicted L_{10} noise levels. Moreover, treatment of an area of such high noise levels and population density must be considered a high priority project.

TABLE 2
 PREDICTED EXISTING NOISE LEVELS AND BARRIER HEIGHTS

Roadway Identification and Stationing	R-O-W to Center of Near Lane of:		Roadway Elevation		No Barrier		Barrier Height to Bring 70 dbA Contour to R-O-W Line	
	Northbound I 75 (ft)	Ramp A (ft)	Northbound I 75 (ft)	Ramp A (ft)	L10 Noise Level at R-O-W (dbA)	Distance From R-O-W To L10 (ft)	70 dbA Line (ft)	
Northbound I 75 - 824+00	25	--	-14	--	92	138	12	
Ramp A - 2+00	58	52	-6	-6	88	425	16	
Ramp A - 6+50	104	77	0	0	84	475	18	
Ramp A - 10+00	115	40	3	2	88	488	14	
Ramp A - 15+00	290	71	7	0	83	313	10	
Ramp A - 19+00	195	22	11	-3	92	413	16	

The proposed barrier sections have the following heights, locations and lengths:

Height (ft)	Stationing (Ramp A)	Length (ft)
18	1+00 to 10+00	900
16	10+00 to 19+00	900
	19+00 to 20+00	1000

The south end of this barrier will butt up against the existing school barrier.

When the large number of potentially impacted residences (106 homes and two apartment buildings), residential yard areas and residents are compared to the moderate cost of the project, the trade-off between noise abatement benefits and economic cost is, in the Department's opinion, shown obviously justified.

The barrier wall proposed is of the concrete slab-panel type as used and proven on I 35W near the University of Minnesota in Minneapolis. These units have reasonable esthetics, practically no maintenance, are relatively easy to erect (need no foundation or upright supports) and meet all physical requirements for sound barriers.

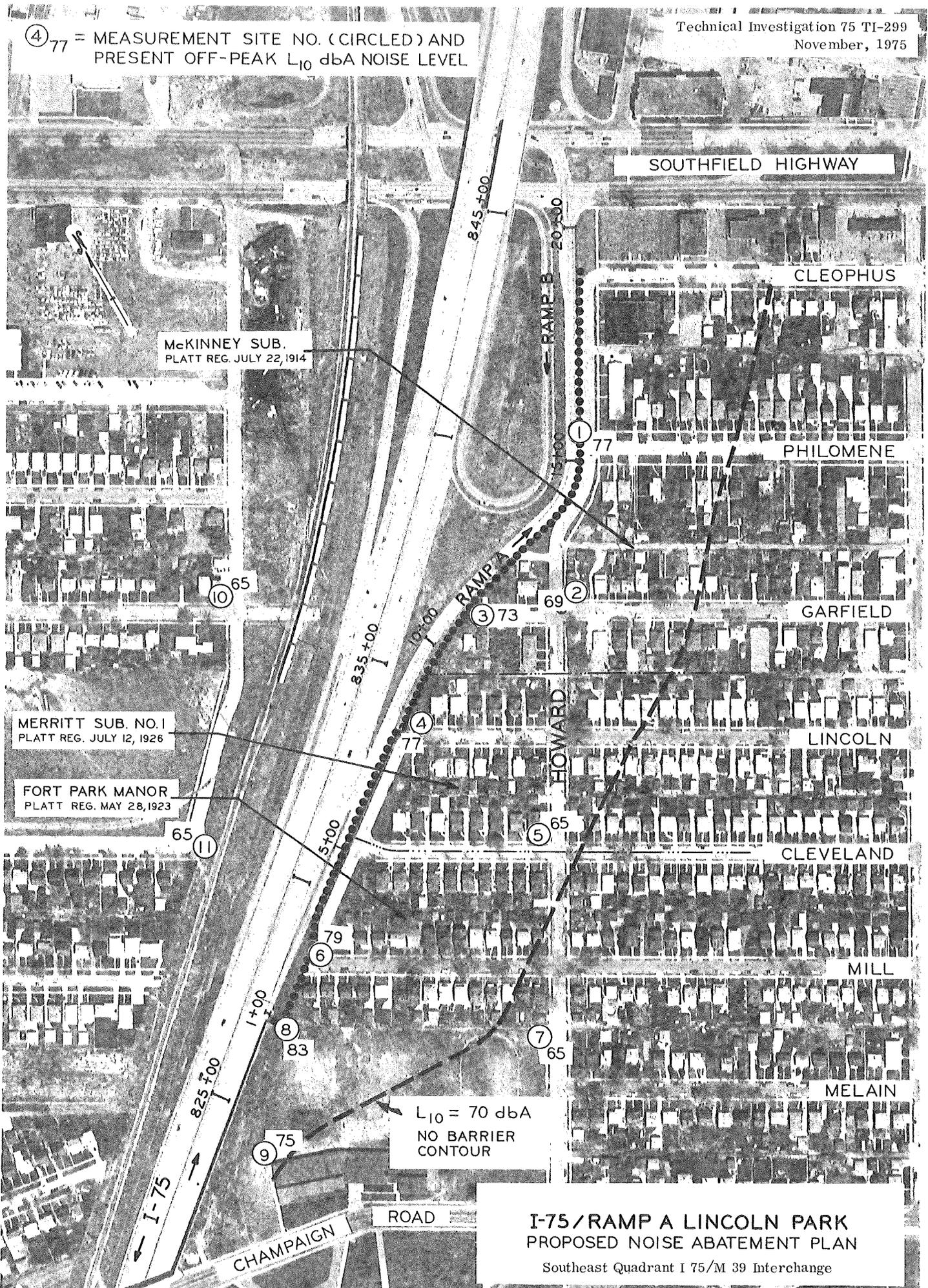
Assumptions necessary for the approved noise predictor computer programs in use today, coupled with the great difficulty in accurately predicting future traffic parameters, produces an uncertainty band around noise predictions of at least 2 dbA. In an effort to somewhat overcome this un-

certainty and the continuously varying height, a height adjustment has been added to most of the calculated barrier heights of Table 2 for design purposes. This precaution, as appropriate in all human environmental considerations, is designed to favor the potentially impacted citizen, and will be achieved at a very nominal additional cost.

RECOMMENDED ALTERNATE

It is the considered recommendation of the Michigan Department of State Highways and Transportation that the Federal Highway Administration approve Interstate participation for implementation of Alternate B as described above and in the Figure.

④₇₇ = MEASUREMENT SITE NO. (CIRCLED) AND
PRESENT OFF-PEAK L₁₀ dBA NOISE LEVEL



**I-75 / RAMP A LINCOLN PARK
PROPOSED NOISE ABATEMENT PLAN**
Southeast Quadrant I 75/M 39 Interchange

APPENDIX

Department LINCOLN PARK POLICE DO NOT USE

County WAYNE City LINCOLN PARK Twp. Date 06-11-75 Time 10:00 A.M. P.M.

Route No. 1-75 (N.B.) Name 650 Mi. N(S)E W Intersection SOUTHWIELD Route No. M-30

State OHIO Drivers License NA1 763 1773 1 DOB 01-24-48 Hazardous Action SEE REMARKS

Driver No. 1 First M. Last Address City State Age Sex 27 M (K)

ROBERT JAMES JAKE 7105 ORCHARD GROVE CLEVELAND OHIO 44144

Year Make Type Trailer Reg. Yr/State Removed to/by 70 25 8 5 13L822 75/OHIO 34200 Mound Rd. Sterling Mi -- Wrecker

Seat Position Name Address Pos Age Sex Inj 1-215-238-3165

1 2 3 4 5 6 1-216-267-5666 or 1-216-267-4849

Total occupants 1 Local Use/Owner Walters Enterprise Inc. 18509 Forestwood Cleveland, Ohio 44135 Hospital Injured taken to Outer Drive

State Drivers License DOB Hazardous Action HBO HN Test

Driver No. 2 First M. Last Address City State Age Sex Inj

Year Make Type Trailer Reg. Yr/State Removed to/by

Seat Position Name Address Pos Age Sex Inj

1 2 3 ROBERT CHARLES REBEKA 22843 Nadine Trenton Mi Ph:676-8986 W 35 M

4 5 6 JAMES CLOVIS STEWART 740 Cambell Detroit Mi Ph:554-1879 W 33 M

OWEN KUHN 13702 Mark Southgate MI Ph:283-4309 W 17 M

Total occupants Local Use/Owner Injured taken to

WEATHER LIGHT ROAD SURFACE ROAD CONDITION VISION OBSTRUCTION VEHICLE DEFECTS

IMPACT CODE TOTAL LANES DRIVER RE-EXAM. Damage Property Other Than Vehicles

0 1 1 3 Divided Limited Access Driver #1 Driver #2

Guard Rail--Wooden Fence--Cyclone Fence

Owner Over Head Light and Pole

Wayne County Road Commission

ACCIDENT DESCRIPTION & REMARKS

Witnesses observed Vehicle #1 N.B. on

I-75 in the center driving lane approx

350ft south of the Southfield Exit

Ramp. Witnesses further stated that

Vehicle #1 sustained a blow-out of the

right front tire of the tractor.

Vehicle #1 then lost control and veered

to the right across the right driving

lane of N.B. I-75, striking the East

shoulder curb of N.B. I-75 approx 650

Ft south of the Southfield Overpass.

Vehicle #1 then overturned on it's

left side sliding approx 150ft north

on the Southfield Exit Ramp and right

shoulder of the Exit Ramp. Vehicle

#1 then struck the right shoulder

retaining fence and barrier rolling

over onto it's top and continuing 30ft

North on the East shoulder of the

Describe all unusual conditions and circumstances

Date Received Time Investigators Charge

06-11-75 10:04 A.M. P.M. A. Garofali R. Lubec J. Ferguson Patr. NONE

1 2 POLICE ACTION

Reviewed Comp. Status

Garofali Ferguson NONE

None Cited for Hazardous Vio. Cited for Other Violation No Enforcement Action Investigated at Scene

open closed

WARD COPY TO: Michigan State Police This form is prescribed by Director, Michigan State Police

County: WAYNE City: LINCOLN PARK Twp.: Date: 06-11-75 Time: 10:00 A.M. P.M.
 Route No. Name: 650 (I-75) N (S.E. W) SOUTHFIELD Intersection: M-39

Driver #1

State: Drivers License: DOB: Hazardous Action: HBD: HN: Test:
 Driver No. 1: First: M. Last: Address: City: State: Age: Sex: Inj:
 Year: Make: Type: Trailer: Reg. Yr/State: Removed to/by:
 Name: Address: Pos: Age: Sex: Inj:
 Seat Position: 2 3 5 6
 Local Use/Owner: Injured taken to:

Driver #2

State: Drivers License: DOB: Hazardous Action: HBD: HN: Test:
 Driver No. 2: First: M. Last: Address: City: State: Age: Sex: Inj:
 Year: Make: Type: Trailer: Reg. Yr/State: Removed to/by:
 Name: Address: Pos: Age: Sex: Inj:
 Seat Position: 2 3 5 6
 Local Use/Owner: Injured taken to:

WEATHER Clear Rain Day Dark
 Cloudy Snow Dawn Street Lights
 Fog Snow Dusk Lights

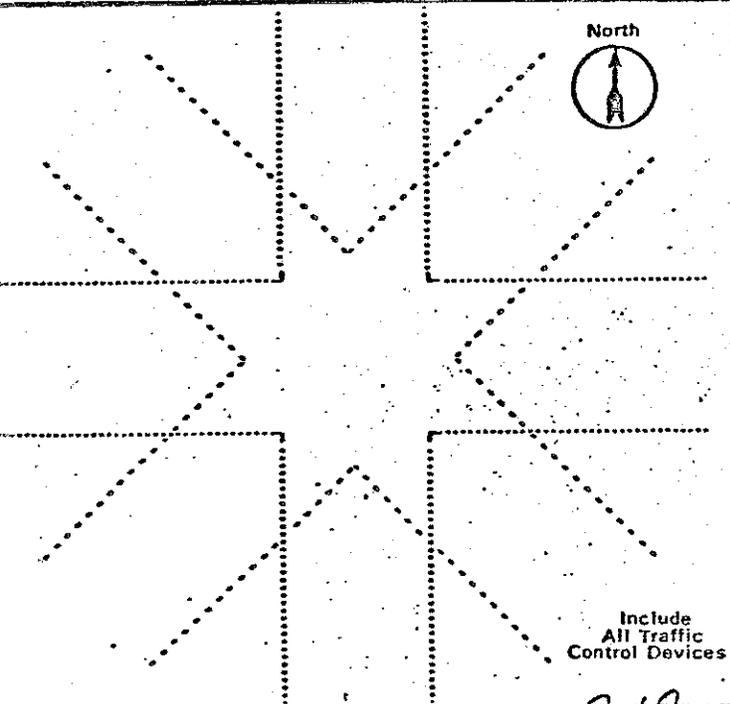
ROAD SURFACE Dry Snowy Icy
 Wet Other

ROAD CONDITION Engineering Maintenance Construction Zone

VISION OBSTRUCTION Vehicle #1 Vehicle #2 None

VEHICLE DEFECTS Vehicle #1 Vehicle #2 None

IMPACT CODE Veh. #1 Veh. #2 Total Veh.
TOTAL LANES Divided Limited Access
DRIVER RE-EXAM. Driver #1 Driver #2



Damage Property Other Than Vehicles: **LAWN (APPROX \$200.00)**
 Owner: **PATRICK R. STEVEN** Address: **1634 LINCOLN PARK, MI**

ACCIDENT DESCRIPTION & REMARKS
 Exit Ramp coming to rest at the W.B. Lincoln street (dead-end) and the I-75 Southfield Exit, pinning the Driver of Vehicle #1 in the cab of the tractor. Driver of Vehicle #1 was freed by the Fire Rescue and taken to Outer Drive Hospital by Taylor Ambulance where he was pronounced Dead on Arrival at 1:30AM by Dr. Donald Salva, M.D.

I-75 / SOUTHFIELD
 Date: 6-11-75

Report Received: 06-11-75 Time: 10:04 A.M. P.M.
 Investigators: A. Garofali, R. Lubecki, J. Ferguson Patr.
 Charge: NONE
 Describe all unusual conditions and circumstances:
 1 POLICE ACTION Cited for Hazardous Vio. Cited for Other Violation No Enforcement Action Investigated at Scene
 Reviewer: [Signature] Comp. Status: [] open [X] closed

County WAYNE City LINCOLN PARK Twp. _____ Date 06-11-75 Time 10:00 A.M. (P.M.)

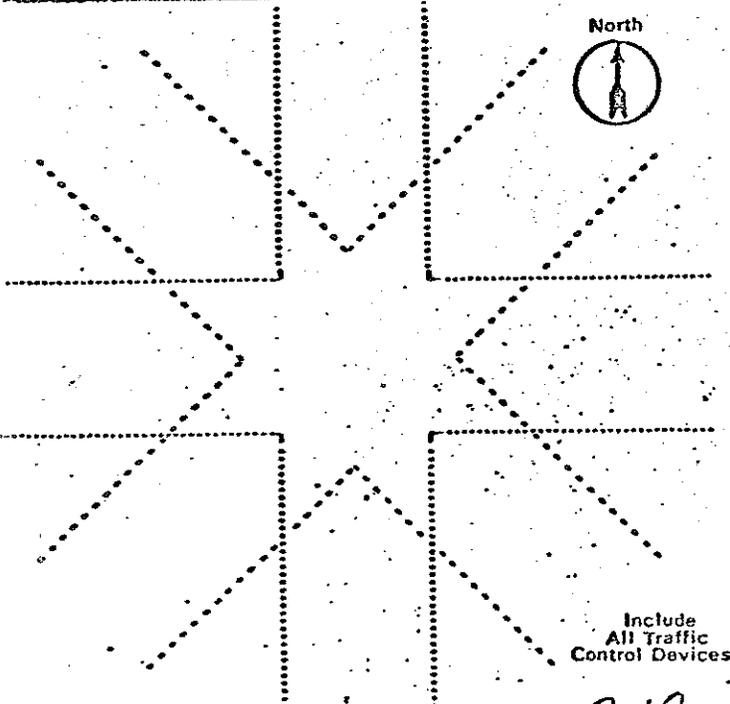
ON I-75 (N.P.) Name 650^{ft} Mr. N S E W Intersection SOUTHFIELD Route No. M-39

Driver #1
 State _____ Drivers License _____ DOB _____ Hazardous Action _____ HBD _____ HN _____ Test _____
 Driver No. 1 First _____ M. _____ Last _____ Address _____ City _____ State _____ Age _____ Sex _____ Inj _____
 Year _____ Make _____ Type _____ Trailer _____ Reg. _____ Yr/State _____ Removed to/by _____
 Name _____ Address _____ Pos _____ Age _____ Sex _____ Inj _____
 Seat position: 2, 3, 5, 6
 Local Use/Owner _____ Injured taken to _____

Driver #2
 State _____ Drivers License _____ DOB _____ Hazardous Action _____ HBD _____ HN _____ Test _____
 Driver No. 2 First _____ M. _____ Last _____ Address _____ City _____ State _____ Age _____ Sex _____ Inj _____
 Year _____ Make _____ Type _____ Trailer _____ Reg. _____ Yr/State _____ Removed to/by _____
 Name _____ Address _____ Pos _____ Age _____ Sex _____ Inj _____
 Seat position: 2, 3, 5, 6
 Local Use/Owner _____ Injured taken to _____

WEATHER: Clear Rain Cloudy Fog Snow
 LIGHT: Day Dark Dawn Street Lights Dusk
 ROAD SURFACE: Dry Snowy Icy Wet Other
 ROAD CONDITION: Engineering Maintenance Construction Zone
 VISION OBSTRUCTION: Vehicle #1 Vehicle #2 Explain None
 VEHICLE DEFECTS: Vehicle #1 Vehicle #2 Explain None

IMPACT CODE: #1 Veh. #2 Total Veh. _____
 TOTAL LANES: Divided Limited Access
 DRIVER RE-EXAM.: Driver #1 Driver #2
 Damage Property Other Than Vehicles: LAWN (APPROX \$200.00)
 Owner Address: PATRICK R. STEVEN 1634 LINCOLN PARK, MI LINCOLN



ACCIDENT DESCRIPTION & REMARKS
 Exit Ramp coming to rest at the W.B. Lincoln street (dead-end) and the I-75 Southfield Exit, pinning the Driver of Vehicle #1 in the cab of the tractor. Driver of Vehicle #1 was freed by the Fire Rescue and taken to Outer Drive Hospital by Taylor Ambulance where he was pronounced Dead on Arrival at 1:30AM by Dr. Donald Salva, M.D.

I-75 & SOUTHFIELD
 Date: 6-11-75
 File No. _____
 Complaint No. _____

Investigator: A. Garofali J. Ferguson Patr.
 Charge: NONE
 1 2 POLICE ACTION
 Cited for Hazardous Vio.
 Cited for Other Violation
 No Enforcement Action
 Investigated at Scene
 Reviewer: OW
 Comp. Status: open closed

NB
I-75

40' FT

SOUTHFIELD
EXIT RAMP

TAKEN FROM ZERO POINT

PT	EDGE	CURB
A	105' FT	0
B	225' FT	0
C	415' FT	0
D	455' FT	23' FT
E	542' FT	0

RIGHT FRONT
BLOW OUT

A

LIGHT POLE # 191-020

* ZERO POINT

DRAWING NOT TO SCALE Rd

NB
I-75

MEDIAN

SOUTHFIELD
EXIT RAMP

17 FT

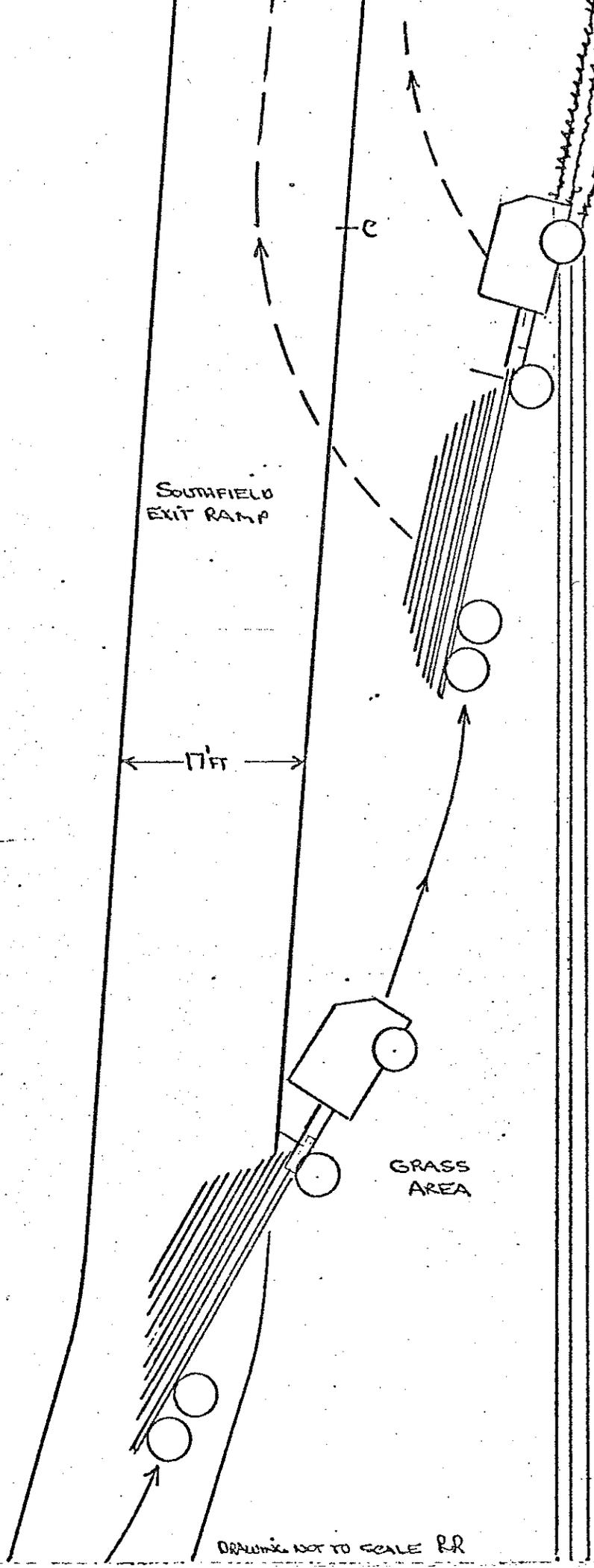
GRASS
AREA

FENCE/BARRIER

C

06-11-75

DRAWING NOT TO SCALE RR

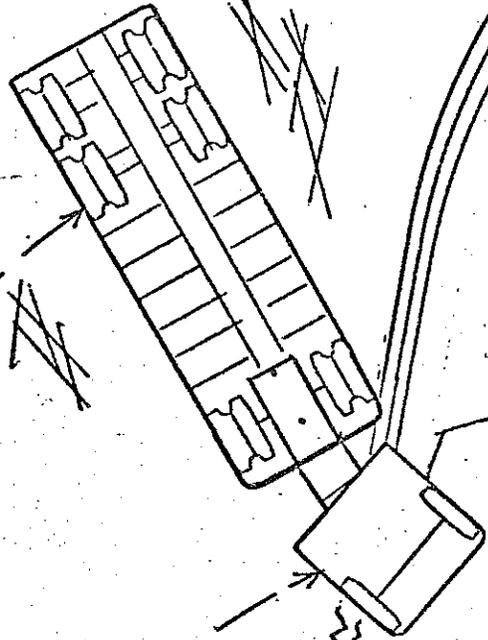


SOUTHFIELD
EXIT RAMP

GRASS AREA

STEEL

LIGHT POLE



GRASS
MEDIAN

Lincoln

FENCE/BARRIER

DRAWING NOT TO SCALE